



# On Specifying Web Services Using UDDI Improvements

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# Agenda

Introduction

Requirements for Specification Frameworks

UDDI: State and Challenges

WS-Specification: Improved Web Service Specification



## Introduction – Web Services...

- ❑ are interoperable pieces of application based on a syntactic wiring standard (XML, SOAP)
  - ❑ offer services using Web based interfaces (WSDL)
  - ❑ are invoked using remote procedure calls (physical reuse)
  - ❑ hide their implementation (black-box)
  - ❑ are catalogued using standardized registries (UDDI)
- Web services are software components



## Critical Success Factors

- ❑ Find and choose suitable (“the right”) Web Services
- ❑ Correctly configure Web services to applications
- Requires both conceptual and technical information:
  - ❑ Conditions of acquisition (e.g. price, service quality)
  - ❑ Technological heterogeneity (e.g. technology or platform)
  - ❑ Syntactic heterogeneity (e.g. data formats)
  - ❑ Semantic heterogeneity (e.g. implemented concepts)
  - ❑ Pragmatic heterogeneity (e.g. implemented processes)



## General Requirements for Specification Frameworks

- ❑ Contain human- and machine-readable specifications
- ❑ Determine what (extent) and how (notations) to specify
- ❑ Provide ordered perspectives (separation of concern)
- ❑ Satisfactorily specify the external view (“provide all the information necessary”)

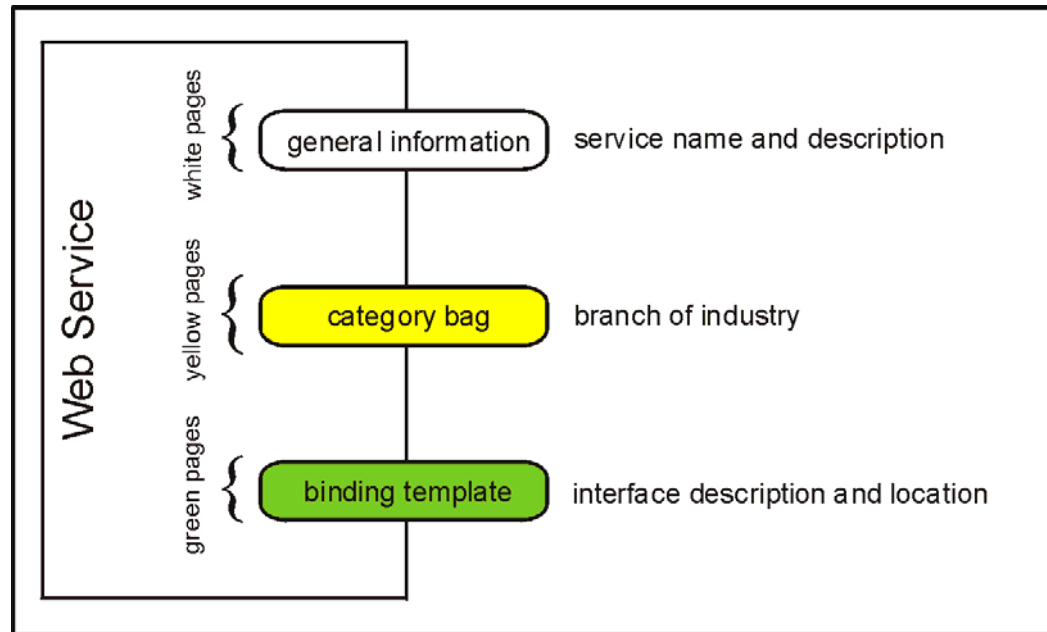


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## UDDI: State and Challenges

- ❑ Mainly provides information referring to businesses rather than Web services
  - ❑ White pages: general information (business name, contacts)
  - ❑ Yellow pages: classifications (branch of industry, location)
  - ❑ Green pages: information on provided services
- ❑ Information referring to Web services is rather sparse
  - ❑ Few general specifications and classifications
  - ❑ Location of the Web service interface description (WSDL)

