

## Emerging Web Services Technology

WS 2009/2010

22.10.2009

Information Systems Group

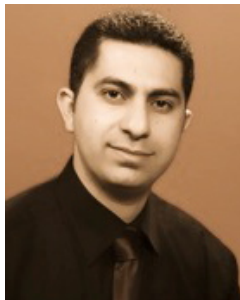
Prof. Felix Naumann

Mohammed AbuJarour

Tobias Vogel

# The Team

2



Mohammed AbuJarour



Prof. Dr. Felix Naumann



Tobias Vogel

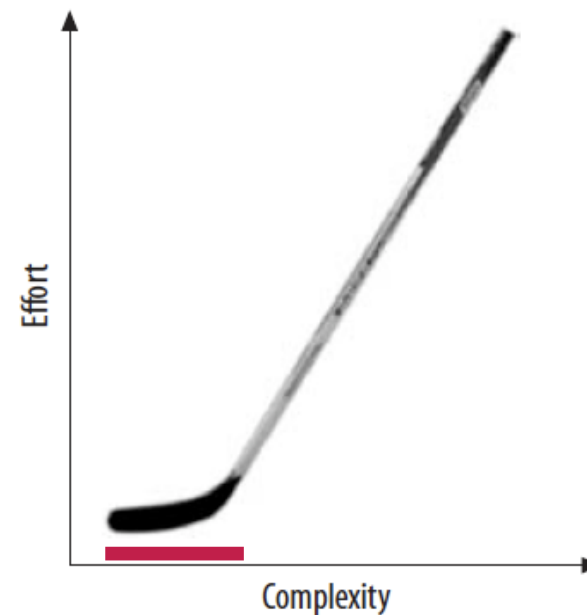
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**(i) Quick Overview**

# Motivation

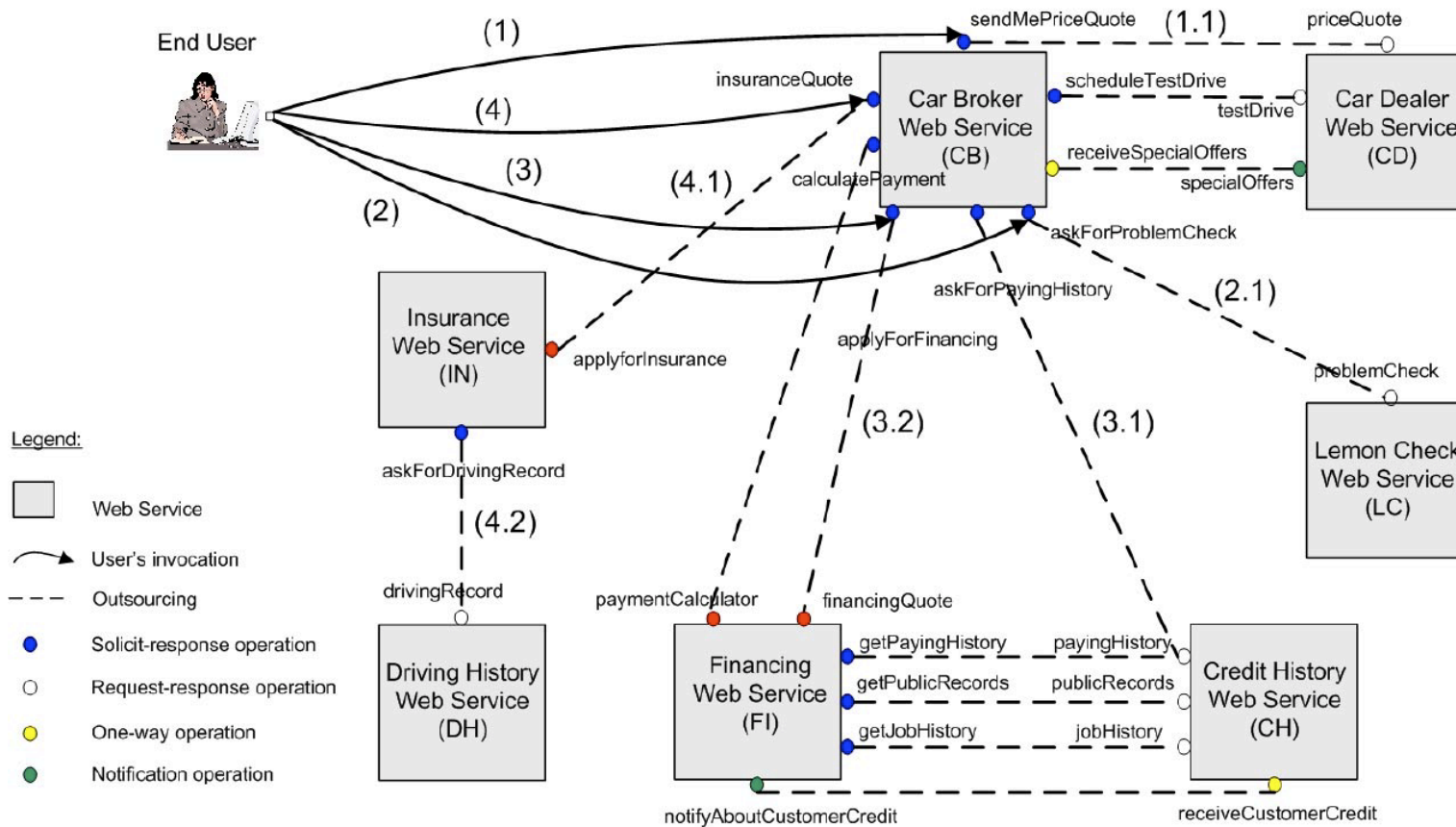
4

- “It is not the strongest of the species that survive, nor the most intelligent, but the ones most **responsive to change**” *Charles Darwin*
- Software systems too complex
- Distributed Systems
  - Dealing with legacy systems
  - Heterogeneity
  - Complexity
  - Different owners
- → Service-oriented Architecture (SOA)



# Example: A Car Brokerage Application

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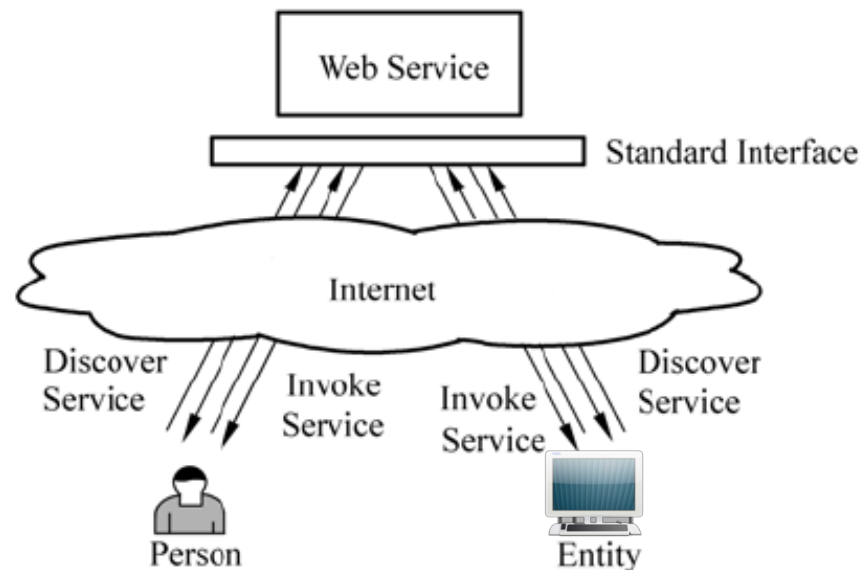
Medjahed, B., Bouguettaya, A., and Elmagarmid, A. 2003. Composing Web services on the Semantic Web. The VLDB Journal 12, 4 (Nov. 2003)

- **What is a Service?**

- “The performance of work (a function) by one for another” [4]

- **What is a Web Service?**

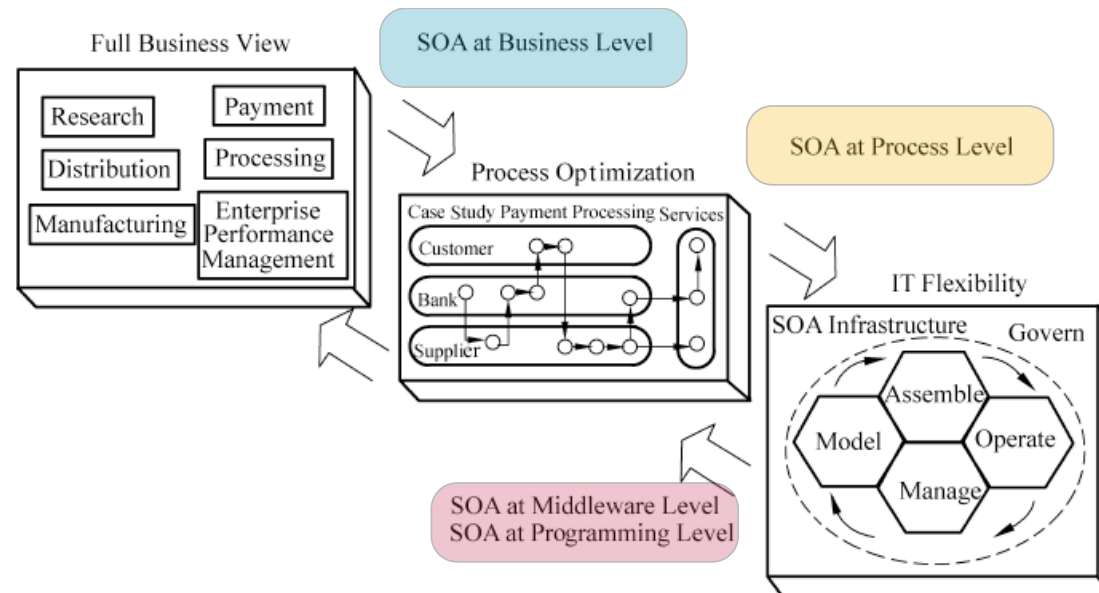
- “A Web Service is a platform-independent programmable module with standard interface descriptions that provide universal accessibility through standard communication protocols” [5]



