



# XML: Where we're coming from, Where we're going

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<http://ibm.com/developerWorks/speakers/colan>



## XML and e-business

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- **Enterprise Application Integration**
  - ▶ XML makes it easy to integrate applications from different vendors, different hardware, different programming languages
  - ▶ End-to-end integration leverages your systems and people for better efficiency
- **Business Partner Integration**
  - ▶ Common XML data formats allow different companies to integrate quickly for e-business
  - ▶ Solves more difficult BP integration problem
  - ▶ New model: find business partners dynamically, and begin doing business immediately
  - ▶ Business directories, marketplaces, auctions





## IBM's XML Strategy



**Mission:** Deliver XML-based solutions that will help our customers and business partners build, deploy, and manage e-business applications.

### We are doing this by

- ▶ Ensuring strong, open standards
- ▶ Enabling our entire product line for XML
- ▶ Building e-business solutions



## A Historical Note ...



**Industrial revolution: 30 years to accomplish**  
**Information revolution: we're now in year 5**





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# XML and Open Standards



## Core Technology Standards

IBM participation includes XML, Schema, DOM, XSL, Namespaces, Linking, XHTML, RDF, XHTML, and XML Query.



## Accelerating the adoption of industry standards

100+ member companies including IBM, Sun, Microsoft, Corel, Software AG, and Oracle.



## The XML Industry Portal

Sponsored by IBM, Sun, Oracle, SAP, ...  
A vendor-neutral XML schema clearinghouse  
Info on how to apply XML in industrial and commercial settings.

UNICEFACT



United Nations Centre for the Facilitation of Procedures and Practices for Administration, Commerce and Transport

[www.alphaWorks.ibm.com](http://www.alphaWorks.ibm.com)

## IBM alphaWorks

Providing early access to emerging technologies to developers.



Creating a Single Global Electronic Market



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# [www.alphaWorks.ibm.com](http://www.alphaWorks.ibm.com)

## Free XML Tools and Technologies

(also Java, C++, multimedia, pervasive computing, voice, and many others)

- XML Parser (Apache Xerces)  
XML4J, XPK4J, XML4C
- XML for RPG on AS/400
- LotusXSL (Apache Xalan)
- SOAP for Java
- TexML
- DataCraft
- P3P Parser
- XML Security Suite
- XML Translator Generator
- VoiceXML
- Voice Server SDK (beta)
- XML Viewer
- Dynamic XML
- PatML
- TaskGuide Viewer (wizards)
- XML Master (XML Bean generator)
- XML TreeDiff
- XML Diff & Merge
- XML Lightweight Extractor
- XMI Toolkit
- Bean Markup Language
- SVGView
- XML Enabler
- Data Descriptors by Example
- SVG Viewer
- XML Productivity Kit
- Visual XML Builder
- Visual DTD
- Visual XML Query
- Visual Transformation
- XML Generator
- XSL Editor v2.0



[ibm.com/developer/xml](http://ibm.com/developer/xml)

The screenshot shows the IBM DeveloperWorks XML zone website. The URL [ibm.com/developer/xml](http://ibm.com/developer/xml) is highlighted at the top. The page layout includes a search bar, navigation links, and a main content area. The featured article is 'Intro to XML messaging' by Uche Ogburn. The right sidebar contains a newsletter sign-up, a developer spotlight, and a news section.

## IBM and Open Source

**XML WORLD EUROPEAN EDITION**

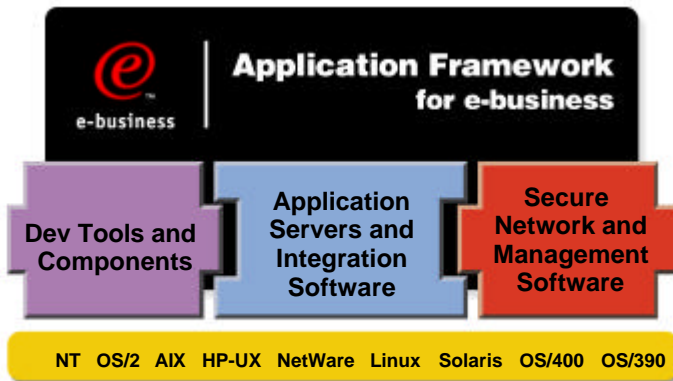
- IBM contributed key XML technologies to Apache
  - ▶ Xerces: XML parsers (Java and C++)
  - ▶ Xalan: XSL processors (Java and C++)
  - ▶ SOAP4J: platform-neutral SOAP 1.1 implementation
- Open source accelerates vendor-neutral standard
  - ▶ Non-proprietary implementation of W3C specs
  - ▶ Public participation through code contribution

