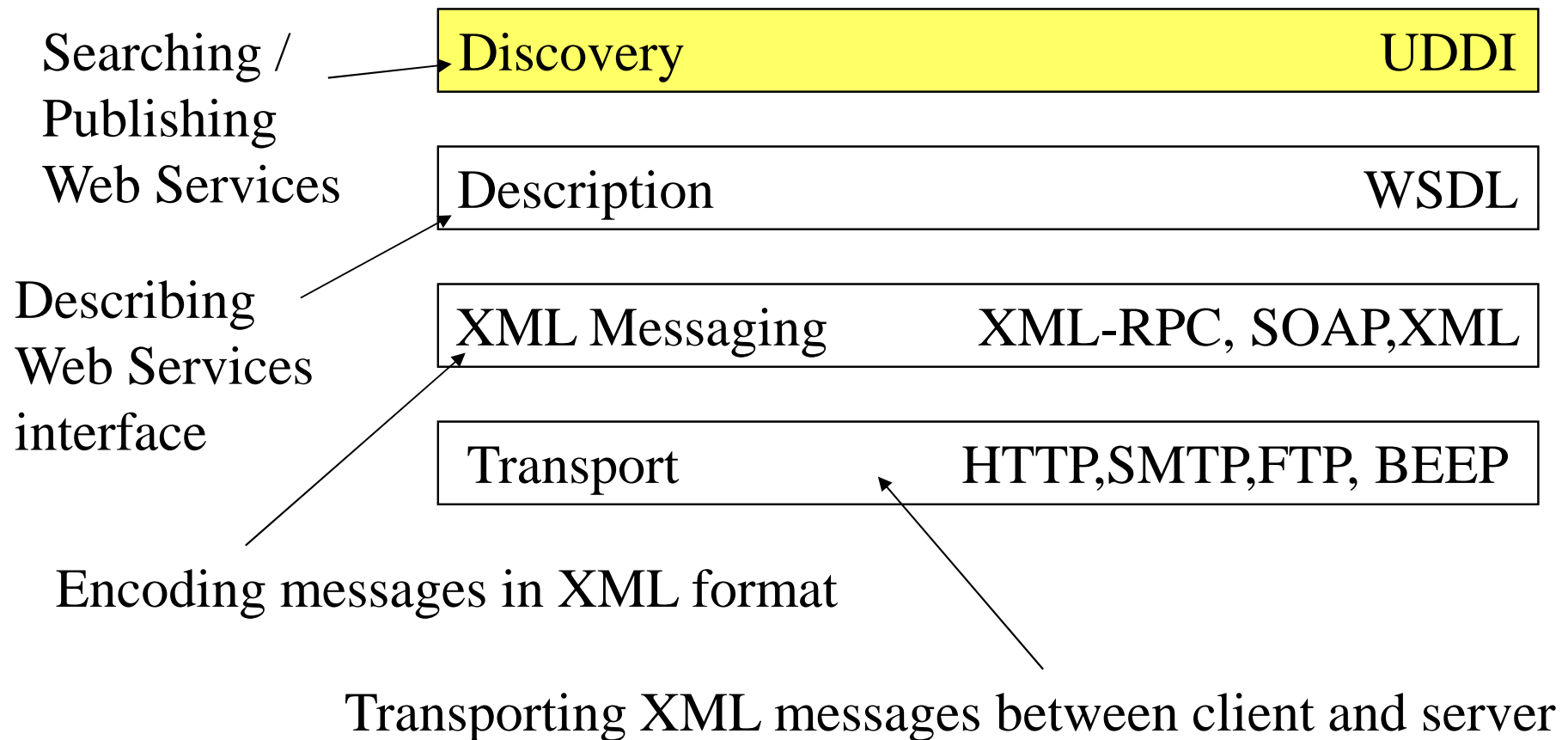


UDDI

Web Service Protocol Stack



UDDI

- UDDI stands for **Universal Description, Discovery, and Integration**
- Represent a technical specification for publishing and finding businesses and Web services
- UDDI 1.0 was originally announced by Microsoft, IBM and Ariba in September 2000
- In May 2001, Microsoft and IBM launched the first UDDI operator sites
- UDDI 2.0 was announced in June 2001
- Approved by the **Organization for the Advancement of Structured Information Standards (OASIS)** as a formal standard in April 2003
- Currently UDDI 3.0 has been published as OASIS committee specifications

Parts of UDDI

- A **technical specification** for building distributed directory of businesses and web services
- **UDDI Business Registry** is a fully operational implementation of the UDDI specification

Categories of data captured in UDDI

- **White pages**
 - Contain general info about a specific company
 - E.g. Business name, business description, contact info, address and phone nos.
- **Yellow pages**
 - Extend the ability to locate a business or service
 - Support classification using various taxonomy systems for categorization
- **Green pages**
 - Provide information on how and where to **programmatically** invoke a service
 - Contain technical info about a Web service
 - Provide address for invoking service
 - Not necessarily SOAP-based service
 - Can provide references to a Web page, email address etc

Microsoft UDDI Business Registry (UBR) node - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://uddi.microsoft.com/search/frames.aspx?frames=true&search=36ea6423-c384-4604-81f9-44b9ce8d6e1e> Go Links

Microsoft
uddi
Business Registry Node

Home Search

Search

Results **Explore**

Service Name

1. Bileşik Faiz
Bileşik Faiz Hesap
2. Jersey Mortgage
Mortgage Banker
State Area since
3. Kontoumsatz-
Dieser Service bi
Kontoumsaetze u
ermittlen.
4. RMD Calculatio
Calculates the Re
Qualified Plan Pa
5. Web Pack
Application for A

Search Criteria

Search enables you to locate Web service information. You can search for services, service providers, or tModels by name or by browsing categorizations.

Browse by Category **Services** **Providers** **tModels**

Browse categorization schemes, select a category, and then search for services, providers, or tModels defined by that category.

Categorization

Select a categorization scheme:

- ntis-gov:sic:1987
- unspsc-org:unspsc:3-1
- unspsc-org:unspsc
- microsoft-com:geoweb:2000
- ntis-gov:naics:1997
- VS Web Service Search Categorization
- ntis-gov:naics:2002
- unspsc-org:unspsc:v6.0501

Action

- Find Providers
- Find Services
- Find tModels
- Cancel

Done Internet

Yellow page data allow us to search by category of service or provider

Why UDDI?