# The Role of Web Services

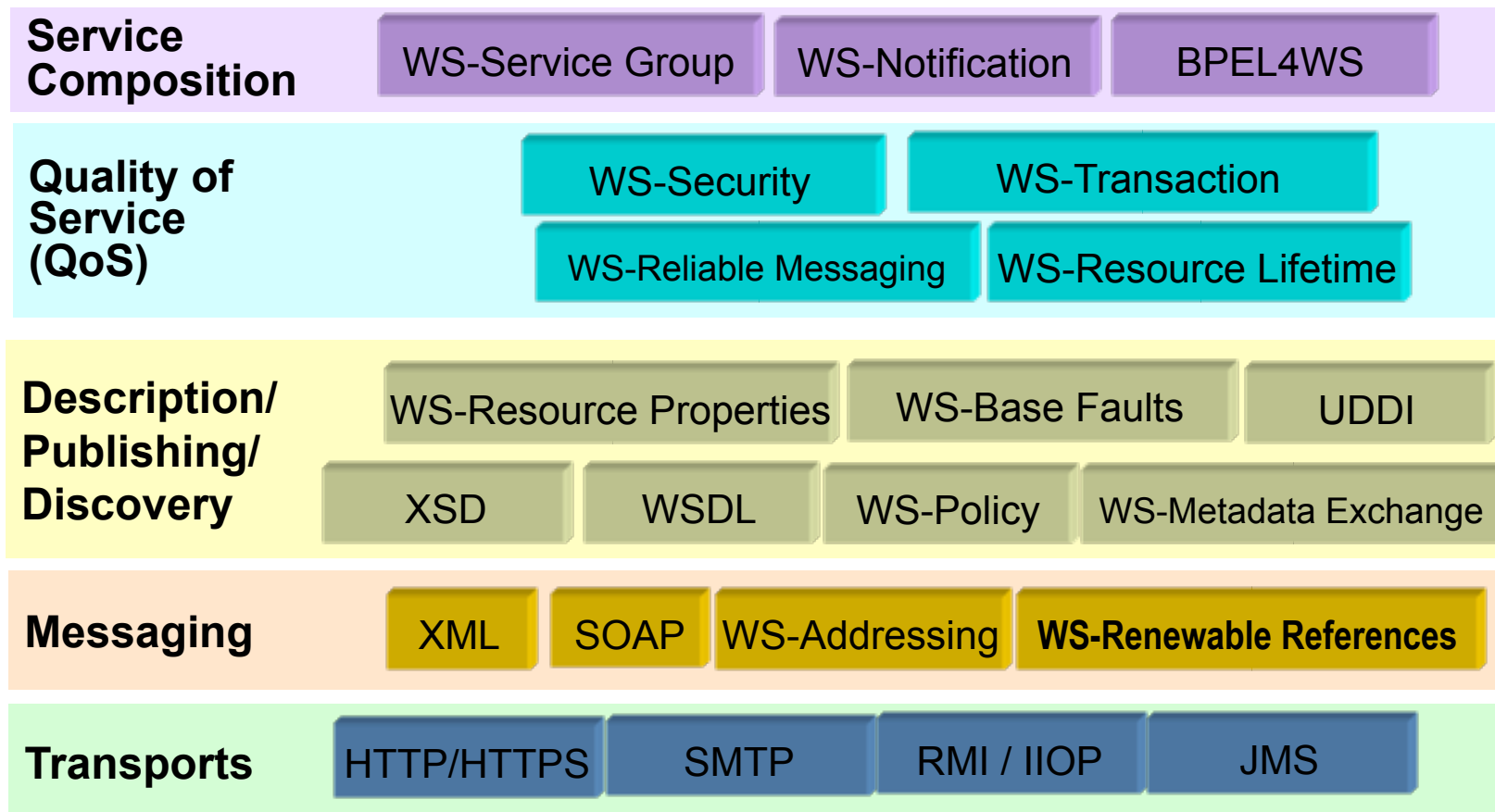
7

- Technical realizing of Service-oriented Architecture (SOA)
- Service-oriented Architecture is
  - “a **business-centric** IT architectural approach that supports integrating business as linked, repeatable business tasks, or **services**. SOA helps users build **composite** applications, which are applications that draw upon functionality from **multiple sources** within and beyond the enterprise to support horizontal business processes.” [5]



# Web Services Standards Stack

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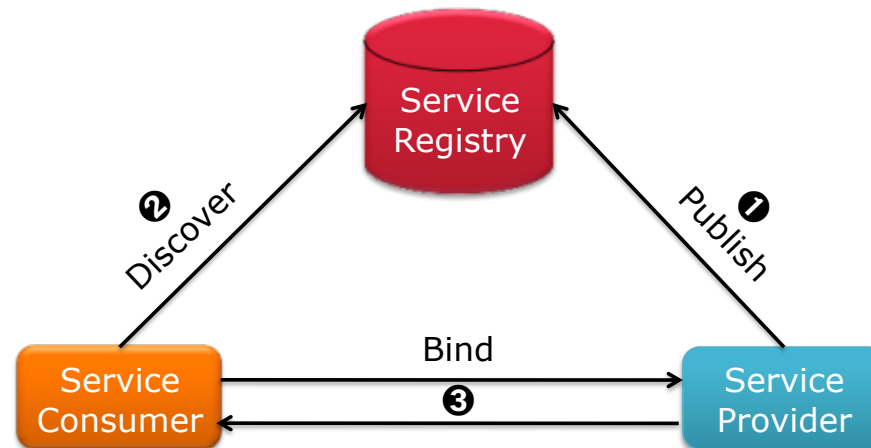


Source: Dr. Daniel Sabbah, Vice President of Strategy & Technology, IBM Software Group, Globus World 2004



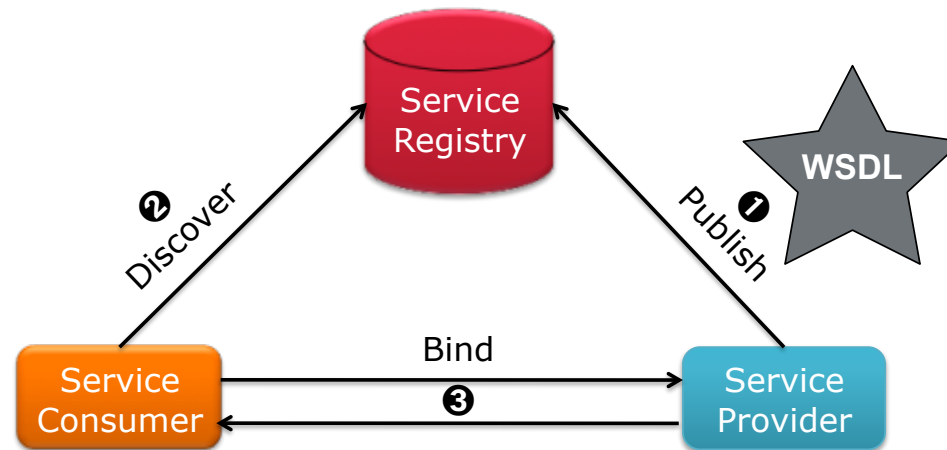
# Triangular SOA Operational Model

9



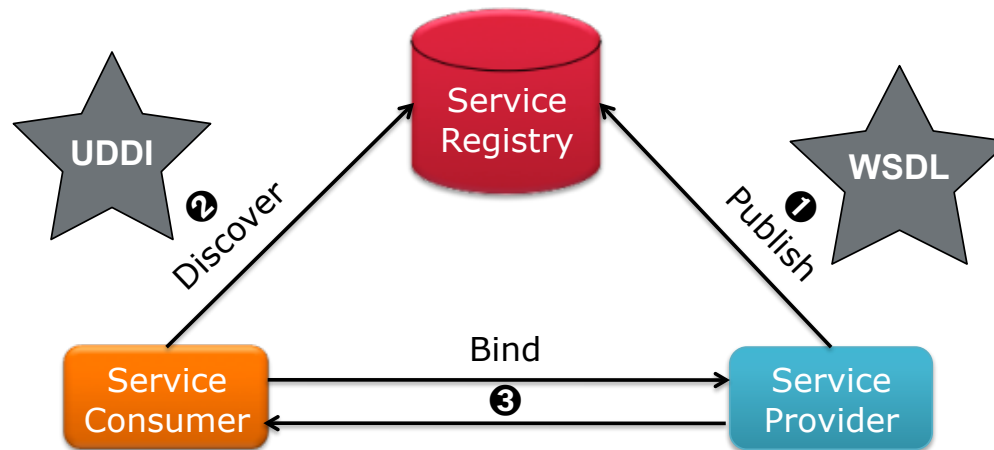
# Triangular SOA Operational Model

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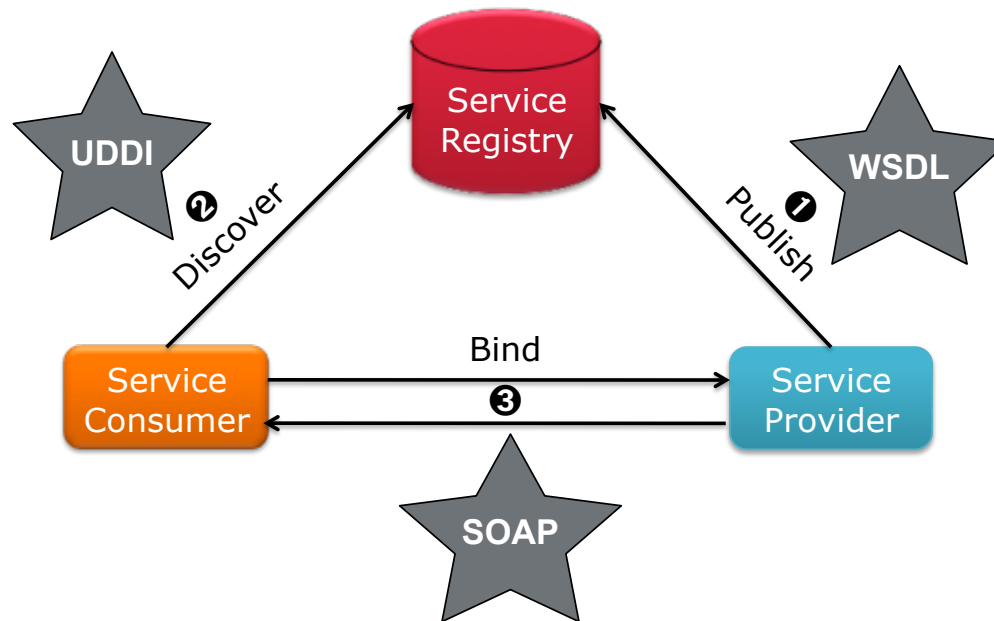
# Triangular SOA Operational Model

