Will Web Services Cause the Widespread Adoption of the Internet by Business?

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Agenda

• Today’s Business Environment
• Web Services Architecture
  – Architecture Framework
  – Web Services Basics
  – Security
  – Other Areas
• Will Web Services Succeed?
• Conclusions
Today’s Business Environment
Business Challenges
Market Dynamics Create Pressure

- Make information transparent and available
- Increase focus on the customer
- Drive competitive advantage

- “Do more with less”
  - Reduce Costs
  - Improve Productivity and Responsiveness
  - Leverage Existing Assets

- Too many point technologies and legacy systems
- Incompatible development and administration environments
- Move to web-centric architecture
Business Challenges
Reduced Effectiveness & Agility

- Business Challenges Result in Compromised Effectiveness and Agility
  - Low Customer Satisfaction, Employee Productivity
  - Manual and Inefficient Business Processes
  - High-cost Customer and Partner Interactions
  - Technology Complexity and Inflexibility
**Imperative**

Integrate to Meet Challenges

**Business Challenges**

- Limited Access to Business-Critical Information
- Lack of Business Process Visibility and Management
- High Cost Business-to-Business Interactions
- Need to Leverage Existing Technology Investments
- Infrastructure Complexity

**CIO Imperatives**

- Integrate Core Applications and Data Sources
- Streamline Processes Across the Extended Enterprise
- Reduce the Cost of B2B
- Integrate Existing Systems, “Build to Integrate”
- Build, Integrate and Deploy on a Unified Platform
Top CIO Priority: Integration

What is your top strategic software project over the next year?

Integration
E-business
Customer Relationship Management
Supply Chain Management/Logistics
Human Resources
Database Software Upgrade
Intranet Improvements
Financial (Accounting)
Marketing Apps on Web site
E-procurement Web site
Commerce Server on Web site
Systems Management Infrastructure
Building Internet Base Company
Engineering Software
Manufacturing Software
Other
Deregulation

Source: Morgan Stanley Dean Witter, 2001
Value of Integration

- Simplified, Streamlined Business Processes
- Access to Critical Information
- Profitable Business Partnerships
- Rapid Return on New Applications

“35% of all IT spending is for application integration”

-- Roy Schulte, Gartner
Value of Integration: Streamlined Business Processes

• Business Process Management
  – Manage processes across multiple systems
  – Centralize business process management and automation across the extended enterprise

• Business Value:
  – Shorter Order Fulfillment Times
  – Greater Visibility to Business Processes
  – Quicker Response to Business Changes
  – Automation, Increased Profitability and ROI
Value of Integration: Access to Critical Information

• Application Integration
  – Leverage information across applications, data sources and legacy systems
  – Web-enable systems with integrated enterprise portals

• Business Value:
  – Improved Decision Making Capabilities
  – Single View of Customer Information
  – Leverage Existing IT Investments
Value of Integration: Profitable Business Partnerships

• Business-to-Business Integration
  – Build secure, Internet-based connections with partners and customers
  – Enable collaborative processes management across the extended enterprise

• Business Value:
  – Lower Cost of B2B Interactions
  – Greater Value of Business Partnerships
  – Larger Trading Partner Network
Value of Integration:
Rapid Return on New Applications

• Build and Extend Enterprise Systems
  – Build applications with integration capabilities
  – Process-enable custom applications

• Business Value:
  – Leverage Skill Set Across Development and Integration Projects
  – Immediate Return on New Applications
  – A Simplified Architecture: Single infrastructure for development, deployment and integration
Web Services Architecture
Web Services Definition

“Web services are content and software processes delivered over the Internet using loosely coupled messages (and increasingly, XML interfaces) that ‘service’ a particular set of user needs.”