- UDDI addresses a number of business problems
 - Helps broaden and simplify business-to-business (B2B) interaction by allowing efficient, simple and automatic discovery of business and services
 - Discovery of service can be done automatically without human intervention
 - Allows dynamic integration of relevant Web services into an aggregate business process
 - Hence enable one-stop shopping for information on businesses and electronic services

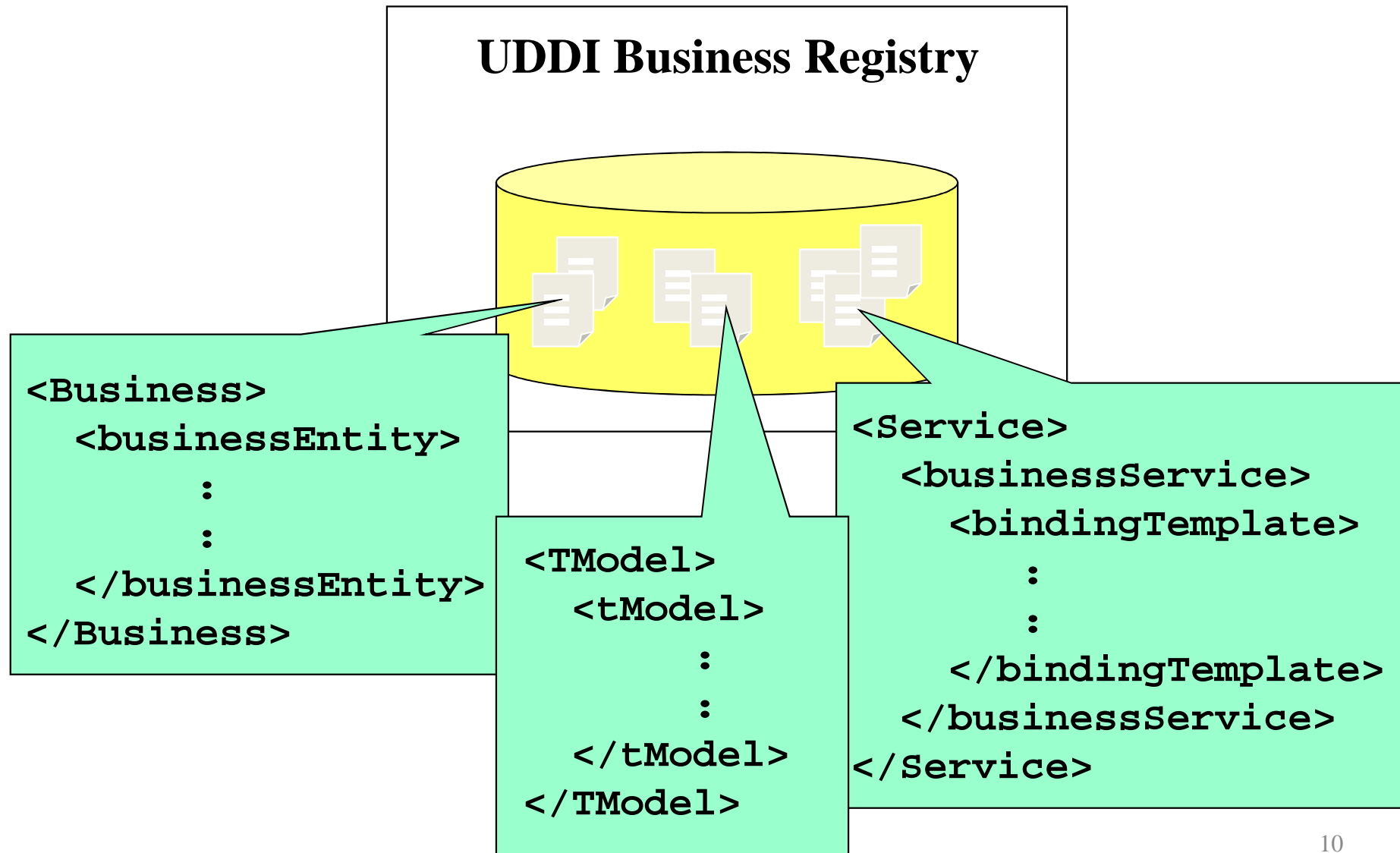
UDDI Technical Overview

- The UDDI technical architecture consists of three parts:
 - UDDI data model
 - An XML Scheme (a rule) for describing businesses and web services
 - UDDI API
 - A SOAP-based API for searching and publishing UDDI data
 - UDDI cloud services
 - Operator sites that provide implementations of the UDDI specification (e.g. Microsoft's UDDI site)

UDDI Data Model

- UDDI includes an XML Schema that describes four core types of information:
 - **businessEntity**
 - About the actual business, e.g. business name, etc.
 - **businessService**
 - About the services provided by the business
 - **bindingTemplate**
 - About how and where to access a specific service
 - **tModel (Technical Model)**
 - Include descriptions and pointers to external technical specifications or taxonomies

UDDI Data Model



A. businessEntity

```
<businessEntity
  businessKey=
    "ba744ed0-3aaf-11d5-80dc-002035229c64">
  <name> XMethods </name>
  <description> ... </description>
  <contacts>
    <contact> ... </contact>
    <contact> ... </contact>
  </contacts>
  <identifierBag> ... </identifierBag>
  <categoryBag> ... </categoryBag>
</businessEntity>
```

Typical contents
of businessEntity
element

A. businessEntity

- **businessEntity** element includes info about the actual business
 - Business name, description, contact info such as address, phone, contact person, etc.
- Each business will receive a unique **businessKey** value when registration to a UDDI server
 - e.g. businessKey of Microsoft in its UDDI server:
0076b468-eb27-42e5-ac09-9955cff462a3
- The key is used to tie a business to its published services

A. businessEntity

- Can also include other unique value(s) in **identifierBag** that identifies the company
 - UDDI supports Dun & Bradstreet D-U-N-S® Numbers and Thomas Registry Supplier IDs
 - e.g. Microsoft's Dun & Bradstreet D-U-N-S® No: 08-146-6849
- Businesses can also register multiple **business categories** in categoryBag based on standard taxonomies, e.g.
 - **NAICS**: The North American Industry Classification System provides industry classification
 - **UNSPSC**: Universal Standard Products and Service Classification provides product and service classification

A. businessEntity

**Examples of identifierBag and
categoryBag contents
(Microsoft)**

```
<identifierBag>
  <keyedReference
    tModelKey=
      "uuid:8609c81e-ee1f-4d5a-b202-3eb13ad01823"
    keyName="D-U-N-S" keyValue="08-146-6849" />
</identifierBag>
<categoryBag>
  <keyedReference
    tModelKey=
      "uuid:c0b9fe13-179f-413d-8a5b-5004db8e5bb2"
    keyName="NAICS: Software Publisher"
    keyValue="51121" />
</categoryBag>
```

Microsoft UDDI Business Registry (UBR) node - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://uddi.microsoft.com/search/frames.aspx?frames=tru

Microsoft
uddi
Business Registry Node

Home Search Quick Help UDDI Help Go

Search

Results Explorer

Microsoft Corporation

- Luc Clement
- Bruce Farr
- Electronic Business In
- Home Page
- Microsoft Developer M
- Online Shopping
- Technet
- Volume Licensing Sel

Microsoft Corporation

A provider is a party, such as a person, group, or business, that offers service. View services and additional information published for this provider. This information can only be modified by the owner (publisher) listed.