9



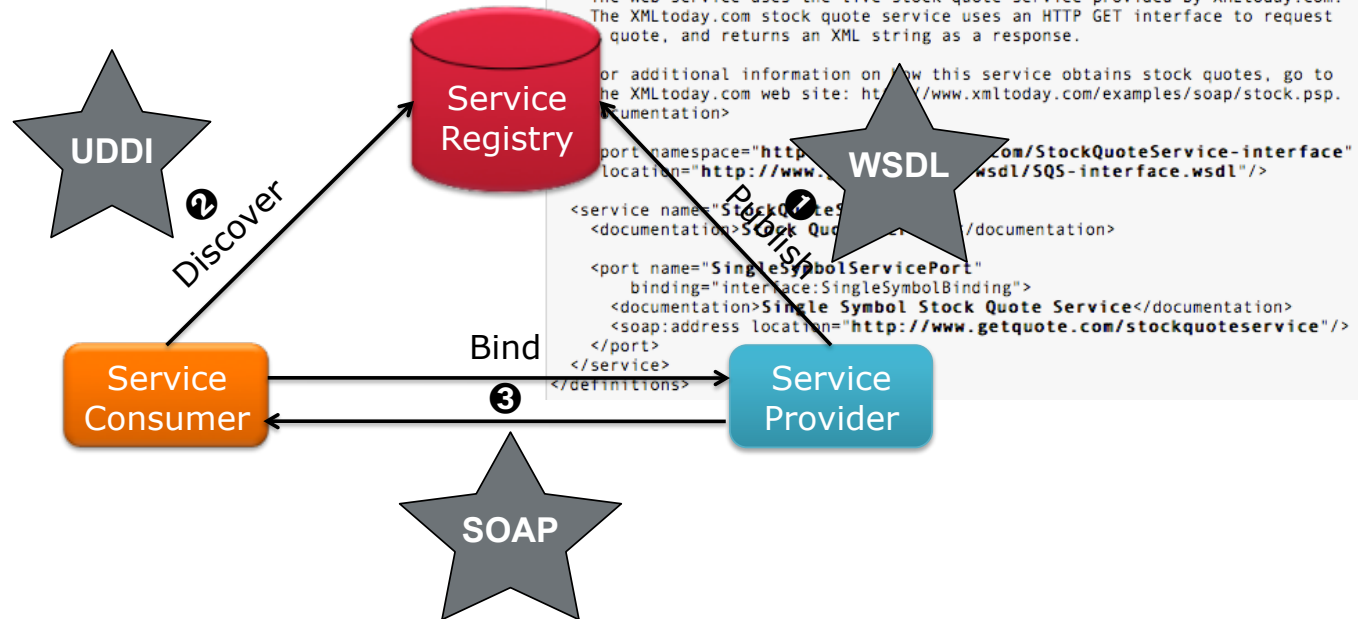
# Triangular SOA Operational Model

9



# Triangular SOA Operational Model

9



# Triangular SOA Operational Model

9

```
<?xml version="1.0"?>
<tModel tModelKey="">
  <name>http://www.getquote.com/StockQuoteService-interface</name>

  <description xml:lang="en">
    Standard service interface definition for a stock quote service.
  </description>

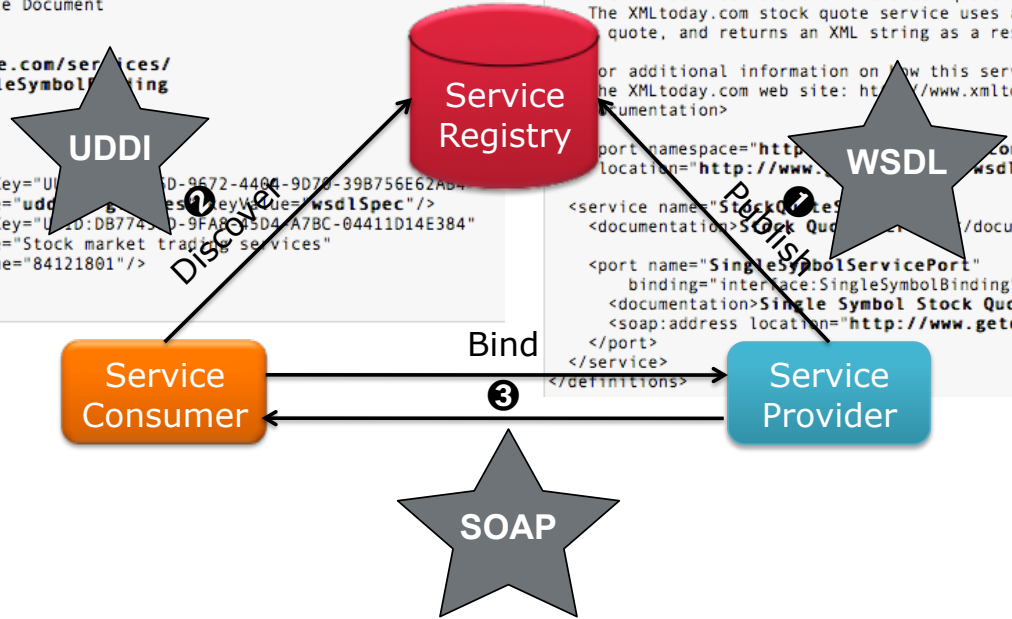
  <overviewDoc>
    <description xml:lang="en">
      WSDL Service Interface Document
    </description>
    <overviewURL>
      http://www.getquote.com/services/SQS-interface.wsdl#SingleSymbolBinding
    </overviewURL>
  </overviewDoc>

  <categoryBag>
    <keyedReference tModelKey="UDDI:9672-4404-9D78-39B756E62A84"
      keyName="uddi:9672-4404-9D78-39B756E62A84:wsdlSpec"/>
    <keyedReference tModelKey="UDDI:DB7743D0-9FAF035D4-A7BC-04411D14E384"
      keyName="Stock market trading services"
      keyValue="84121801"/>
  </categoryBag>
</tModel>
```

```
<?xml version="1.0"?>
<definitions name="StockQuoteService"
  targetNamespace="http://www.getquote.com/StockQuoteService"
  xmlns:interface="http://www.getquote.com/StockQuoteService-interface"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
  xmlns="http://schemas.xmlsoap.org/wsdl/">

  <documentation>
    This service provides an implementation of a standard stock quote service.
    The Web service uses the live stock quote service provided by XMLtoday.com.
    The XMLtoday.com stock quote service uses an HTTP GET interface to request
    a quote, and returns an XML string as a response.
    For additional information on how this service obtains stock quotes, go to
    the XMLtoday.com web site: http://www.xmltoday.com/examples/soap/stock.psp.
  </documentation>

  <port namespace="http://www.getquote.com/StockQuoteService-interface"
    location="http://www.getquote.com/stockquoteservice"/>
  </port>
  <service name="StockQuoteService"
    <documentation>Single Symbol Stock Quote Service</documentation>
    <port name="SingleSymbolServicePort"
      binding="interface:SingleSymbolBinding">
      <documentation>Single Symbol Stock Quote Service</documentation>
      <soap:address location="http://www.getquote.com/stockquoteservice"/>
    </port>
  </service>
</definitions>
```



# Triangular SOA Operational Model

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```
<?xml version="1.0"?>
<tModel tModelKey="">
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  <description xml:lang="en">
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  </description>

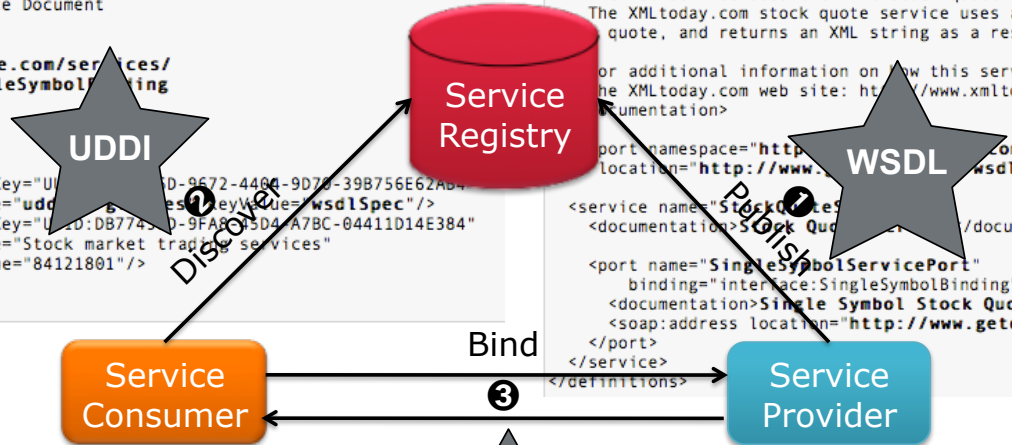
  <overviewDoc>
    <description xml:lang="en">
      WSDL Service Interface Document
    </description>
    <overviewURL>
      http://www.getquote.com/services/SQS-interface.wsdl#SingleSymbolBinding
    </overviewURL>
  </overviewDoc>

  <categoryBag>
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<?xml version="1.0"?>
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  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
  xmlns="http://schemas.xmlsoap.org/wsdl/">

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    the XMLtoday.com web site: http://www.xmltoday.com/examples/soap/stock.psp.
  </documentation>

  <port namespace="http://www.getquote.com/StockQuoteService-interface"
    location="http://www.getquote.com/stockquoteservice"/>
    <documentation>Single Symbol Stock Quote Service</documentation>
  </port>
</definitions>
```



A SOAP request:

```
POST /InStock HTTP/1.1
Host: www.example.org
Content-Type: application/soap+xml; charset=utf-8
Content-Length: nnn

<?xml version="1.0"?>
<soap:Envelope
  xmlns:soap="http://www.w3.org/2001/12/soap-envelope"
  soap:encodingStyle="http://www.w3.org/2001/12/soap-encoding">

  <soap:Body xmlns:m="http://www.example.org/stock">
    <m:GetStockPrice>
      <m:StockName>IBM</m:StockName>
    </m:GetStockPrice>
  </soap:Body>

</soap:Envelope>
```



# Triangular SOA Operational Model

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```
<?xml version="1.0"?>
<tModel tModelKey="">
  <name>http://www.getquote.com/StockQuoteService-interface</name>

  <description xml:lang="en">
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  </description>

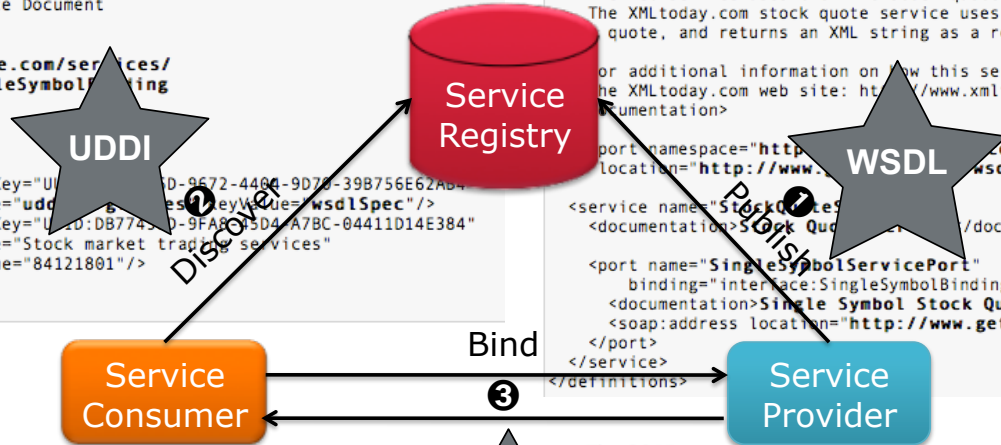
  <overviewDoc>
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    <overviewURL>
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    </overviewURL>
  </overviewDoc>

  <categoryBag>
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<definitions name="StockQuoteService"
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  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
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  </documentation>

  <port namespace="http://www.getquote.com/StockQuoteService-interface"
    location="http://www.getquote.com/stockquoteservice"/>
    <documentation>Single Symbol Stock Quote Service</documentation>
  </port>
</definitions>
```



A SOAP request:

```
POST /InStock HTTP/1.1
Host: www.example.org
Content-Type: application/soap+xml; charset=utf-8
Content-Length: nnn

<?xml version="1.0"?>
<soap:Envelope
  xmlns:soap="http://www.w3.org/2001/12/soap-envelope"
  soap:encodingStyle="http://www.w3.org/2001/12/soap-encoding">

  <soap:Body xmlns:m="http://www.example.org/stock">
    <m:GetStockPrice>
      <m:StockName>IBM</m:StockName>
    </m:GetStockPrice>
  </soap:Body>

</soap:Envelope>
```