➔ Ongoing demonstration of IBM's dedicated support of industry standards

**The Apache Software Foundation**  
<http://www.apache.org/>



# Enabling the IBM product line

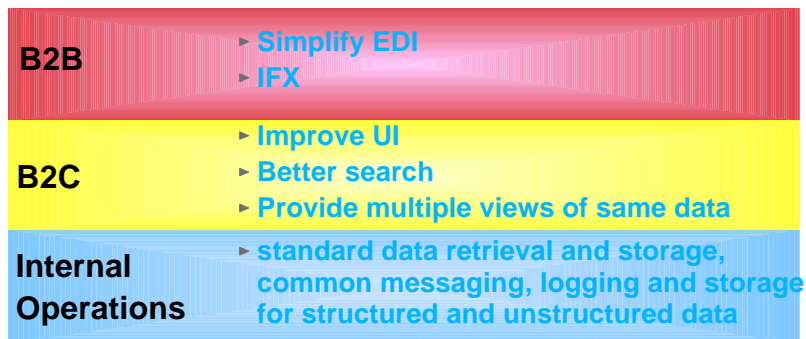


Build	Deploy	Manage
WebSphere Studio	WebSphere	Tivoli
VisualAge	Domino	SecureWay
	DB2	
	MQSeries	



# First Union

- **Vision:** Use new technology to improve customer satisfaction



- **Challenges:**
  - ▀ Deliver new product offerings
  - ▀ Integrate with third party applications
  - ▀ Reduce time to market





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# SABRE/NOKIA: Copernicus Project

■ **Vision:** Real time information on delayed or canceled flights to busy travelers via smart phone

■ **Challenge**

- ▶ Improved customer service and customer satisfaction
- ▶ SABRE: Maintain market leadership - SABRE "anywhere"
- ▶ Nokia: Establish position as a technology leader in WAP solutions

■ **Solution**

- ▶ Pervasive computing application using Java servlets, XML, transcoding, and web application serving
- ▶ IBM products and services: Visual Age for Java, WebSphere, OnDemand Server, LotusXSL, XML4J

■ **Value**

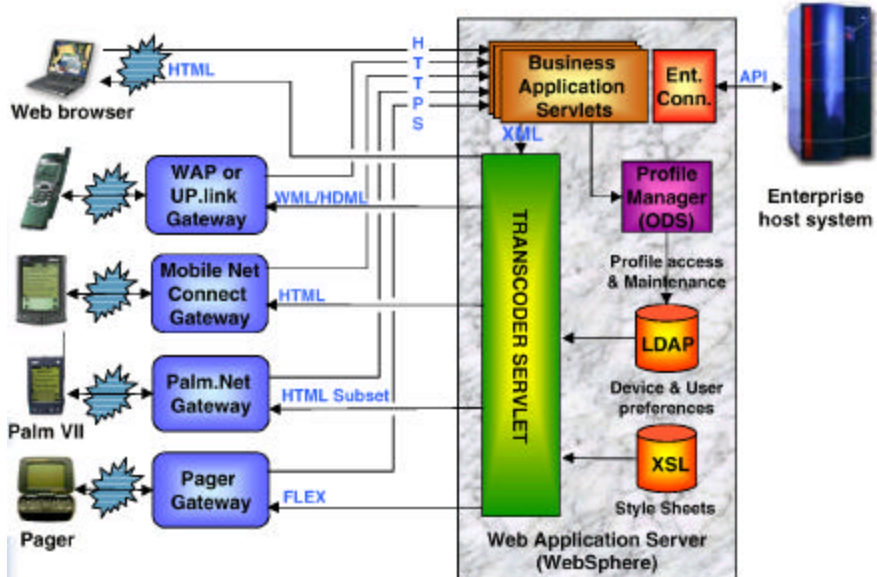
- ▶ Business to Business Integration for new service offering



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# SABRE/Nokia Architecture using WebSphere Transcoding Publisher





## Patterns for e-business

- **What they are:**
  - ▶ Repository of successfully implemented designs
    - architecture patterns, design patterns, runtime patterns, guidelines and best practices, code
  - ▶ source of information for architects and developers
  - ▶ distillation of the collected wisdom of IBM, partners, and customer IT architects
  - ▶ code samples and representative implementations
- **What they aren't:**
  - ▶ a complete road map to build applications
  - ▶ architectural imperatives for success
  - ▶ vision of what might be in the future
- <http://www.ibm.com/framework/patterns>