## UDDI Web Service Specification





## UDDI Sample

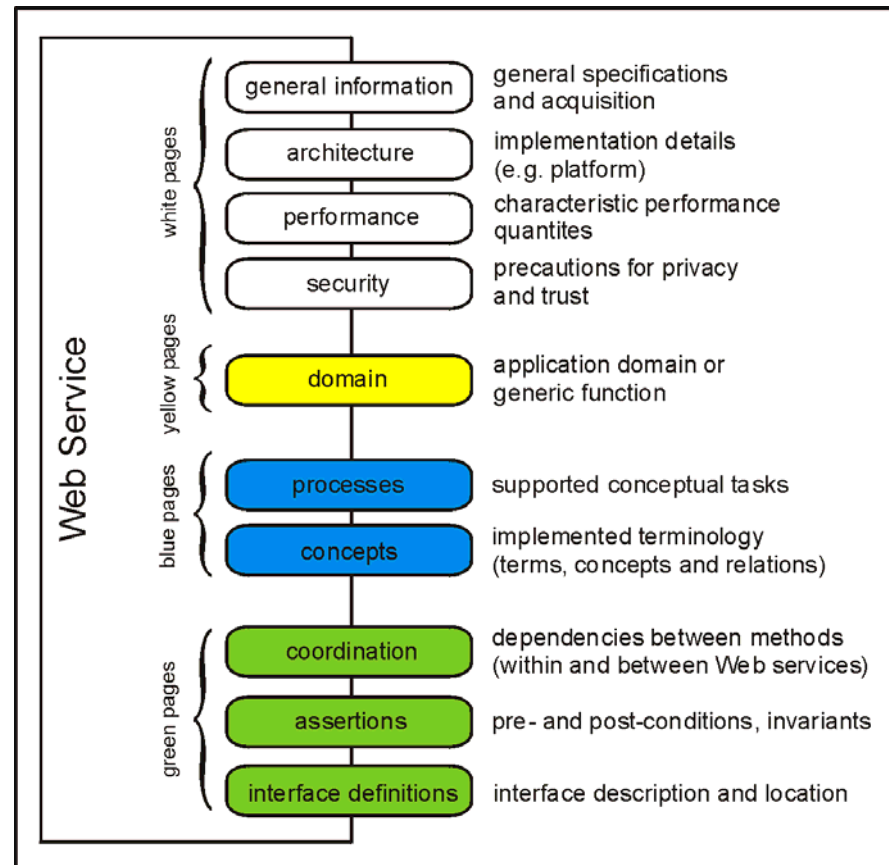
```
<businessService serviceKey="74cebe59-4adb-4919-9f52-8cbbf6ca4c28">
  <name> Oversoft EasyBanking </name>
  <description>
    Get your current account balance over the Internet.
  </description>
  <bindingTemplates>
    <bindingTemplate bindingKey="f5296cc1-8498-4b09-8e84-7ce9a73d112b">
      <description> EasyBanking WebService Binding </description>
      <accessPoint URLType="http">
        http://www.easybanking.oversoft.biz/easybanking.asmx
      </accessPoint>
      <tModelInstanceDetails>
        <tModelInstanceInfo>
          <instanceDetails>
            ...
            <instanceParms>
              http://www.easybanking.oversoft.biz/easybanking.asmx?WSDL
            </instanceParms>
          </instanceDetails>
        </tModelInstanceInfo>
      </tModelInstanceDetails>
    </bindingTemplate>
  </bindingTemplates>
  <categoryBag>
    <keyedReference
      tModelKey="70a80f61-77bc-4821-a5e2-2a406acc35dd"
      keyName="Internet Business services, n.e.c."
      keyValue="7399"/>
  </categoryBag>
</businessService>
```



## WS-Specification: Targets

- ❑ Provide a more sophisticated specification of Web Services
- ❑ Consider the pre-mentioned general requirements
  - Technical and conceptual specifications
    - ❑ Technological, syntactic, semantic, and pragmatic perspectives
- ❑ Maintain backward-compatibility to UDDI
  - Augment the UDDI data model by:
    - ❑ Adding new specifications to existing perspectives
    - ❑ Introducing new perspectives

## WS-Specification: Framework





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## White and Yellow Pages

- ❑ **Acquisition:** license agreement, scope of supply, distribution channels, prices, and payment
- ❑ **Platform:** used version of the Web Service Architecture, dependencies to other Web services (e.g. MS Passport)
- ❑ **Performance:** quality of service, data throughput
- ❑ **Security:** message integrity, confidentiality, and authentication (denoted using WS-Security)
- ❑ **Classifications:** application domain taxonomies