The SOAP response:

```
HTTP/1.1 200 OK
Content-Type: application/soap+xml; charset=utf-8
Content-Length: nnn

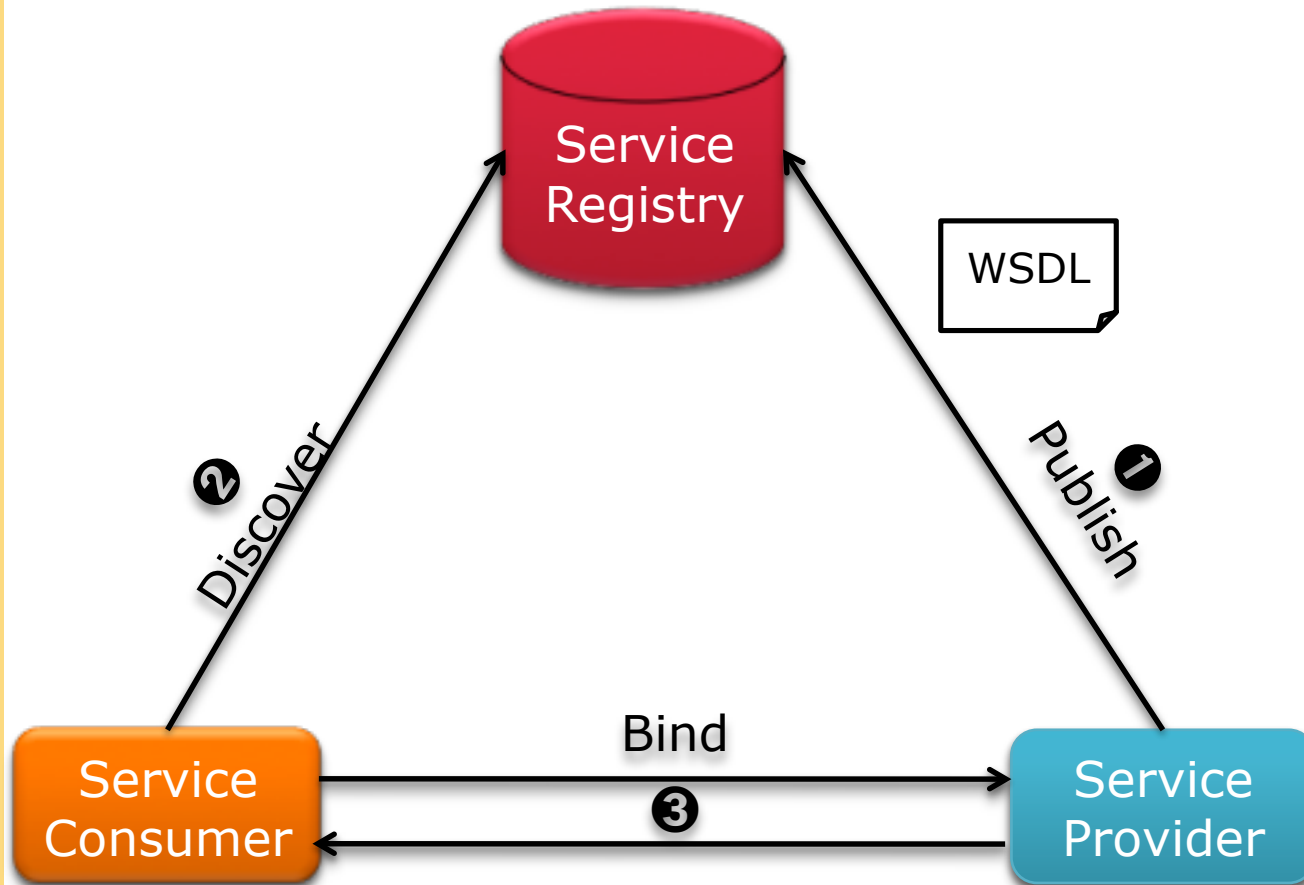
<?xml version="1.0"?>
<soap:Envelope
  xmlns:soap="http://www.w3.org/2001/12/soap-envelope"
  soap:encodingStyle="http://www.w3.org/2001/12/soap-encoding">

  <soap:Body xmlns:m="http://www.example.org/stock">
    <m:GetStockPriceResponse>
      <m:Price>34.5</m:Price>
    </m:GetStockPriceResponse>
  </soap:Body>

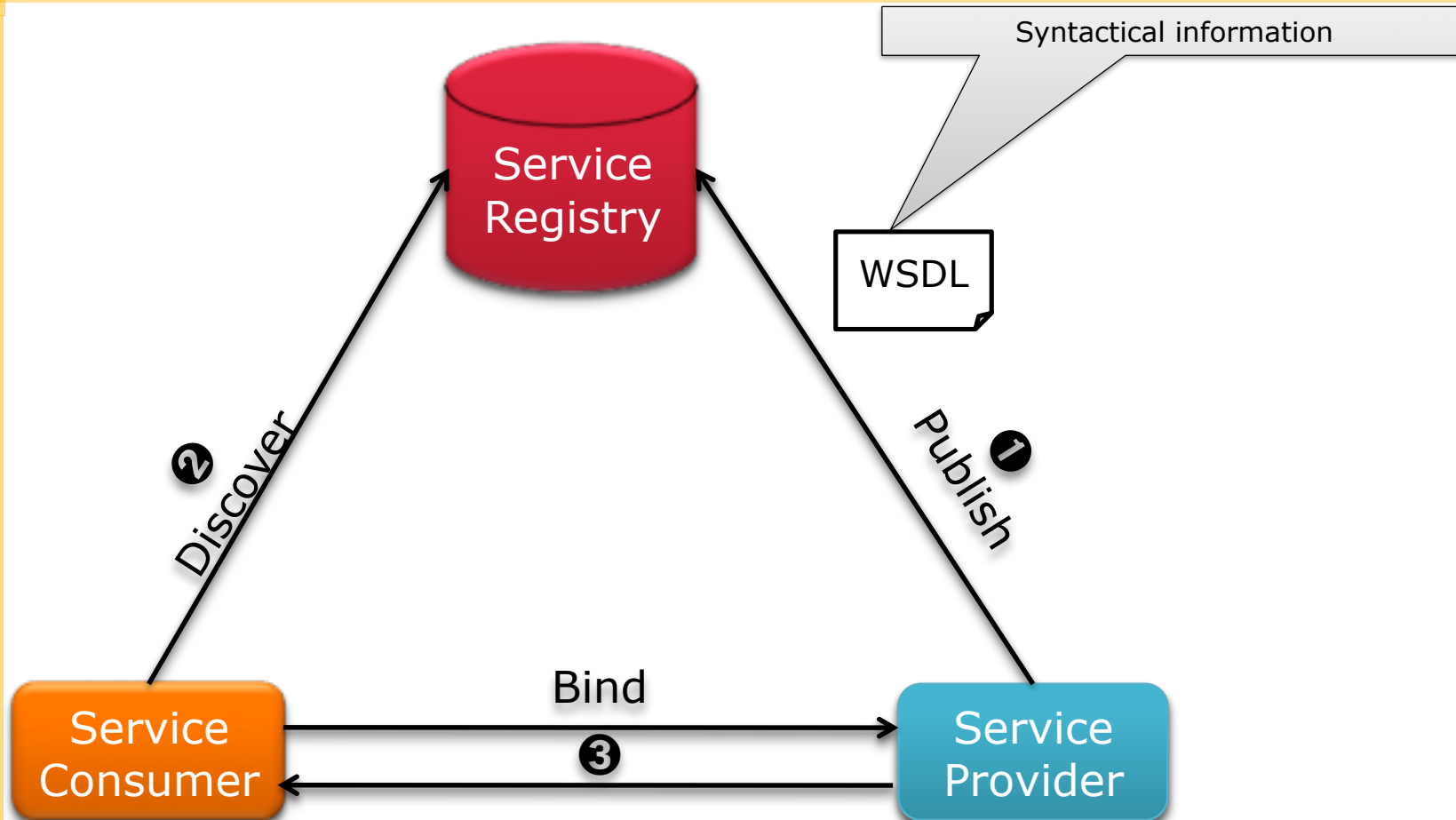
</soap:Envelope>
```