Details Services Contacts Identifiers **Categories** Discover

A categorization scheme is a predefined set of categories, derived from an external hierarchy, that can be used to classify a provider.

Categorizations

Categorization Scheme: ntis-gov:naics:1997
Key Name: NAICS: Software Publisher
Key Value: 51121
1 record(s) found.

E.g. NAICS classification of Microsoft is “Software Publisher” with no. 51121

B. businessService

```
<businessService
  serviceKey=
    "d5921160-3e16-11d5-98bf-002035229c64"
  businessKey=
    "ba744ed0-3aaf-11d5-80dc-002035229c64">
  <name>XMethods Delayed Stock Quotes</name>
  <description> ... </description>
  <bindingTemplates>
    <bindingTemplate>
      :
    </bindingTemplate>
  </bindingTemplates>
</businessService>
```

To tie the service with the business

Typical contents of businessService element

B. businessService

- **businessService** element includes info about a single web service or a group of related Web services
- Include the name, description and an optional list of bindingTemplates
- Like businessEntity, each businessService has a unique **service key**
- Should specify the **businessKey** to relate with the business that provides that service

C. bindingTemplate

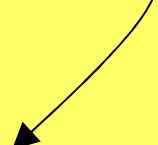
```
<bindingTemplate
  serviceKey="d5921160-3e16-11d5-98bf-002035229c64"
  bindingKey="...">
  <description xml:lang="en">
    :
  </description>
  <accessPoint URLType="http">
    http://services.xmethods.net:80/soap
  </accessPoint>
  <tModelInstanceDetails>
    :
  </tModelInstanceDetails>
</bindingTemplate>
```

Typical contents of
bindingTemplate
element

C. bindingTemplate

- **bindingTemplate** element includes info about how and where to access a specific web service
- E.g. The Stock Quote Service is available via SOAP at <http://services.xmethods.net:80/soap>
- The **serviceKey** ties the bindingTemplate with the businessService “the Stock Quote Service”
- **tModelInstanceDetails** should further specify the key of the tModel used in this service

```
<tModelInstanceDetails>
  <tModelInstanceInfo
    tModelKey=
      "uuid:0e727db0-3e14-11d5-98bf-002035229c64" />
</tModelInstanceDetails>
```



D. tModel

- **tModels** are primarily used to provide pointers to external technical specifications
- bindingTemplate only provides info about where to access the SOAP binding, but not how to interface with it
- tModel element fills this gap by **providing a pointer to an external specification**, such as WSDL

D. tModel

```
<tModel
  tModelKey=
    "uuid:0e727db0-3e14-11d5-98bf-002035229c64"
  ...>
  <description xml:lang="en">
    Simple stock quote interface
  </description>
  <overviewDoc>
    <description xml:lang="en">wsdl link
  </description>
  <overviewURL>
    http://www.xmethods.net/tmodels/
    SimpleStockQuote.wsdl
  </overviewURL>
</overviewDoc>
```

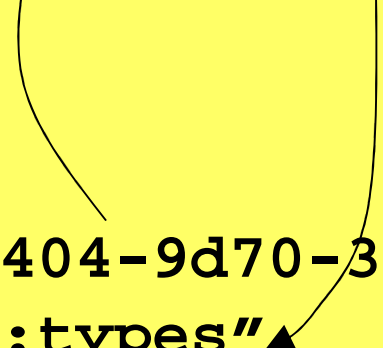
Same as that listed in bindingTemplate

A pointer points to the actual WSDL file

D. tModel

key to this external specification

```
<categoryBag>
  <keyedReference
    tModelKey=
      "uuid:c1acf26d-9672-4404-9d70-39b756e62ab4"
    keyName="uddi-org:types"
    keyValue="wsdlSpec"  />
  </categoryBag>
</tModel>
```



Define the category of this tModel
Categorization scheme: uddi-org:types
Category: wsdlSpec

Microsoft UDDI Business Registry (UBR) node - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://uddi.microsoft.com/search/frames.aspx?frames=true&search=b5ebeb75-0e55-46b2-9f0b-0fd04031fb> Go Links

Microsoft **uddi** Business Registry Node Sign In

Home Search Quick Help UDDI Help Go

Search

Results Explore

XMethods Simple Stock Quote

A tModel typically represents a description of an interface and can be referenced as part of the binding and instance information for a service.

Details Identifiers **Categories** Overview Document

A categorization scheme is a predefined set of categories, derived from an internal or external hierarchy, that can be used to classify a tModel.

Categorizations

Categorization Scheme: uddi-org:types
Key Name: uddi-org:types
Key Value: wsdlSpec
1 record(s) found.