## White Pages: Sample

```
<termsAndConditions>
  Limitation of Liability ...
  Copyright Notices ...
</termsAndConditions>
<scopeOfSupply>
  Oversoft EasyBanking can easily be used downloading the EasyBanking Client
  which is available under http://www.easybanking.oversoft.biz. ...
</scopeOfSupply>
<distribution>
  <channel>
    <name> unlimited use (flat rate) monthly payment </name>
    <price currencyKey="811464A4-823F-4a87-9F85-5B69443705B1" name="usd">
      9.90
    </price>
    <acceptedPayments>
      <payment key="3c27116-5493-4931-9411-dd2218e84e11" name="debit advice"/>
      ...
    </acceptedPayments>
  </channel>
  ...
</distribution>
<architecture>
  <platform key="D3AAA982-9D28-42af-B94B-C3FDA5EF82AD" name="SOAP1.1"/>
</architecture>
<performance>
  <specification key="0F092294-7652-419d-8E58-F58E33F1C6B5" name="mtbf">
    1420.5 days
  </specification>
  ...
</performance>
<security>
  <specification key="4141D795-689B-4597-A5FC-12A1BF3DC260" name="ws-sec">
    <Signature xmlns="http://www.w3.org/2000/09/xmldsig#">
      <SignedInfo>
        <SignatureMethod Algorithm="http://www.w3.org/2000/09/xmldsig#sha1"/>
        <DigestMethod Algorithm="http://www.w3.org/2000/09/xmldsig#sha1"/>
        <DigestValue>LyLsF0Pi4wPU...</DigestValue>
      </SignedInfo>
    </Signature>
  </specification>
  ...
</security>
```



## Blue Pages: Conceptual Information

- ❑ **Conceptual semantics:** implemented concepts with definitions (denoted using ontologies, or normative language)

Sample: “Price” includes value added tax (VAT).

- ❑ **Conceptual pragmatics:** implemented (business) processes (denoted using workflow languages, e.g. BPML)

Sample: “Buying” consists of contract negotiation, contractual conclusion, good delivery, and compensation (payment).



## Blue Pages: Sample

```
<concepts>
  <specification key="D93C2858-8164-46df-BA22-37D2A0AF0564" name="lexicon">
    <concept>
      <term> account </term>
      <definition>
        stores information about the current account business which can be
        evaluated by getting an account statement. Accounts can be debited or
        balanced, respectively. ...
      </definition>
    </concept>
  </specification>
  ...
</concepts>
<processes>
  <specification key="5D071356-7D35-40ba-B175-960D7D9063B0" name="bpml">
    <process name="GetBalance" xmlns="http://www.bpml.org/2002/6/BPML">
      ...
    </process>
  </specification>
  ...
</processes>
```



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## Green Pages: Technical Information

- ❑ **Syntax:** Interface Definitions (denoted using WSDL)  
methods, datatypes, exceptions (faults), properties
- ❑ **Semantics:** Assertions (denoted using UML OCL)  
pre- and postconditions, invariants
- ❑ **Pragmatics:** Method coordination (denoted using WSFL, WS-Coordination, or temporalOCL)  
order constraints, concurrency constraints



## Green Pages: Sample

```
<coordination>
  <specification key="07793A52-BD60-4961-A03C-DF684DDE8282" name="extocl">
    <formalStatement>
      EasyBanking::GetBalance() pre: sometime_past(Login())
    </formalStatement>
    <description>
      Before retrieving the balance of the account one has to log in.
    </description>
  </specification>
  ...
</coordination>
<assertions>
  <specification key="E9D7C918-C8BA-42f0-8559-B1C5B2DB18FE" name="ocl">
    <formalStatement>
      EasyBanking::Login() pre: self.LoginCredentials.length > 0
    </formalStatement>
    <description>
      The login credentials must not be empty.
    </description>
  </specification>
  ...
</assertions>
<interfaceDefinitions>
  <specification key="CF53E356-FF7E-4538-AEBE-7B98867F1A9F" name="wsdl1.2">
    <definitions xmlns:http="http://schemas.xmlsoap.org/wsdl/http/"
      xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
      xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
      xmlns="http://schemas.xmlsoap.org/wsdl/">
      <types>
        ...
      </definitions>
    ...
  </specification>
  ...
</interfaceDefinitions>
```



**Thank You...**

**... for your attention. Questions?**

- Today
- Later: [overhage@bwl.tu-darmstadt.de](mailto:overhage@bwl.tu-darmstadt.de)