# Semantic Web Services on 1 slide



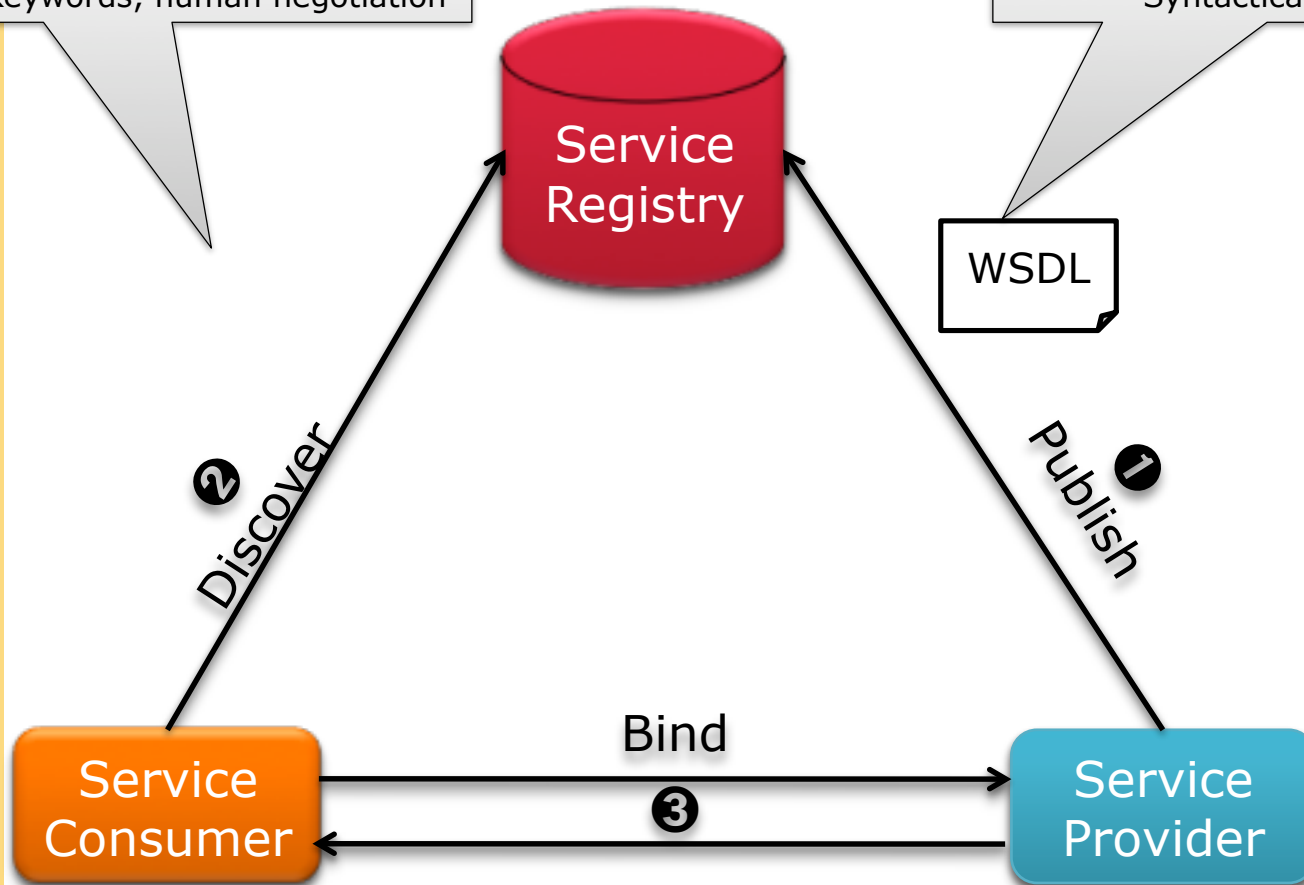
# Semantic Web Services on 1 slide



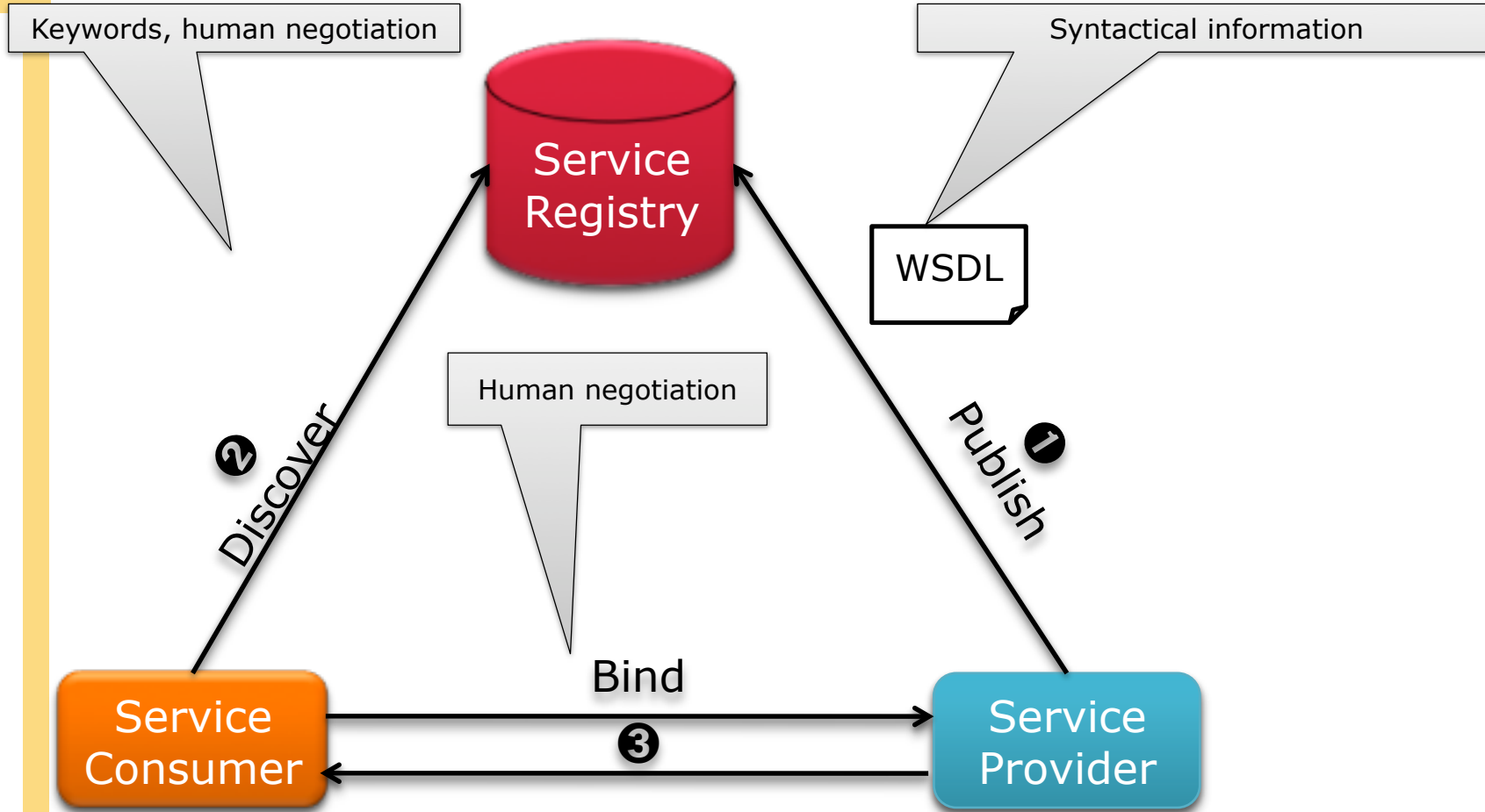
# Semantic Web Services on 1 slide

Keywords, human negotiation

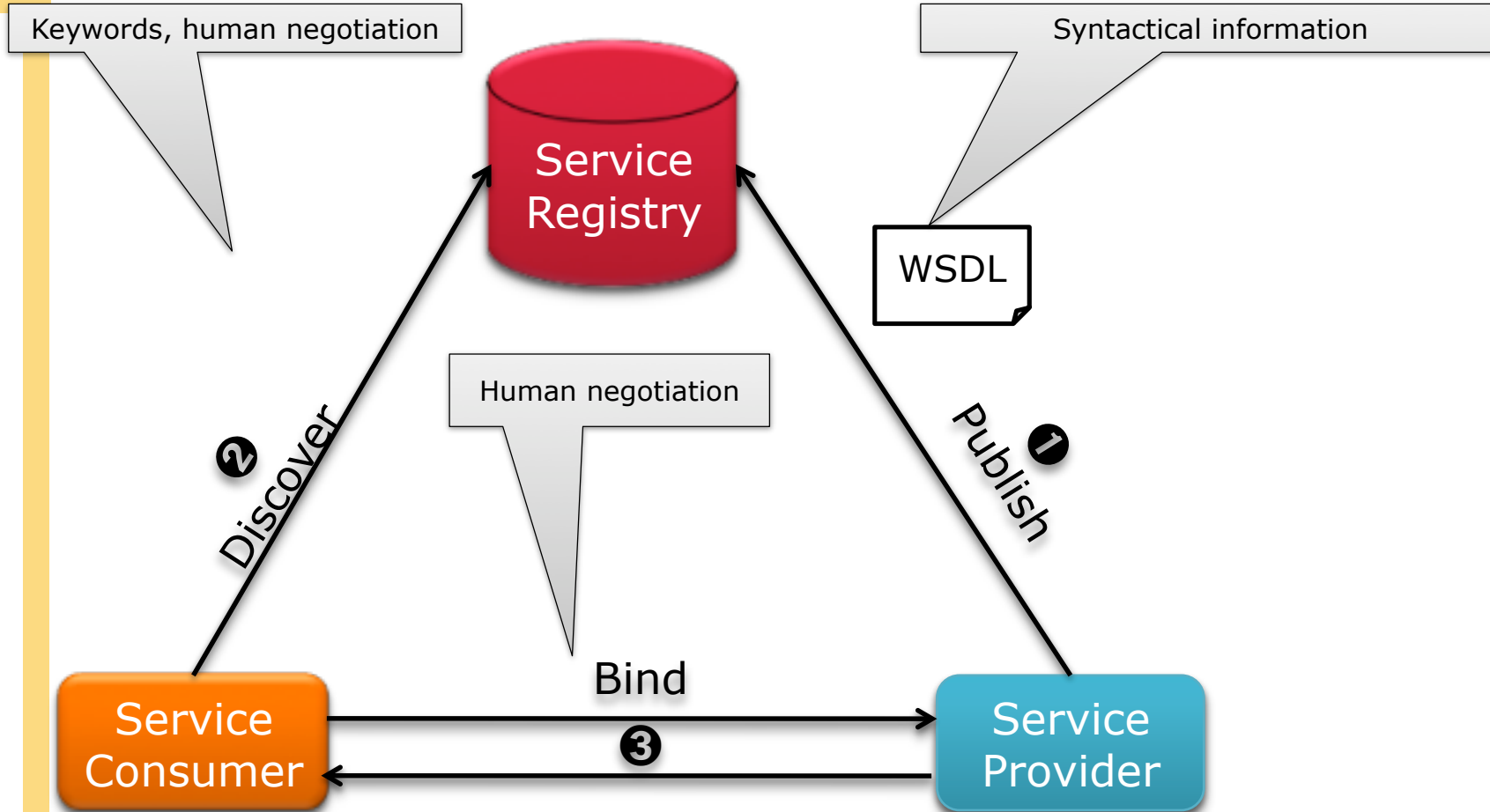
Syntactical information



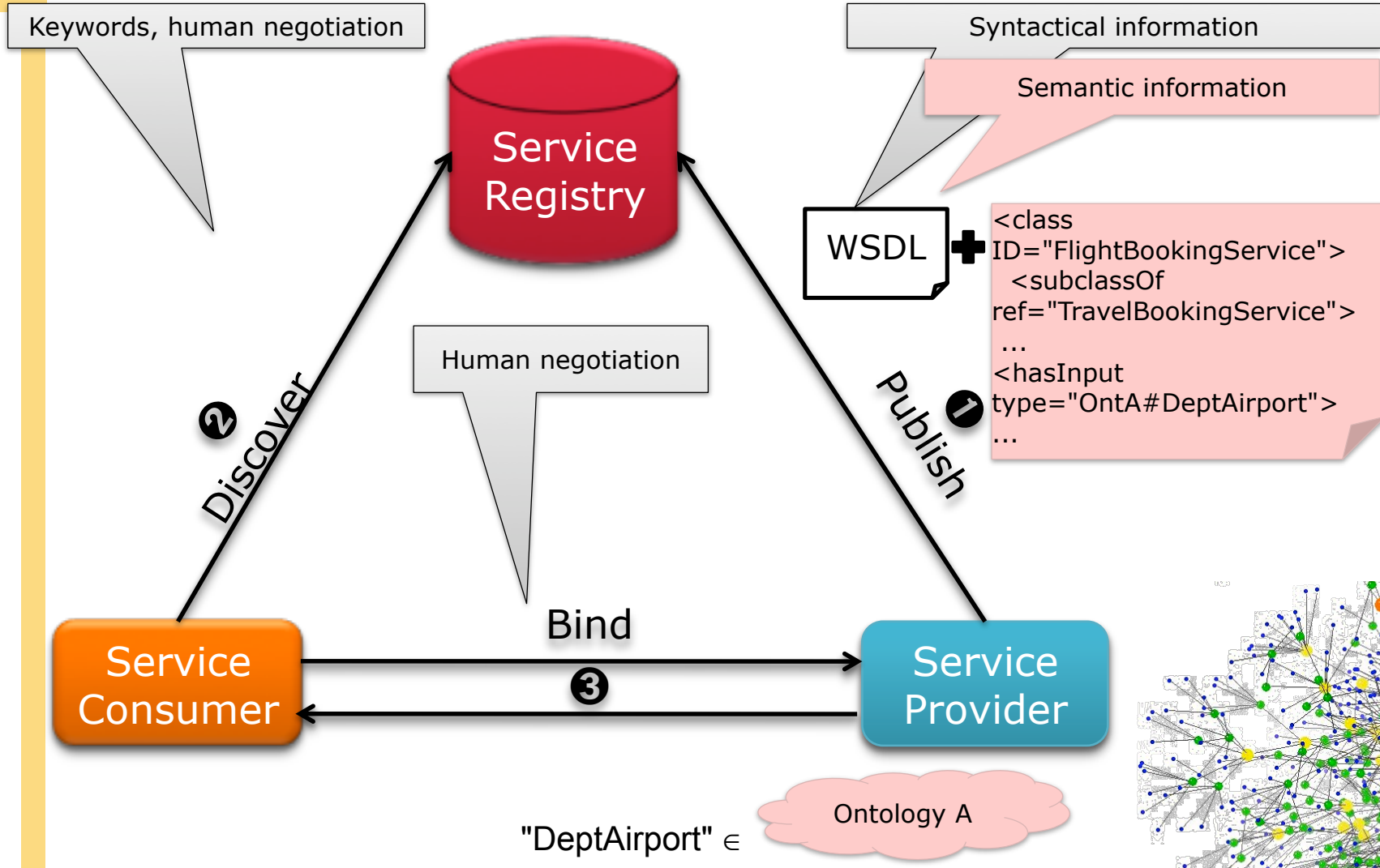
# Semantic Web Services on 1 slide



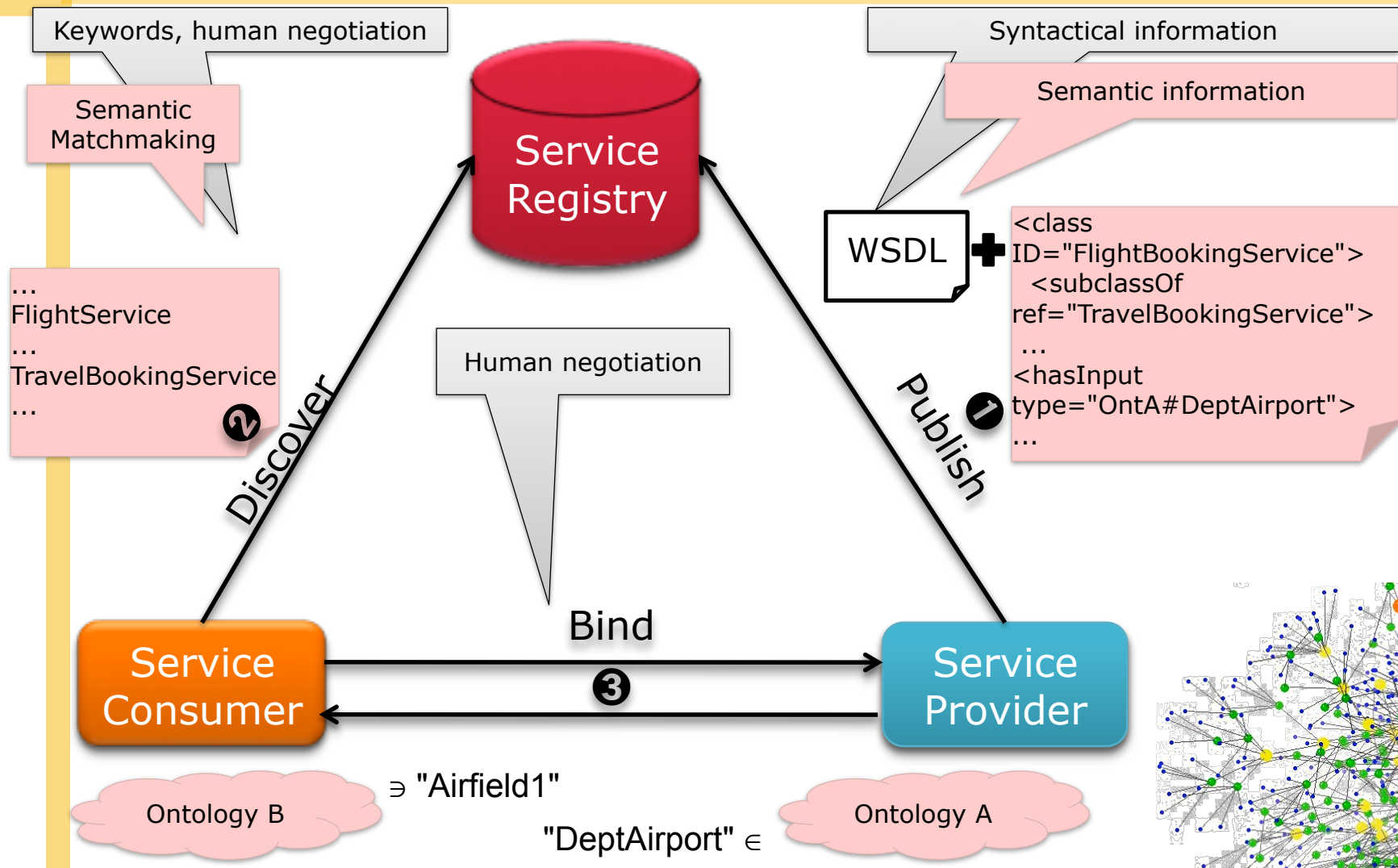
# Semantic Web Services on 1 slide



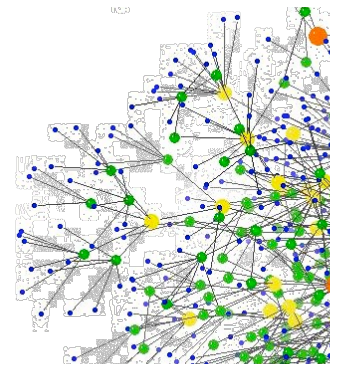