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Internet

UDDI API

- There are two ways to search or publish a business/service
 - Using the Web pages provided by the UDDI implementation (UDDI cloud service), such as uddi.microsoft.com
 - ⇒ Need human intervention
 - Using the APIs provided by UDDI
 - ⇒ Can be made automatic by calling the APIs with computer programs
- UDDI APIs can be divided into two parts:
 - Inquiry APIs
 - Publishing APIs

UDDI API

Inquiry Operations:

Find

find_business

find_service

find_binding

find_tModel

Get details

get_businessDetail

get_serviceDetail

get_bindingDetail

get_tModelDetail

get_registeredInfo

get_registeredInfo

Publishing Operations:

Save

save_business

save_service

save_binding

save_tModel

Delete

delete_business

delete_service

delete_binding

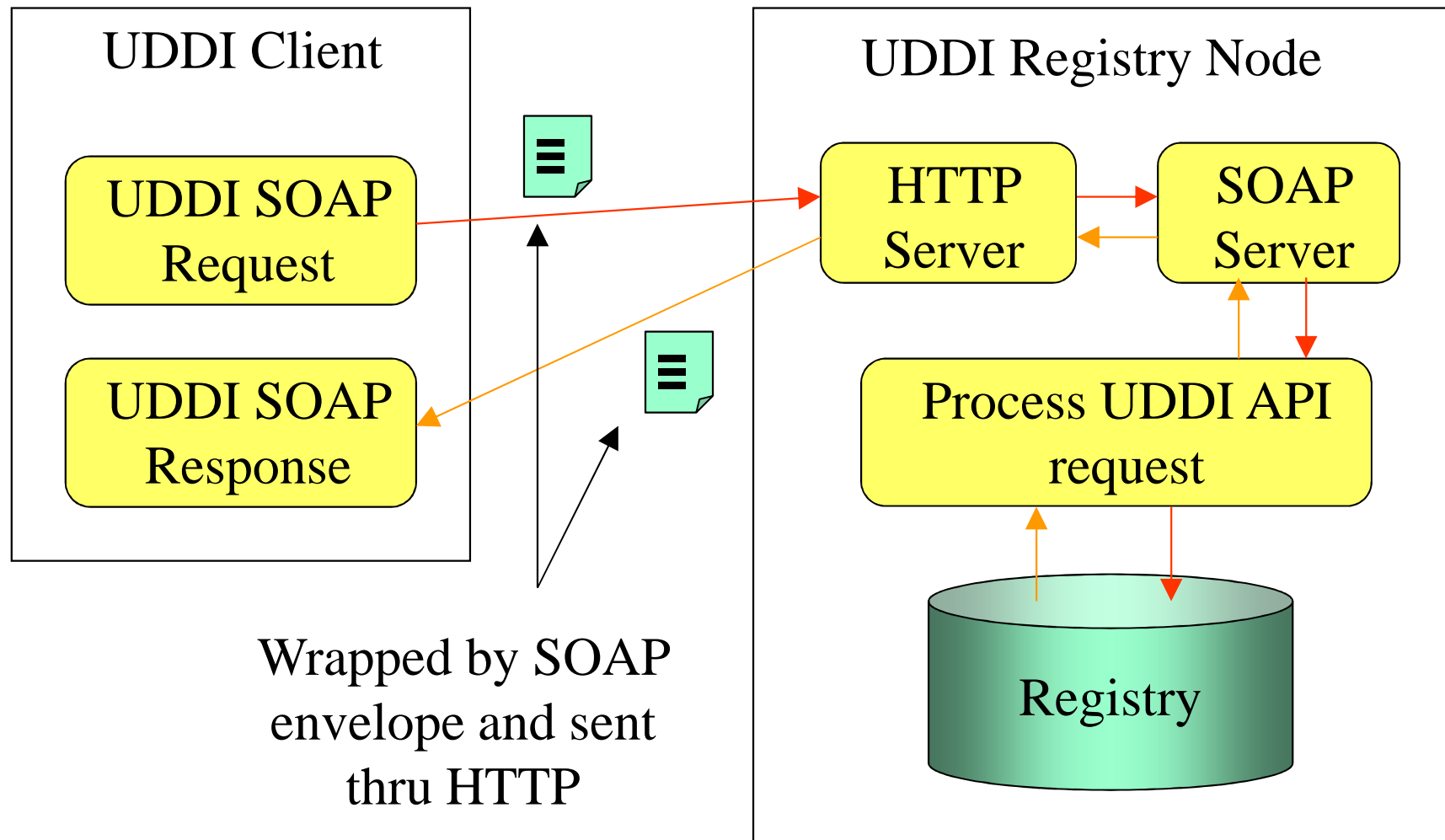
delete_tModel

Security

get_authToken, discard_authToken

**Examples of
Inquiry and
Publishing
APIs**

UDDI API



UDDI API

Example: find_business

Wrapped by a SOAP envelope

Default namespace
Based on SOAP 1.1

```
<envelope xmlns=  
  "http://schemas.xmlsoap.org/soap/envelope/">  
  <body>  
    <find_business generic="1.0"  
      xmlns="urn:uddi-org:api">  
      <name>XMethods</name>  
    </find_business>  
  </body>  
</envelope>
```

Using UDDI 1.0

UDDI API find-business

Look for XMethod (ignore case, perform left-to-right lexical search)

```
<envelope xmlns=
```

```
"http://schemas.xmlsoap.org/soap/envelope/">
```

```
<body>
```

```
<businessList generic="1.0"
```

```
operator="Microsoft Corporation"
```

```
truncated="false" xmlns="urn:uddi-org:api">
```

```
<businessInfos>
```

```
<businessInfo businessKey=
```

```
"ba744ed0-3aaf-11d5-80dc-002035229c64">
```

```
<name>XMethods</name>
```

```
<description> ... </description>
```

```
<serviceInfos>
```

```
<serviceInfo> ... </serviceInfo>
```

```
</serviceInfos>
```

```
</businessInfo>
```

```
</businessInfos>
```

```
</businessList>
```

```
</body>
```

```
</envelope>
```

A full record is shown,
not partial

Business info
about
XMethod

Indicate the service(s)
provided by XMethod

Response from Microsoft UDDI Registry

UDDI API

Example: get_businessDetail

```
<envelope xmlns=  
  "http://schemas.xmlsoap.org/soap/envelope/">  
  <body>  
    <get_businessDetail generic="1.0"  
      xmlns="urn:uddi-org:api">  
      <businessKey>  
        ba744ed0-3aaf-11d5-80dc-002035229c64  
      </businessKey>  
    </get_businessDetail>  
  </body>  
</envelope>
```