## XML: where the industry is now

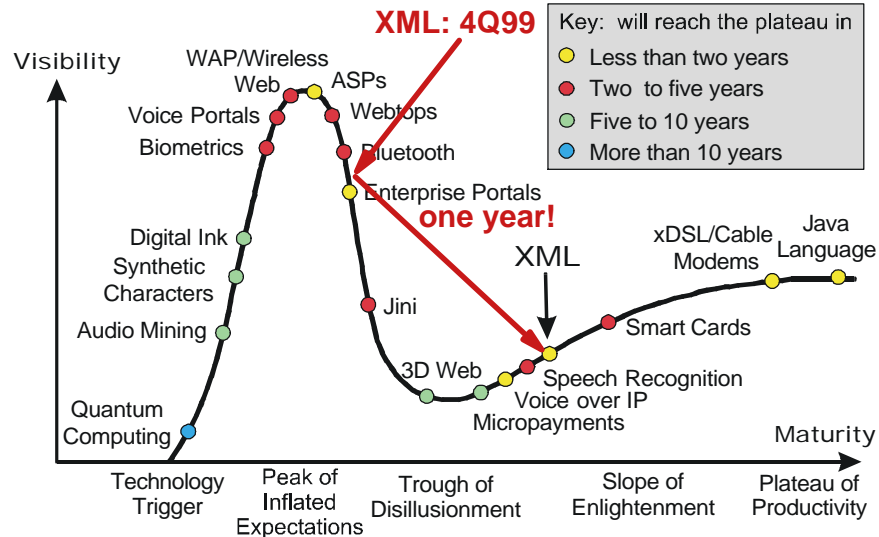
- Many important base technical standards are now W3C recommendations (<http://w3.org>)
- OASIS has established XML.ORG as the registry and repository for industry-specific vocabulary standards
- [xml.apache.org](http://xml.apache.org) has robust, mature implementations of XML parser, XSL processor, and SOAP4J as open-source implementations
- countless products using XML from all vendors



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## Where is XML Going?



**Gartner Group "Hype Curve": 4Q2000**



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## The e-business future: Are we there yet?

- We all know XML is the way to exchange data
  - ▶ between platforms
  - ▶ regardless of programming language
  - ▶ on different devices
  - ▶ with different middleware
- Isn't there something missing here?
- We need standards for exchanging data.
- What's the model and mechanism for exchanging documents to conduct e-business?
  - ▶ ebXML.org
  - ▶ Web Services





## SOAP:

### ~~Simple Object Access Protocol~~

### Services-Oriented Architecture Protocol

- SOAP 1.0: Userland, Microsoft, DevelopMentor
  - SOAP 1.0 was specific to COM and HTTP
- SOAP 1.1 (April 26, 2000) - includes contributions from IBM and Lotus
  - substitutable Transport bindings (not just HTTP)
  - substitutable Language bindings (e.g. Java)
  - substitutable Data encodings (pluggable)
  - completely vendor-neutral
  - independent of: programming language, object model, operating system, or platform

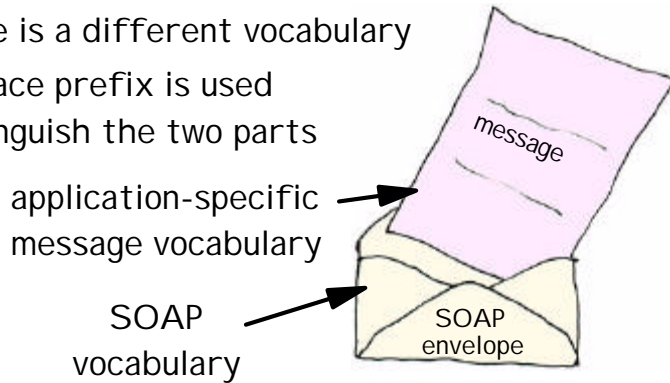


## Apache SOAP 2.1

- SOAP4J on IBM alphaWorks: April 28, 2000
- Contributed by IBM to the Apache Software Foundation: June 1, 2000
- SOAP4J from Apache:
  - Solid SOAP v1.1 implementation, supporting HTTP and SMTP protocols
  - platform-independent Java
  - **Free download** from [xml.apache.org](http://xml.apache.org) with source
  - Under development by IBM and others
- SOAP distribution includes:
  - User's Guide
  - a tool for debugging SOAP
  - API documentation
  - three samples

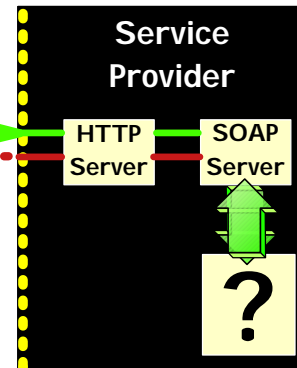
# SOAP Message structure

- Request and Response messages
  - ▶ Request invokes a method on a remote object
  - ▶ Response returns result of running the method
- SOAP defines an "envelope"
  - ▶ "envelope" wraps the message itself
  - ▶ message is a different vocabulary
  - ▶ namespace prefix is used to distinguish the two parts



# SOAP hides the service implementation from the requester

Service Requester



- Simple, standard XML messages
  - we're only interested in the request and response messages
  - we don't really want to know about the implementation details (less work for us!)