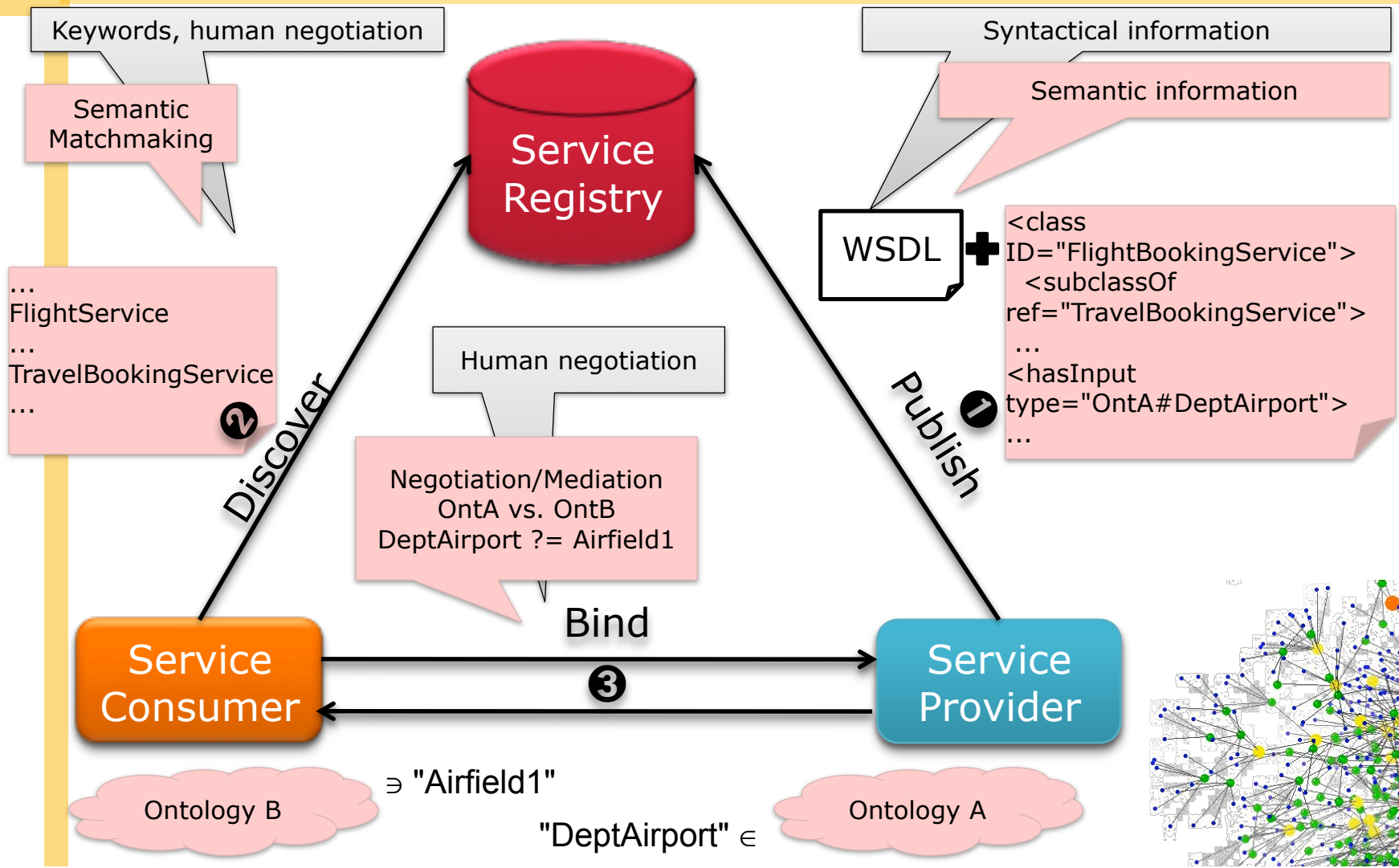
# Semantic Web Services on 1 slide



# Semantic Web Services on 1 slide



# Semantic Web Services on 1 slide





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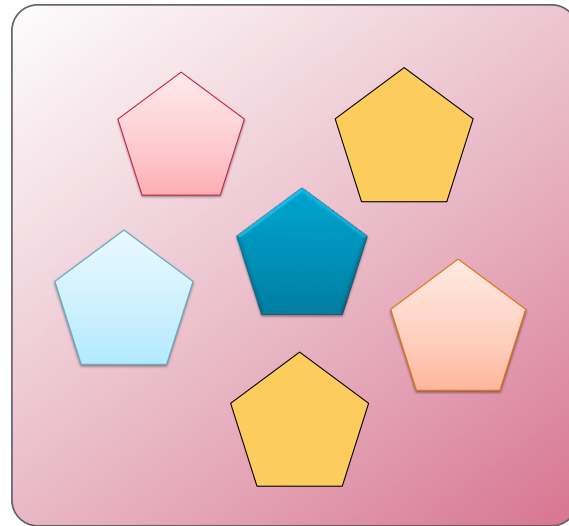
**(ii) Topics**

# Topics Areas



# Topics Areas

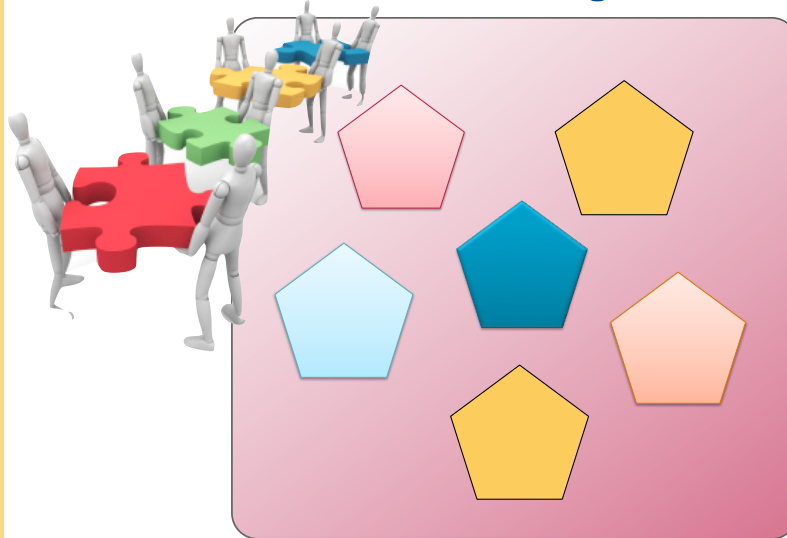
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# Topics Areas