To query for the complete
businessEntity record based on its key

```

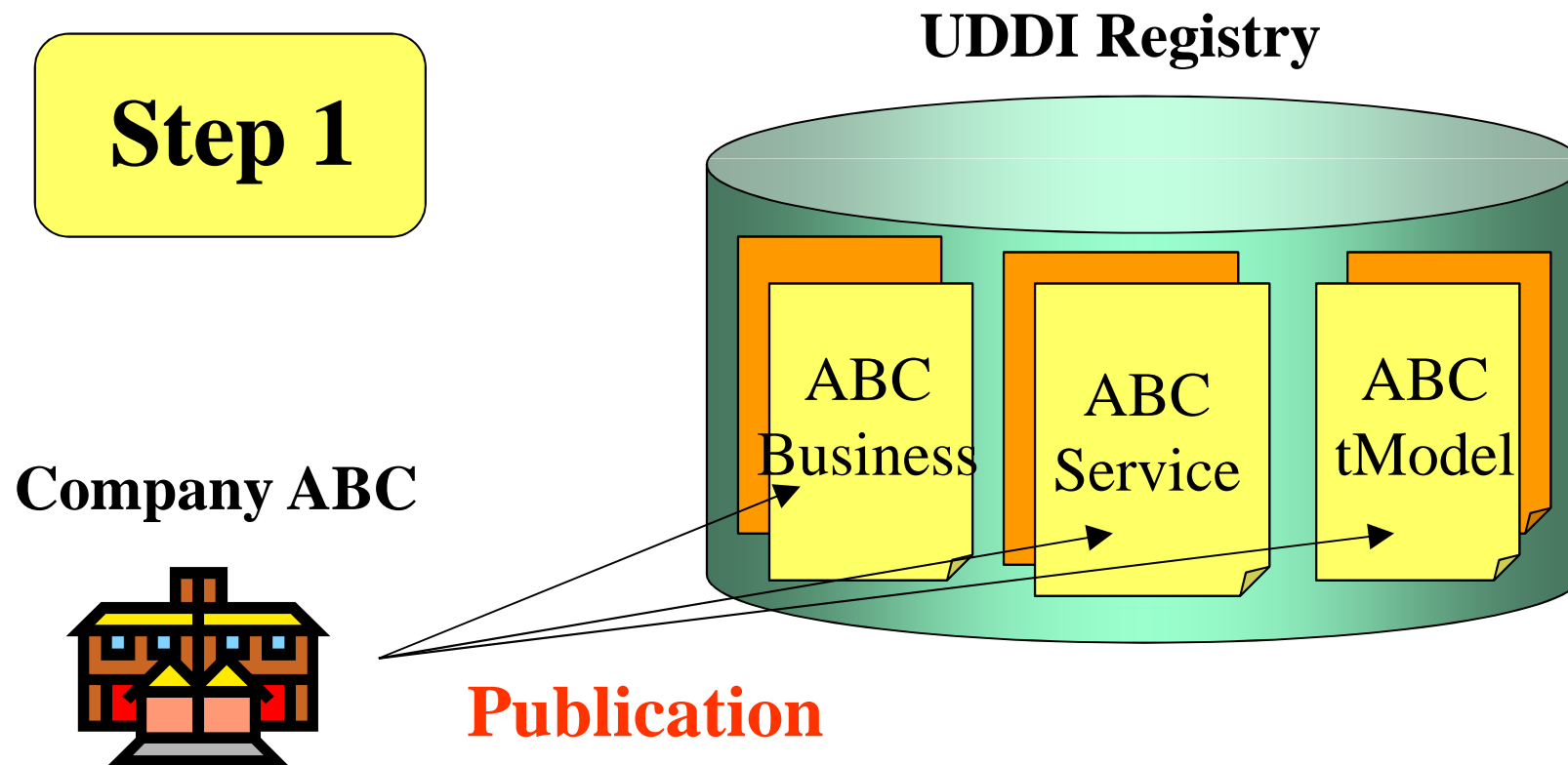
<envelope xmlns=
  "http://schemas.xmlsoap.org/soap/envelope/">
  <body>
    <businessDetail generic="1.0"
      operator="Microsoft Corporation"
      truncated="false" xmlns="urn:uddi-org:api">
      <businessEntity businessKey=
        "ba744ed0-3aaf-11d5-80dc-002035229c64">
        <name>XMethods</name>
        <description> ... </description>
        <contacts>
          <contact> ... </contact>
        </contacts>
        <businessServices>
          :
        </businessServices>
      </businessEntity>
    </businessDetail>
  </body>
</envelope>