EJB? Corba? Cobol?



## Why SOAP Will Succeed

Other distributed technologies failed on the Internet because they strongly coupled the endpoints and therefore could not become pervasive:

- × DCOM - requires Windows at each endpoint
- × CORBA - requires compatible ORBs at each endpoint
- × RMI - requires Java at each endpoint
- ✓ SOAP is the platform-neutral choice
  - simply an XML wire format
  - places no restrictions on the endpoint implementation technology choices
  - implementations are free, some are open-source



## SOAP and Standardization

- SOAP was submitted to W3C for consideration as a standard (June 1, 2000)
  - ▶ W3C has formed a working group called "XML Protocol".
  - ▶ The group is considering what SOAP offers as input to the process
  - ▶ The XML Protocol specification may or may not be SOAP at its heart, yet the problems SOAP solves are the important requirements of XML Protocol.
- Industry-specific SOAP messages will start a new round of vocabulary standards work



## SOAP is great, but...

- How do you find the services?
- We need a directory service
- UDDI: Universal Description, Discovery, and Integration

**SOAP+UDDI = Web Services**



## A New Web Model

- Until now, the Web has provided for
  - ▶ browsing of linked documents
  - ▶ manually-initiated purchases and transactions
  - ▶ downloading files

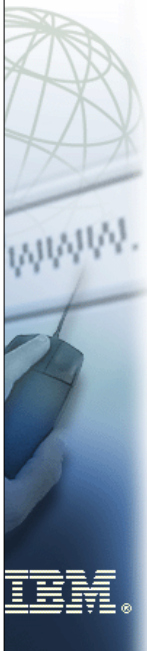
→ all of this is manual, by way of a browser
- Web Services is a new model for using the Web
  - ▶ transactions initiated automatically by a program, not necessarily using a browser
  - ▶ can be described, published, discovered, and invoked dynamically in a distributed computing environment
  - ▶ new ways of using the web: intelligent agents, marketplaces, auctions

→ all built on XML!



## What are Web Services?

- **The next evolution of e-business**
  - ▶ publishing of business functions to the Web
  - ▶ universal access to these functions
- **A natural extension to the client-server model**
  - ▶ transaction model for e-business
  - ▶ invoke methods on remote objects (SOAP)
  - ▶ directory of available services and service providers, using SOAP lookup (UDDI)
  - ▶ standard description languages based on XML for services and service providers (WSDL, WDS)
- **e-business is driving the merging of Web, IT & Object technologies to form the foundation for Web Services**



## Examples of Web Services

- **Business Information with rich content**
  - ▶ weather reports
  - ▶ news feed
  - ▶ airline schedules
  - ▶ stock quotes
  - ▶ credit check
  - ▶ credit card validation
  - ▶ request for quote
  - ▶ auctions
- **Transactional Web Services for B2B or B2C**
  - ▶ airline reservations
  - ▶ rental car agreements
  - ▶ supply chain management
  - ▶ purchase order
- **Business Process Externalization**
  - ▶ business linkages at a workflow level
  - ▶ allows complete integration at a process level



## Web Services: Components

### ■ Service Registry

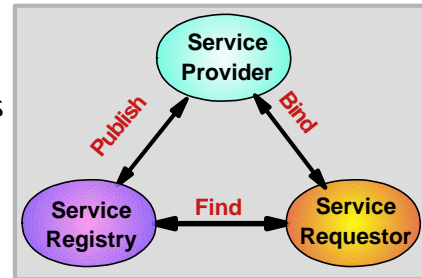
- ▶ provides support for publishing, locating services
- ▶ like telephone yellow pages

### ■ Service Provider

- ▶ provides e-business services
- ▶ **PUBLISHES** availability of these services through a registry

### ■ Service Requestor

- ▶ **FINDS** required services via the Service Registry
- ▶ **BINDS** to services via Service Provider



## Web Services: Base Technologies

### ■ SOAP - Simple Object Access Protocol

- ▶ an XML protocol to invoke a method on a server to perform a given operation
- ▶ request message is sent by service requestor
- ▶ response message is sent by service provider

### ■ UDDI - Universal Description, Discovery, Integration

- ▶ UDDI servers act as a directory of available services and service providers
- ▶ SOAP can be used to query UDDI for services