12

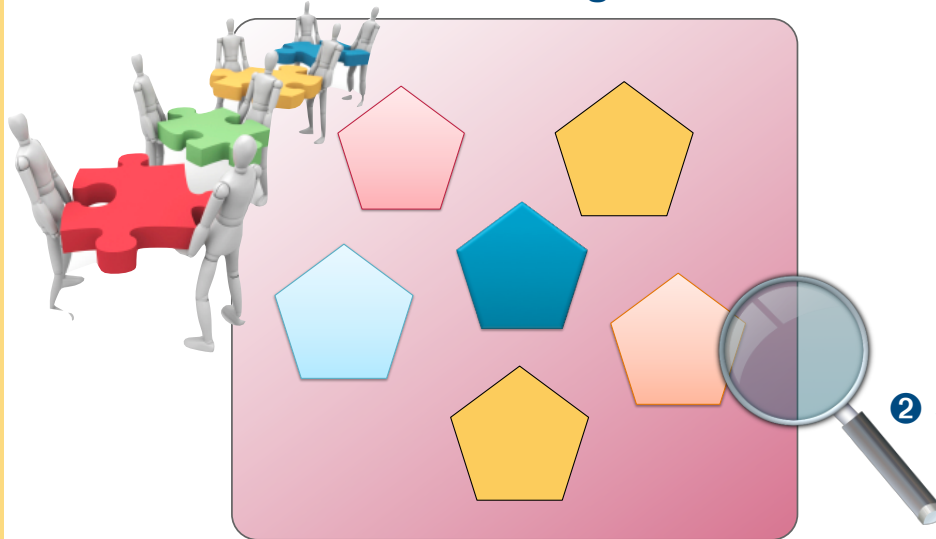
## ① Service Management



## Topics Areas

12

### ① Service Management

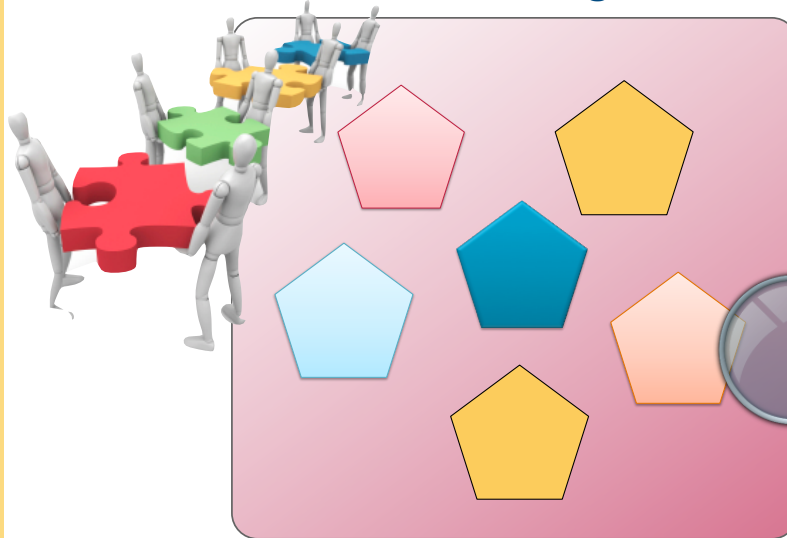


### ② Service Discovery and Selection

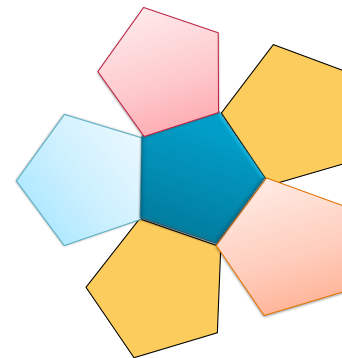
# Topics Areas

12

## ① Service Management



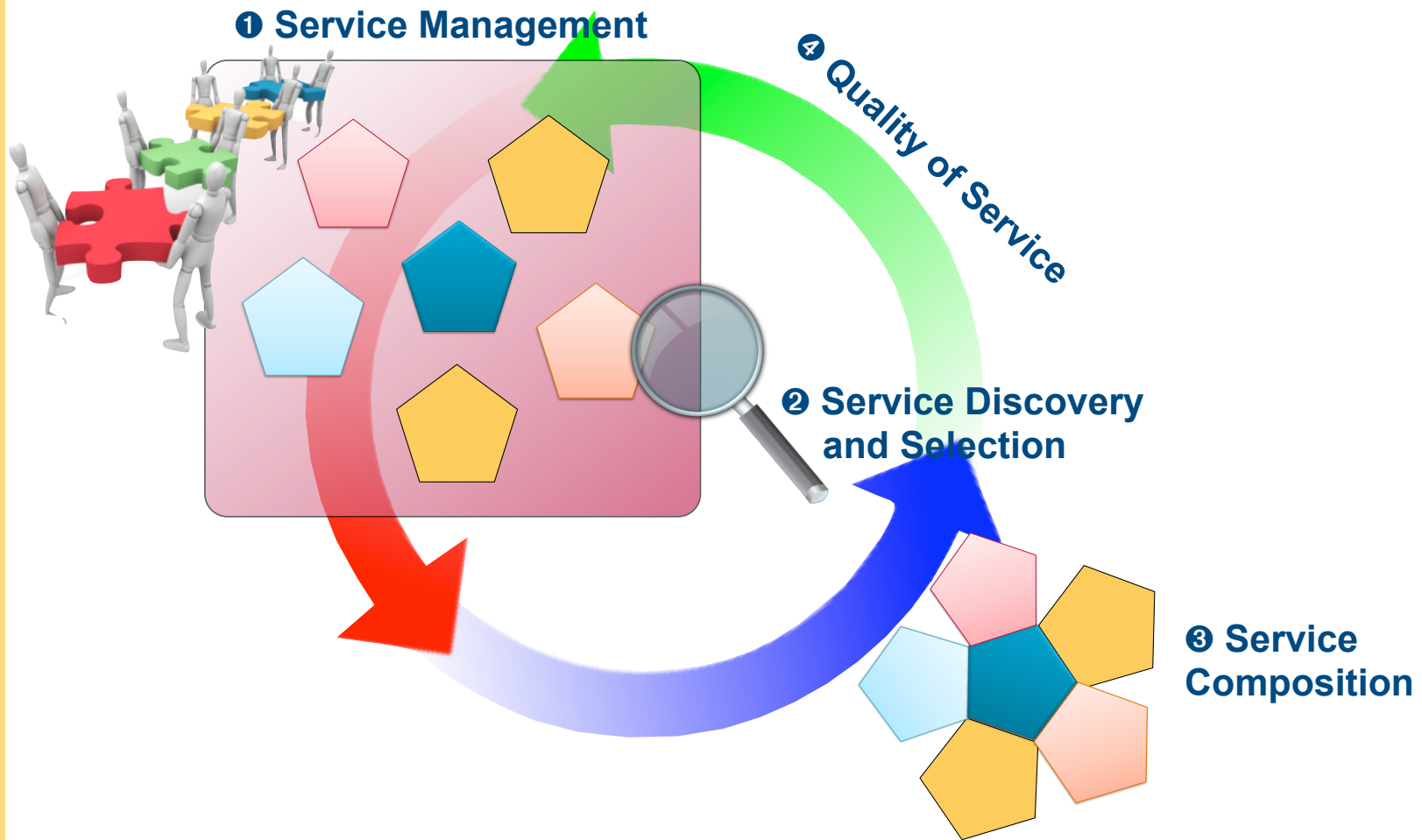
## ② Service Discovery and Selection



## ③ Service Composition

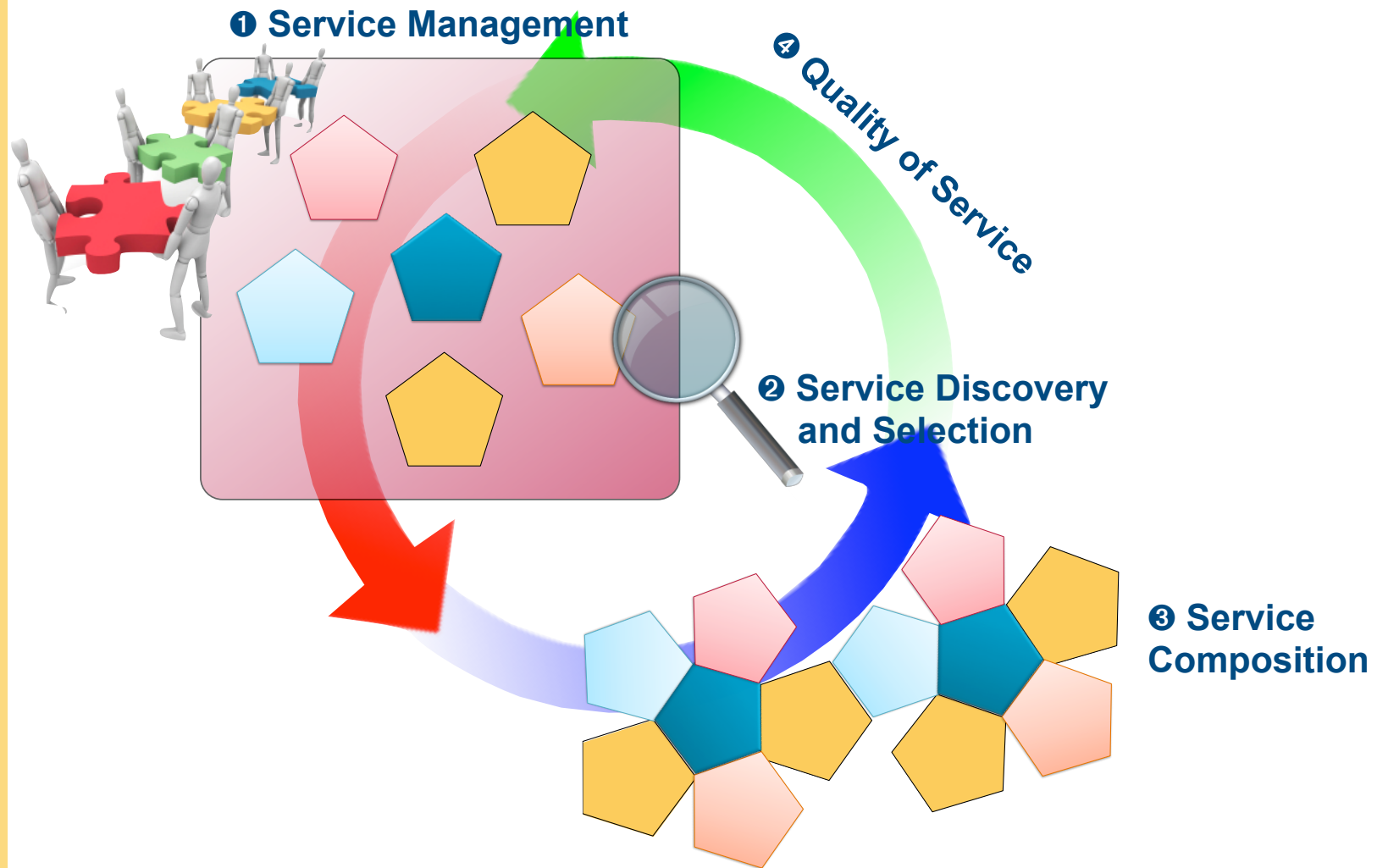
# Topics Areas

12



# Topics Areas

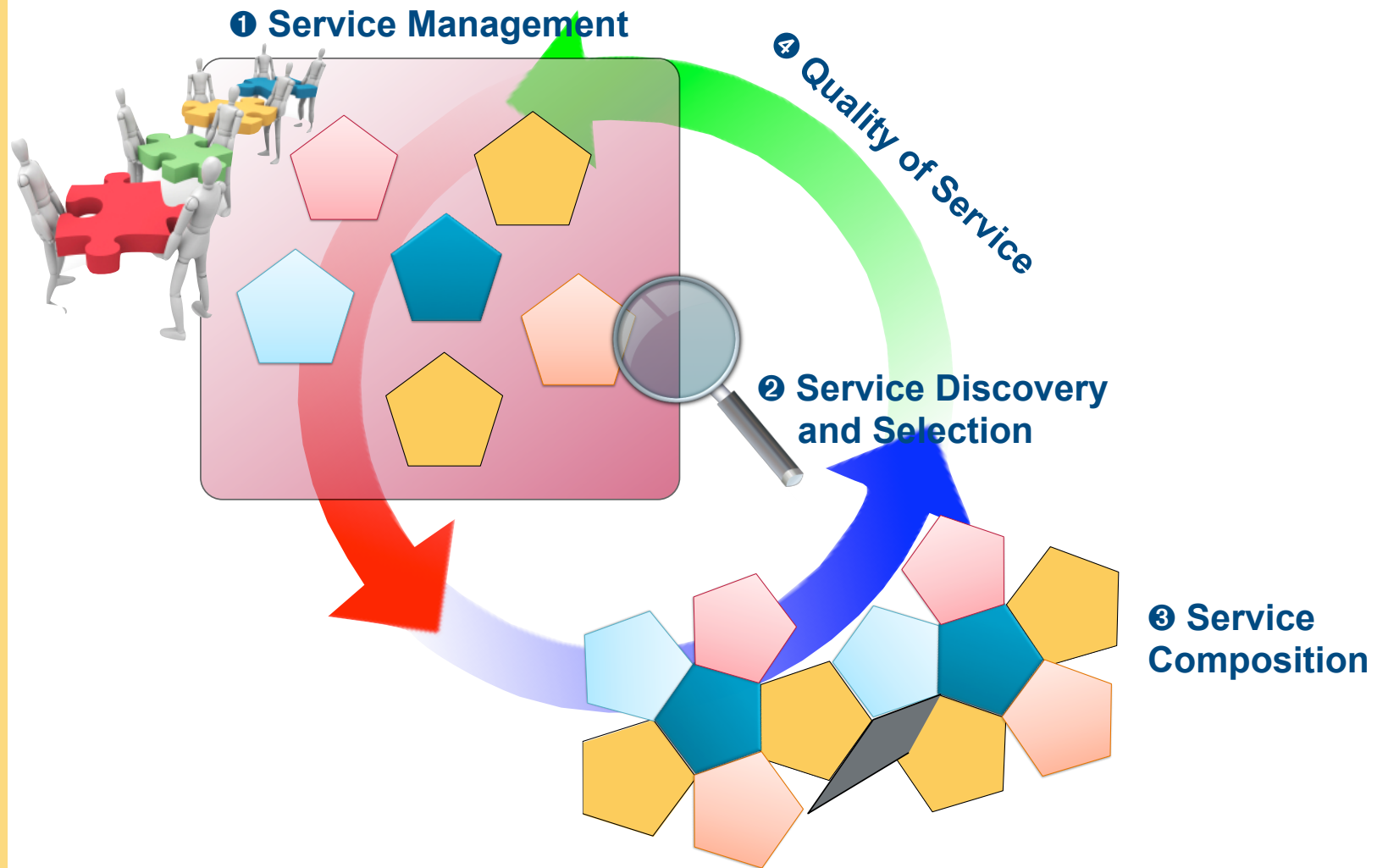
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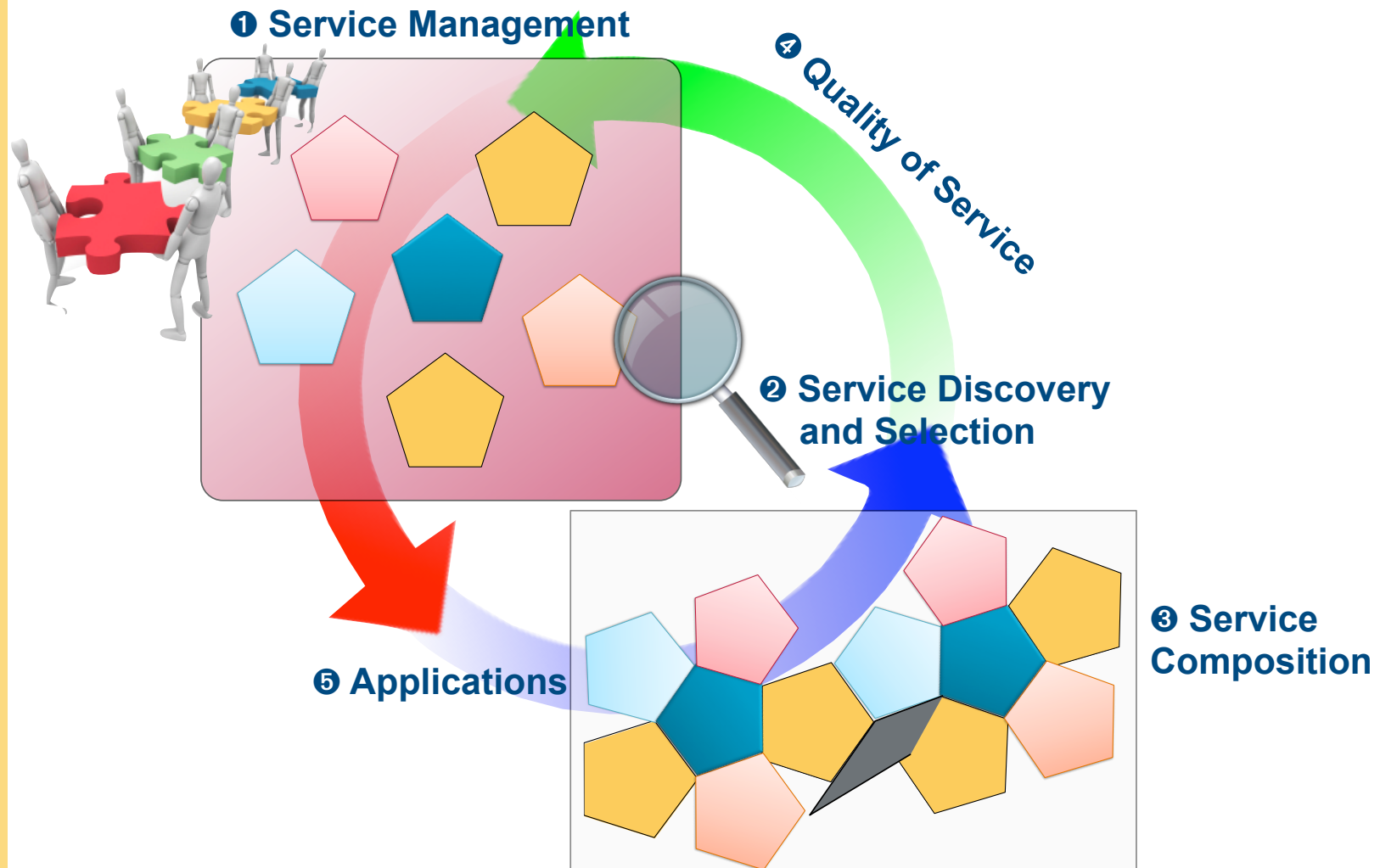
# Topics Areas