```

businessEntity record

Response from Microsoft UDDI Registry
Return a businessEntity record

An example of Publication, Inquiry and Invocation Process

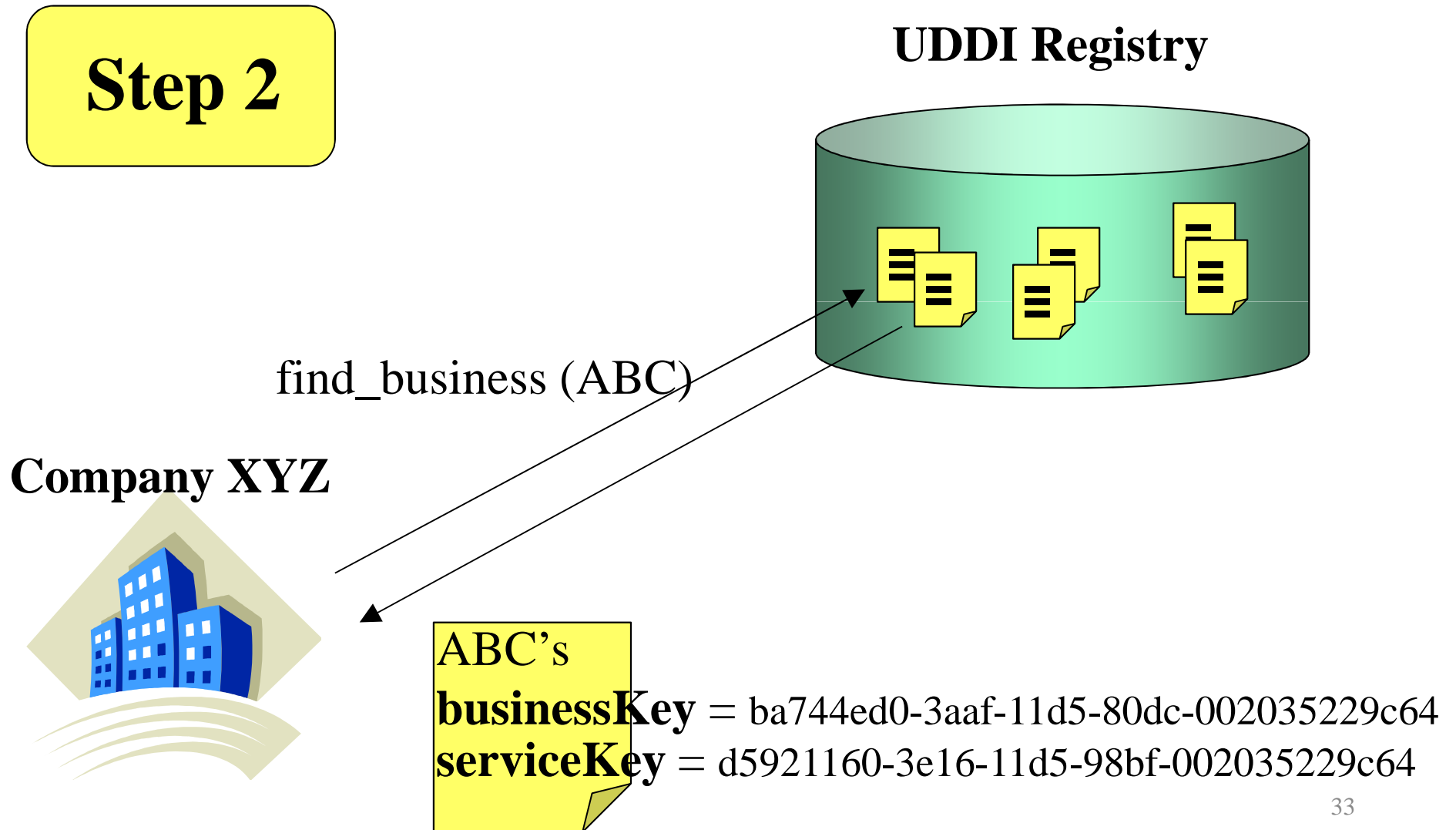


An example of Publication, Inquiry and Invocation Process

- The objective of **publishing business** is to allow the clients to know the details of the business
 - such as the name of the company, the contact person, address and phone number etc.
- By **publishing the service**, the clients would know where and how to contact the service provider
 - such as the access point (or URL) of the service, transport protocol used (HTTP, FTP or else)
- **Publishing the tModel** allows the clients to invoke the service provided by the business
 - based on the WSDL document of the service

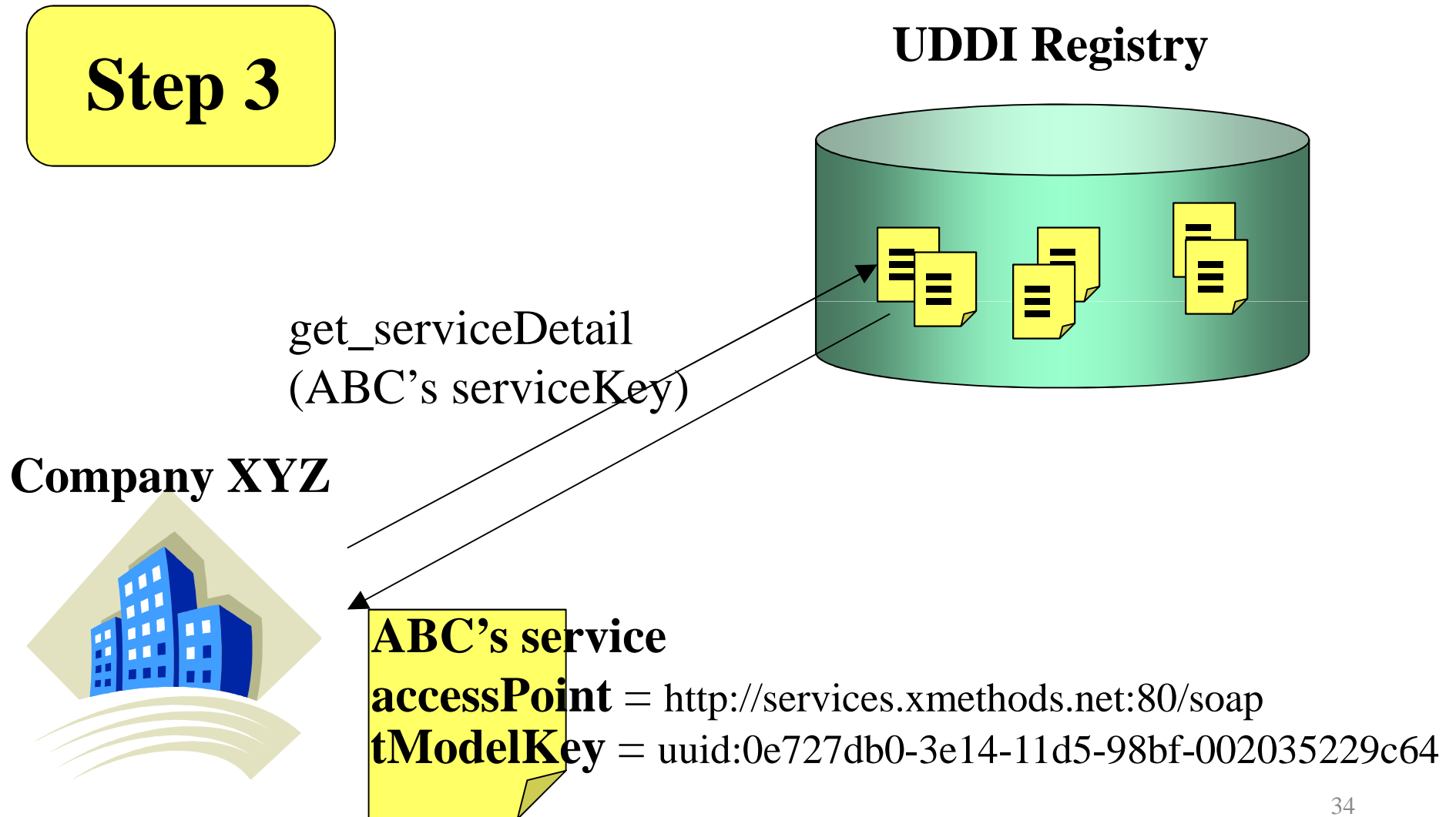
An example of Publication, Inquiry and Invocation Process