### ■ WSDL - Web Services Description Language

- ▶ an XML vocabulary to describe service interfaces



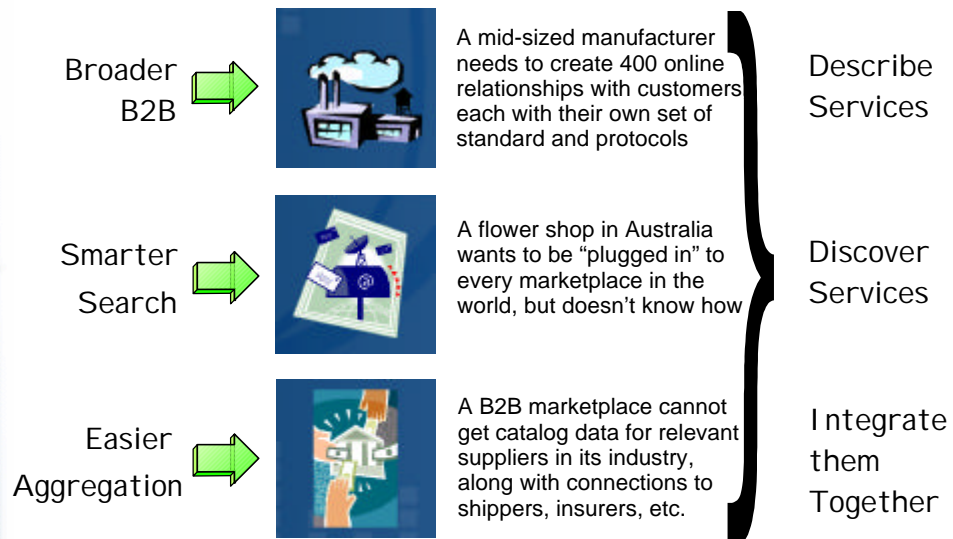
## UDDI



- Universal Description, Discovery, and Integration
- A project to speed interoperability and adoption for web services
  - ▶ Standards-based specifications for service description and discovery
  - ▶ Shared operation of a web-based business registry
  - ▶ Partnership among industry and business leaders - more than 200 companies have signed up so far



## Problems UDDI Solves





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## UDDI Vision and Process

### 1. Start with existing standards

- ▶ TCP/IP, HTTP, XML
- ▶ Industry-specific schemas
- ▶ Shared vision of open protocols

### 2. Augment and implement via a Web Service

- ▶ Common web services "stack"
- ▶ Shared implementation to avoid confusing customers
- ▶ Public specs, open service, inclusive process

### 3. Transition to a Standards Body

- ▶ Manage design process for 3 revs
- ▶ License control and IP to a 3rd party



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## UDDI at Work



SydneyNet.com

UDDI Registry

1. Harbour Metals creates online website with local ASP

2. ASP registers Harbour Metals with UBR

4. Consumers and businesses discover Harbour Metals and do business with it

3. Marketplaces and search engines query UBR, cache Harbour Metals data, and bind to its services





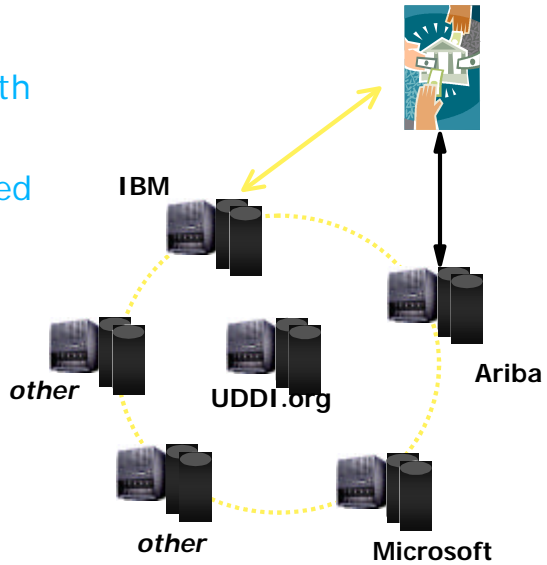


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# Registry Operation

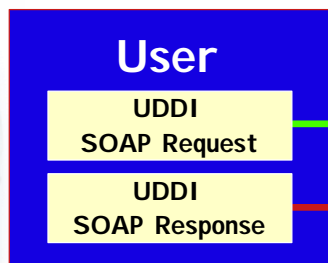
- Peer nodes (websites)
- Companies register with any node
- Registrations replicated on a daily basis
- Complete set of "registered" records available at all nodes
- Common set of SOAP APIs supported by all nodes
- Compliance enforced by business contract