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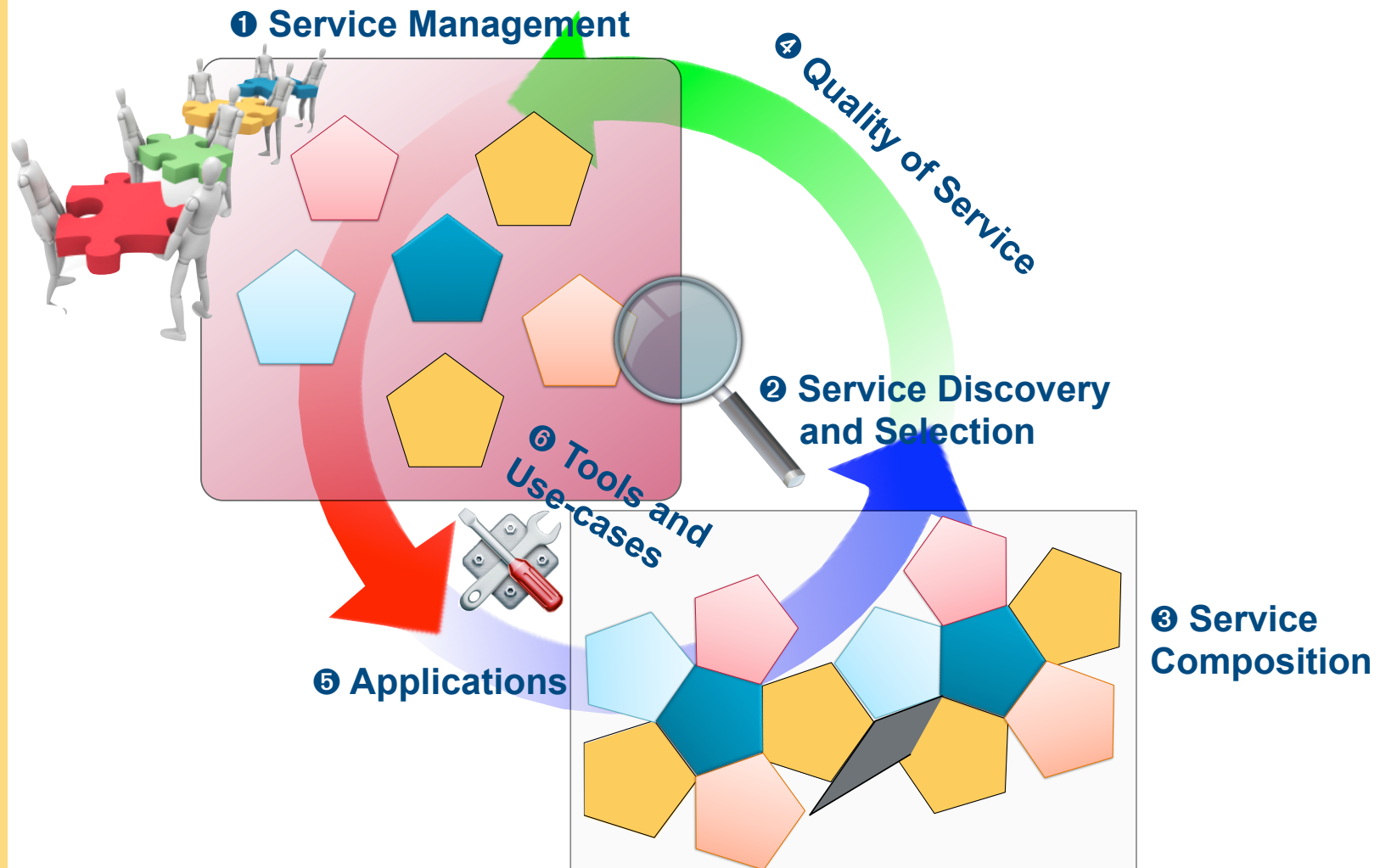
# Topics Areas

12



# Topics Areas

12



- Yu et al. **Deploying and managing Web services: issues, solutions, and directions.**
  - Research problems, solutions, and directions to deploying Web services that are managed by an integrated Web Service Management System (WSMS)
- Repp et al. **A cross-layer approach to performance monitoring of web services.**
  - Detect bad performance and service interruptions much earlier rather than waiting for their propagation through the full protocol stack
- Schröpfer et al. **A Flexible Approach to Service Management-Related Service Description in SOAs.**
  - Describe a service description approach that is based on OWL-S and focuses on non-functional criteria, such as price, availability.
- Kaminski and Perry. **Employing intelligent agents to automate SLA creation.**
  - System that the parties can use to facilitate both fast and flexible agreements.
- Gunarathne et al. **BPEL-Mora: Lightweight Embeddable Extensible BPEL Engine.**
  - Embeddable, scalable and extensible WSBPEL compliant process engine

- Stein et al. **Enabling business experts to discover web services for business process automation.**
  - A structural and a semantic matching algorithm as well as a tool for Web service assessment by non-IT people.
- Baldoni et al. **Service selection by choreography-driven matching.**
  - Retrieving a web service, which can play a given choreography role, preserving at the same time a condition of interest
- Sirbu et al. **A logic-based approach for service discovery with composition support.**
  - A logic based approach for service discovery with composition support
- Küster et al. **Evaluation of semantic service discovery-a survey and directions for future research.**
  - Discuss the applicability of well-known evaluation methodologies from information retrieval and provide an exhaustive survey of the current evaluation approaches

- Lau and Tran. **Composite web services.**
  - Approach where entire services are composed into composite services
- Lécué et al. **A framework for dynamic web services composition.**
  - A framework for performing dynamic service composition by exploiting the semantic matchmaking between service parameters to enable their interconnection and interaction
- Quintero et al. **Model Centric Approach of Web Services Composition.**
  - A Web service composition modeling solution, following the MDA approach, considering both –structural and dynamic properties- enriched with semantic constraints
- Ruiz and Pelechano. **Model Driven Design of Web Service Operations using Web Engineering Practices.**
  - Approach that allows identifying the operations of Web services following a model driven approach, taking the OO-Method / OOWS conceptual models as the source
- She et al. **The SCIFC Model for Information Flow Control in Web Service Composition.**
  - An access control model to empower the services in a service chain to control the flow of their sensitive information

- Le-Hung Vu. **Towards Probabilistic Estimation of Quality of Online Services**
  - A framework that uses domain knowledge on service structure and related constraints, to effectively get accurate estimation of quality of online services
- Pahl et al. **Model-Driven Performance Evaluation for Service Engineering**
  - An approach for the empirical, model-based performance evaluation of services and service compositions in the context of Model-driven service engineering
- Nepal et al. **Reputation Propagation in Composite Services**
  - A method of distribution of reputation received by a composite service to its component services, which guarantees “fair share” of reputation

- Fei et al. **A MapReduce-Enabled Scientific Workflow Composition Framework**
  - A MapReduce-enabled scientific workflow composition framework, which deals with both the world of tasks and the world of workflows
- Dasgupta et al. **An Abstraction Framework for Service Composition in Event-Driven SOA Systems**
  - A proactive event-driven model where user activities and services are treated as events
- Yu and Rege. **A Relational approach for efficient service selection**
  - A systematic approach for efficiently service selection by using QoWS as the major criterion, by adopting a relational approach QoWS information in a relational DBMS



- Ankolekar et al. **Tools for Semantic Web Services**
  - 5 tools: Java ↔ WSDL → OWL-S → UDDI
- Ljiljaba Stojanovic. **Ontology-based Change Management**
  - How to handle changes while bypassing inconsistencies
- Drumm and Cabral. **An eGovernment Case Study**
  - How to integrate services across different service providers
- Della Valle et al. **An eHealth Case Study**
  - Discovery of second opinion services and mediation and record linkage between health care datasets

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**(iii) Organization**

## Organization

- Web page: [http://www.hpi.uni-potsdam.de/naumann/lehre/ws\\_0910/ws.html](http://www.hpi.uni-potsdam.de/naumann/lehre/ws_0910/ws.html)
- ECTS credit points: 3.
- Time: **Thursday 09:15 – 10:45.**
- Location: **HPI A-2.2.**
- Registration:
  - Email with your favorite **3-topics** from *distinct areas* to (Mohammed AbuJarour) before **26.10.2009.**
- Prerequisites:
  - XML and Databases, Algorithms, Networks, Programming Paradigms and n-tier Architecture.
- Session on “Foundations of Web Services” next week.
- Papers will be available / accessed online or in the library.

## Requirements to pass the seminar:

- Attendance:
  - Show up in **all** sessions.
  - If you cannot attend for some reason, let us know per email beforehand.
- Give a talk in **English**:
  - 30 minutes: talk.
  - 15 minutes: discussion and comments.
- Participation:
  - In **all** talks.
  - Discussion and challenging questions.
- Report
  - The report should discuss (not summarize) the assigned work/material.
  - Show strengths, weaknesses, suggestions and comments ...
  - Due in 3 weeks from the date of the talk.
  - Around 8-10 pages

1. **“Emerging Web Services Technology”**, Pautasso and Bussler. (2007)
2. **“Emerging Web Services Technology II”**, Gschwind and Pautasso. (2008)
3. **“Semantic Web Services: Concepts, Technologies, and Applications”**, Studer, Grimm and Abecker. (2007)
4. **“SOA in Practice: The Art of Distributed System Design”**, M. Josuttis. (2007)  
[auch auf Deutsch]
5. **“Services Computing”**, LJ. Zhang, Jia Zhang, and Hong Cai. (2007)



# The End

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<p>1</p>	<p>2</p>	<p>3</p>	<p>4</p>	<p>5</p>	<p>6</p>
<p>7</p>	<p>8</p>	<p>9</p>	<p>10</p>	<p>11</p>	<p>12</p>
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<p>19</p>	<p>20</p>	<p>21</p>	<p>22</p>		