Step 2



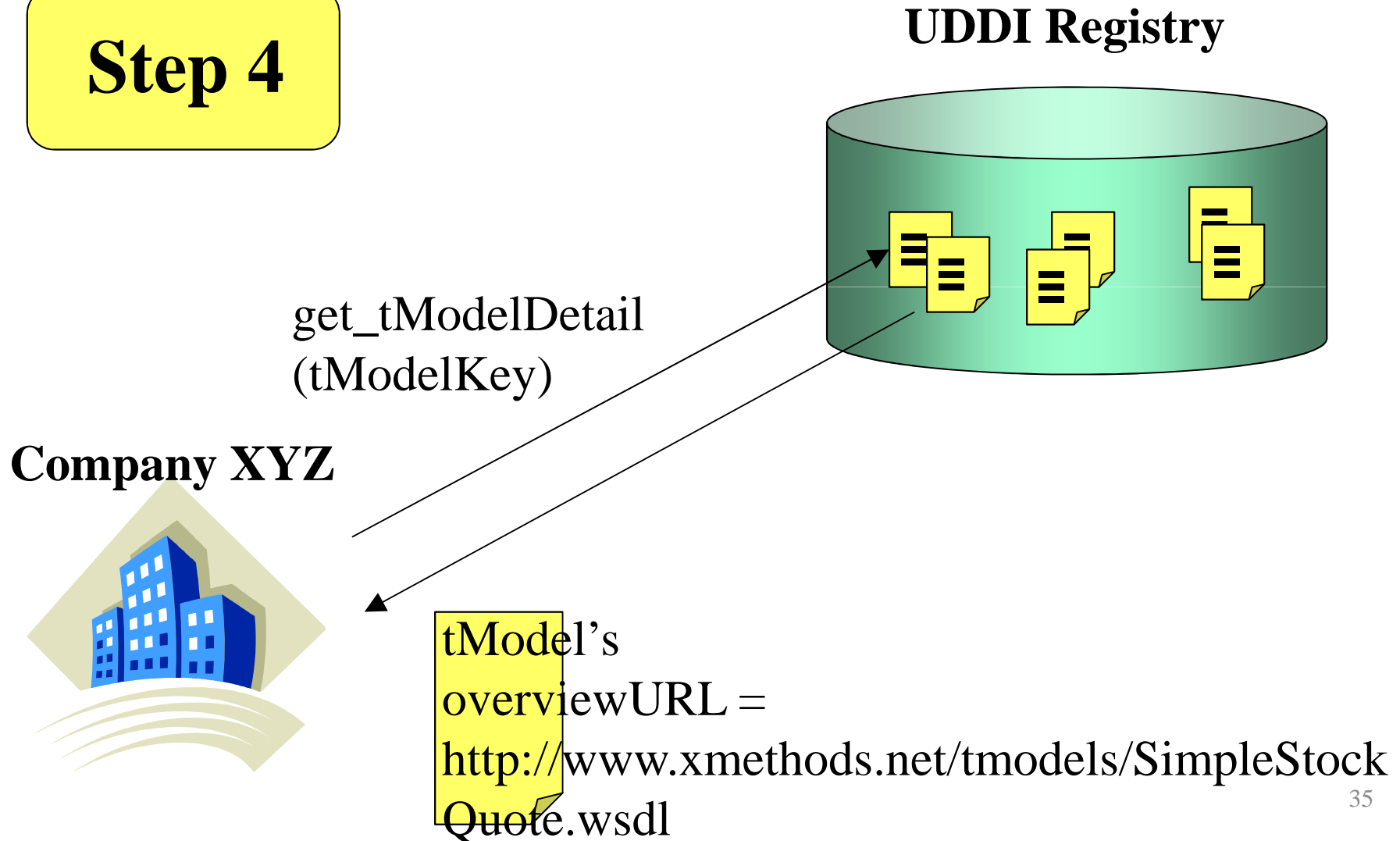
An example of Publication, Inquiry and Invocation Process

Step 3



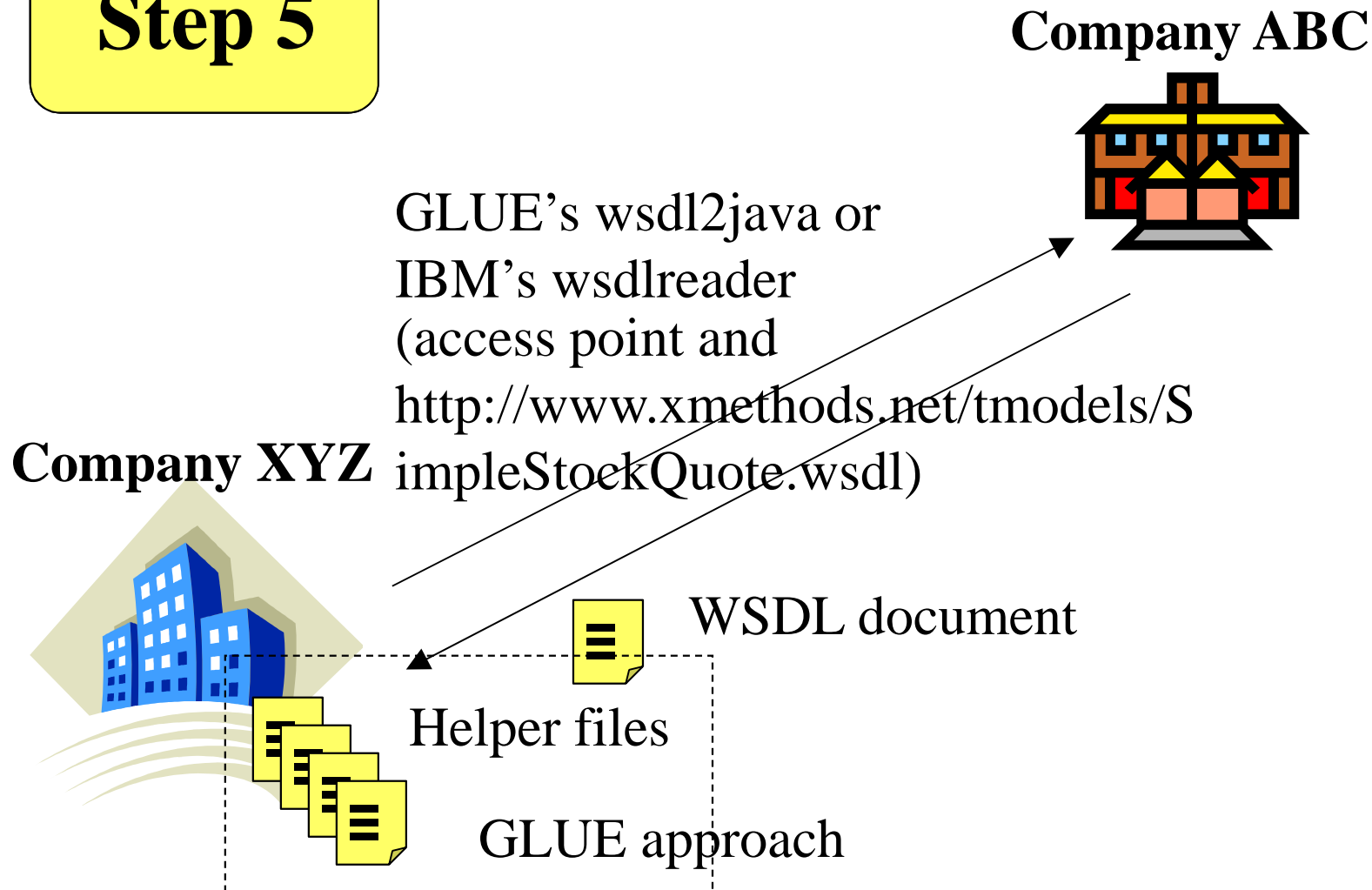
An example of Publication, Inquiry and Invocation Process