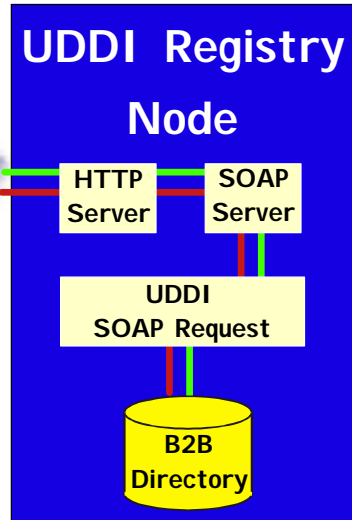
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# UDDI and SOAP



Create, View, Update, and Delete registrations



Implementation-neutral



## UDDI Roadmap



V1	V2	V3
Business Units	Corporations	Associations
3 Taxonomies	More Taxonomies	Custom Taxonomies
Descriptions of Services	Layered Services	Workflow
Sept 2000	March 2001	December 2001



## IBM's Web Services Strategy



**Mission:** Deliver Web Services solutions that will help our customers and business partners build, deploy, and manage e-business applications.

### We are doing this by

- ▶ Ensuring strong, open standards
- ▶ Enabling our entire product line for SOAP, UDDI, WSDL, and emerging Web Services technologies
- ▶ Building e-business solutions

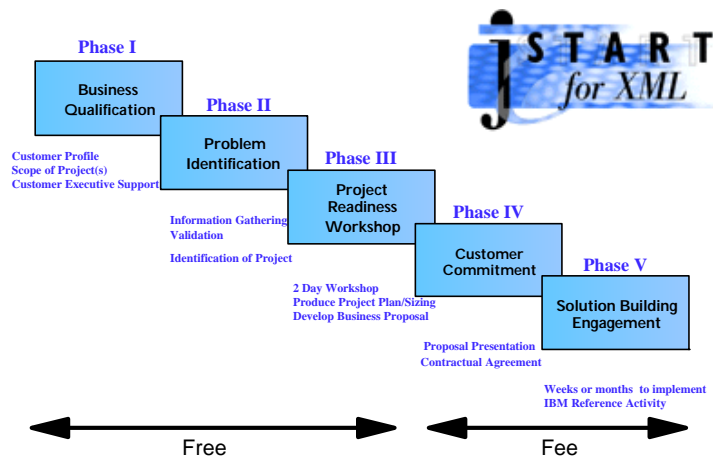


## Web Services in IBM Software

- SOAP4J and UDDI 4J in WebSphere
- DB2 Universal Database: XML Extender
  - web services for query retrieval
  - stored procedures in WSDL
- MQ Series
  - technology preview of SOAP in 1H2001
- Visual Age for Java
  - wizards and tools for developing Web Services applications faster and easier
- Lotus Domino:
  - enable Domino Services as Web Services
  - incorporate SOAP interfaces and XML-based messaging



## Building Web Services solutions



We use a "jumpstart" approach to help customers successfully build e-business solutions using XML, starting with education and ending with services.

Case studies are at [www.ibm.com/xml](http://www.ibm.com/xml)



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## Free! Web Services Resources

- [ibm.com/services/uddi](http://ibm.com/services/uddi)
  - ▶ IBM's UDDI registry, our resources for UDDI
- [ibm.com/developer/webservices](http://ibm.com/developer/webservices)
  - ▶ massive search engine of web-wide resources
  - ▶ tutorials, technical articles, source code
  - ▶ industry news: business and standards
- [ibm.com/alphaworks](http://ibm.com/alphaworks)
  - ▶ free downloads of useful tools and resources
  - ▶ shows direction of our products
- [oss.software.ibm.com](http://oss.software.ibm.com)
  - ▶ UDDI 4J and other open-source software from IBM

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Want to see who's out there?  
[Locate a business or service](#)

Want to try it out?  
[Locate a business or service in the Test Registry](#)

**Spotlight**

IBM open sources technology for accessing UDDI Business Registry  
You can [read](#) how IBM is continuing its commitment to open source implementations of standards for Web Services.

IBM announces the addition of new technologies for the [Web Services Toolkit 2.1 on alphaWorks](#)

IBM extends the horizon of e-business with Web services  
To learn the latest about Web services, a new type of application that has the potential to revolutionize B2B...

If you do not have the free Acrobat Reader plugin, you can download it here: [Get Acrobat Reader](#)

**ibm.com/services/uddi** Downloads

Search **ibm.com/services/uddi**  
Universal Description, Discovery and Integration

Developer resources

**UDDI API**  
Web-based services provides the next evolutionary application for the World Wide Web (WWW). Open and programmable elements that are available and freely accessible can be used to promote and discover this new category of service.

**developerWorks**  
Need it? Get it. Tools, code, and tutorials for open standards-based development.

**alphaWorks**  
Direct access to IBM's emerging technologies over the Internet.

**WebSphere Developer Domain**  
Developer resources for understanding and working with the WebSphere software platform for e-business.

**UDDI.org**  
An open B2B framework for describing services, discovering businesses, and integrating business services using the Internet.

**Download the IBM Web Services Toolkit**  
design and execute web-service applications; this toolkit is a runtime environment complete with demos and example.

**Developing wireless Web applications**  
Use Wireless Markup Language to make your Web apps accessible from a mobile phone.

**Is your site accessible?**  
Find out what makes a Web site accessible to disabled users -- and whether yours needs to comply.

**XML resources**

**Messaging: the transport part of the XML puzzle**  
A guide to technologies, protocols, and future directions.

IBM Services/UDDI  
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**FEATURE: Matchmaking for Web services**

 UDDI4J is an open-source registry implementation from IBM. Follow Doug Tidwell as he shows how to build applications that can make use of a [UDDI registry](#).

**Highlights**

- Follow Greg Flury as he explores an [application service provider portal](#) implemented in Web services. (Articles)
- We continue Greg Flury's detail on how to build an [application service provider portal](#) using Web services. (Articles)
- This piece explains the [upcoming ebXML standard](#) from the OASIS group and the United Nations, how it will affect future global e-commerce, and how it relates to Web services. (Articles)
- Learn how to create [technology environments](#) that suit the needs of producers and requestors. (Articles)
- [Apply WSAT to WSDL](#) to allow current applications to take advantage of Web services. (Articles)
- The [Source4Me demo](#) is a real Web services application that makes use of several services online, published through a common broker, and located dynamically by the application.
- Let Doug Tidwell educate you about Web services with this [tutorial](#). (Education)

**Columns**

 **The Web services (r)evolution, Part 4**  
By Graham Glass  
In this [installment](#), Graham explains WSDL, how to describe the core properties of a Web service, and introduces tools that leverage WSDL to accelerate your development process.

 **The Python Web services developer, Part 1**  
By Mike Olson (pictured here) and Mike Olson  
Snake your way into Web services using the Python programming language and its impressive tool. This [new column](#) begins with an introduction to the language and the tools.

**Letter from the editor**  
Find out what the [Web Services special topic](#) is all about and how it can help you.

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[WSDL Toolkit 1.1](#)  
[XML & Web Services Development Environment](#)

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[WSO: Workshop on Web Services \(onTrack\)](#)  
[Core's Sunny shares his views on Microsoft's Web open source, Linux, and Core's future \(PC World\)](#)  
[Sun launches Web Services strategy \(Network Computing\)](#)  
[Nalan Java version 2.0.0 released \(Apache XML Project\)](#)

**From IBM**

IBM developer domain  
WebSphere  
VisualAge for Java  
Lotus  
Notes.net

Related IBM sites  
[alphaWorks \(code\)](#)  
[Partner program](#)  
[Tool subscription](#)

IBM Worldwide  
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## IBM's Web Services Toolkit

- An implementation of the Web Services architecture for creating, locating and invoking web services
- Access web-based server, or use a local test registry (supported)
- Useful papers on Web Services
- Includes IBM WebSphere Application Server
- Needs only a JDK to run
- Available for free download from <http://ibm.com/alphaworks>



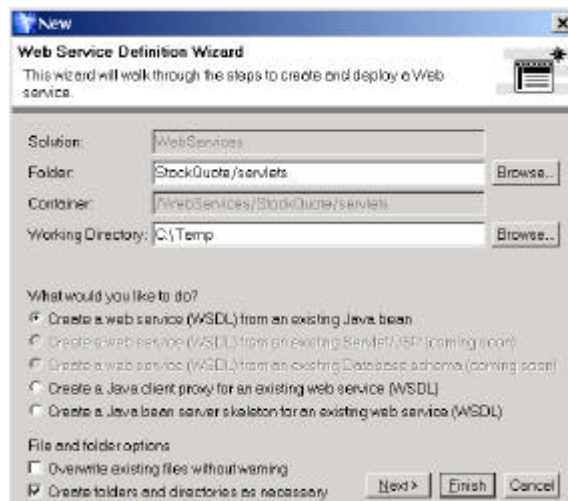
## UDDI 4J: now open-source!