Step 4



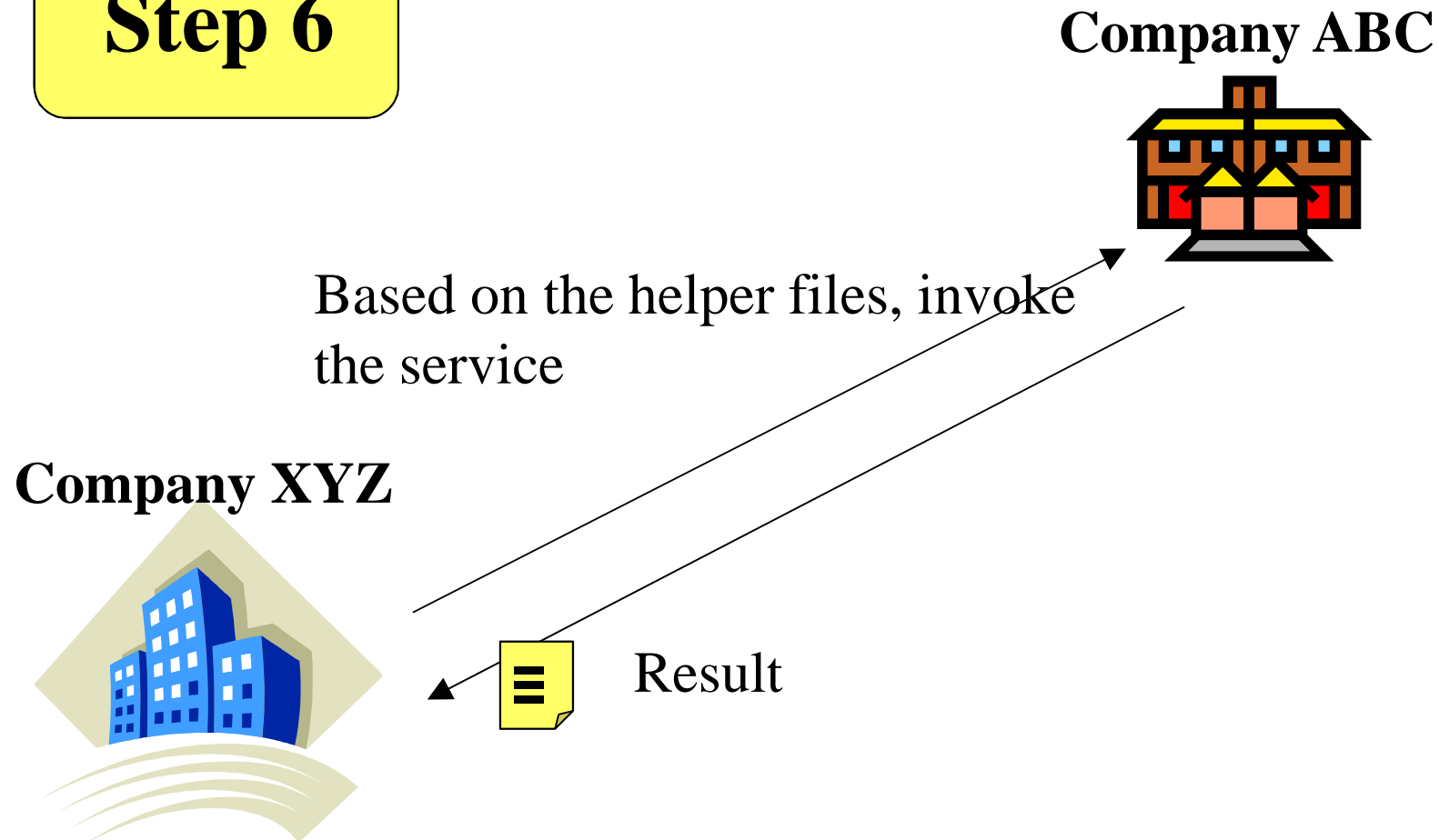
An example of Publication, Inquiry and Invocation Process

Step 5



An example of Publication, Inquiry and Invocation Process

Step 6



UDDI Toolkits - RosettaNet's UDDI

- One of RosettaNet's main accomplishments is the creation of **Partner Interface Processes (PIPs)**
- PIPs are XML-based interfaces that enable two trading partners to exchange data. E.g.
 - **PIP2A2**: Enable a partner to query another for product info
 - **PIP3A4**: Enable a partner to submit an electronic purchase order and receive acknowledgement of the order
- Many PIPs have been registered within the UDDI of RosettaNet

UDDI Toolkits - jUDDI

- An open source implementation of OASIS's UDDI v3 specification
- Platform Independent
- Use with any relational database that supports ANSI standard SQL (MySQL, Oracle, DB2, Sybase, Derby etc.)
- Deployable on any Java application server that supports the Servlet 2.3 specification
- jUDDI registry supports a clustered deployment configuration.
- Easy integration with existing authentication systems
- Supports VM embeddable mode

UDDI Toolkits - jUDDI v3 Services

- UDDI Specification version [3.0.2](#) compliant
- JDK 1.6 Recommended
- Built on [JAXB](#) and [JAX-WS](#) standardized interfaces, tested on Apache CXF
- Built on JPA standardized interfaces, tested with [Apache OpenJPA](#) and [Hibernate](#)
- Pre-configured bundle deployed to [Apache Tomcat](#)
- Full featured user interface (based on [Bootstrap](#))
- Includes extensive predefined tModels, such as [Quality of Service Metrics](#)

Reference

- <http://juddi.apache.org/demos/ConsoleDemo.mp4>

Thank You