- Open-source Java bindings for UDDI messages
  - ▶ Creates SOAP messages via Java method calls with same "API" as UDDI messages
  - ▶ Other housekeeping chores to make your UDDI implementation work easier
- Read Doug Tidwell's "UDDI 4J: Matchmaking for Web services" to get started
  - ▶ [ibm.com/developerworks/library/ws-uddi4j.html](http://ibm.com/developerworks/library/ws-uddi4j.html)
- UDDI 4J source and binaries available
  - ▶ [oss.software.ibm.com](http://oss.software.ibm.com)  
(IBM's open source software site)
  - ▶ OSI -approved open-source licence



## XML and Web Services Development Environment (DE)

- Tool suite for developing XML applications, and creating and accessing Web Services
- available at <http://ibm.com/alphaworks>



## Web Services: Business Revolution

- A revolutionary new approach to doing e-business
  - ▶ a global electronic yellow pages of business products and services
  - ▶ fosters new business models like marketplaces, auctions, dynamic e-business integration with newly-found business partners
- Opportunities: third-party value-added
  - ▶ industry-specific marketplaces
  - ▶ vendor history and selection services
  - ▶ wide-open! how could YOU use this valuable business information?



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## Web Services: Software Evolution



- **NOT a software revolution**
  - ▶ builds on existing standards
  - ▶ extends your existing systems
  - ▶ does not require a new programming language
- **SOAP model is not new**
  - ▶ similar in some respects to RPC of 20 years ago
- **What's new: the added power of internet standards for remote object invocation**
  - ▶ use of implementation-neutral message format
  - ▶ UDDI : a universal directory of available services
  - ▶ layered services for business aggregation



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**What does this tree  
have to do  
with the Internet?**





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# The Expanding Internet Foundation

Common Interoperability Standards for e-business are layered like rings of a tree

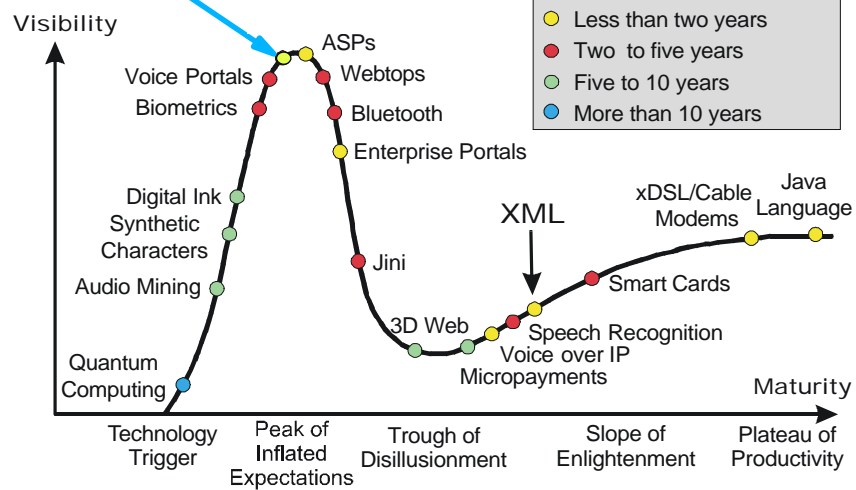


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# Where is Web Services Going?

## Web Services



Will Web Services rise faster than XML?





## Web Services: Summary

- **Software evolution, Business revolution**
  - ▶ describe, discover, integrate services
  - ▶ increase market reach, syndicate assets, decrease connection costs
  - ▶ Large role for e-marketplaces, portals, xSPs
- **Open standards is a requirement**
  - ▶ Build on current B2B standards stack
  - ▶ IBM leads adoption of emerging standards
  - ▶ Platform-neutral claims get put to the test
- **Get started now with IBM**
  - ▶ WebSphere platform meets requirements
  - ▶ Web Services Toolkit, Development Environment
  - ▶ jStart Web services consulting
  - ▶ Partnerships with the early adopters



## Questions?

[ibm.com /services / uddi](http://ibm.com/services/uddi)

UDDI registry and resources

[ibm.com / developer / webservices](http://ibm.com/developer/webservices)

tutorials, technical papers, industry news, source code:  
all about UDDI from SOAP, web-wide resource index

[ibm.com / alphaworks](http://ibm.com/alphaworks)

free: web services toolkit, dev environment, many XML tools

[xml.apache.org](http://xml.apache.org)

Apache open-source Software Foundation,  
home of SOAP4J

[oss.software.ibm.com](http://oss.software.ibm.com)

IBM's open-source software, including UDDI 4J

[uddi.org](http://uddi.org)

official site for UDDI organization

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[ibm.com/developerWorks/speakers/colan](http://ibm.com/developerWorks/speakers/colan)

PDFs of this and  
other presentations  
are available  
on this site