David Smith, Gartner Group
11 October 2000
The Internet Revolution

• Business to Consumer
  – Retail Stores
  – Mail Order
  – Telephone Call Centers

⇒ Pervasive Web Access

• Business to Business
  – Private VANs and EDI
  – FAX
  – People and Telephones

⇒ Universal Connectivity

• Lower Costs to Build and Sell
• Global Reach to customers and suppliers
⇒ Greater ROI
Loosely-Coupled and Tightly-Coupled

**Tightly-Coupled**
- High Degrees of Interdependence
- Difficult to change parts
- Synchronous Invocations (RPCs, conversations)
- Implicit State Sharing
- Implicit Contexts
- 2PC Transactions
- Best for *intra*-enterprise

**Loosely-Coupled**
- Greater Independence
- Much easier to change parts
- Asynchronous invocations (messaging)
- Meta-Data Sharing
- Explicit Contexts in messages
- Workflow
- Ideal for *inter*-enterprise

**CORBA 2, J2EE 1.2, and DCOM are all tightly-coupled**

**CORBA 3, J2EE 1.3, and .NET add loosely-coupled capabilities**

Web Services is an architecture for loosely-coupled applications
Why Loose Coupling
Booking a Business Trip

Start  \[\rightarrow\]  S1  \[\rightarrow\]  S2

Check flight Schedules

S2  \[\rightarrow\]  S3

T1  \[\rightarrow\]  S4  \[\rightarrow\]  S5

failure

T2  \[\rightarrow\]  S6  \[\rightarrow\]  S7

Cancel

S8

End

flight  \[\rightarrow\]  hotel  \[\rightarrow\]  car

Reservations
Web Services Architecture: Functional Overview

Delivery
- Access
- Discovery
- Presentation
- Personalized Content

Business Process Choreography

Integration Legacy

Business Logic Components

Container
- System Services

Policy and Management
- Identity
- Security
- User Administration

Platform
- OS
- Hardware
- VM
- etc.
Web Services Basics

• Wire Protocols
  – The components representing what is sent during a given exchange; data, the envelope and the metadata necessary for a meaningful transmission

• Description
  – The specifications required for the format definition, use or application of the wire components

• Discovery
  – The specifications that provide the mechanisms for automatic searching and discovery of the components in the Wire and Description stacks
Wire Protocols

• Message envelope & controlled extensibility (XML)
  – Versioning
  – Mandatory and optional message parts

• Message Exchange (SOAP)
  – A syntax for packaging XML documents for distribution across a variety of transports
  – Defines rules for encoding and decoding data on the wire
  – A framework for strong exception handling

• Binary attachments (MIME, DIME)
Description

• **XML Schema**
  – An XML-based syntax for declaring content models
  – All the functionality of a Document Type Definition (DTD), but with additional functionality such as data typing
  – The vocabulary of an XML Schema document is comprised of about thirty elements and attributes

• **Service Description**
  – Web Services Definition Language (WSDL)
  – Messages, sent and received, protocols used to exchange them, logical ports associated with services, transport bindings
  – Functionally analogous to IDL
Discovery

• Universal Description, Discovery, and Integration (UDDI)
  – Enables a web service to obtain metadata about itself such as
    • a service description
    • process flow or
    • related contracts.
  – A protocol to obtain identifiers of services based on given characteristics
  – Functionally similar to CORBA Trader
Security

Elements of a Secure Infrastructure

• Trust
• Authorization
• Authentication
• Confidentiality
• Audit
Authorization and Authentication

- **SAML**
  - an XML Framework for Exchanging Authorization and Authentication Info
  - OASIS Committee Spec

- **XACML**
  - an XML specification for expressing access policies
  - Active OASIS TC

- **WS-Security**
  - SOAP enhancements for Quality of Protection
  - Active OASIS TC
  - Based on IBM, Microsoft, and Verisign specification

- **Liberty Identity**
  - Single sign-on
  - Federated Userid/password management
  - 1.0 Spec released October 2002
  - Liberty Alliance Project

- **Passport**
  - Single sign-on
  - Centralized Userid/password management
  - Microsoft .NET
Confidentiality and Trust

- **SSL**
  - Total message encryption (including headers)
  - Based on Public Keys
  - IETF Standard

- **XML Encryption**
  - Partial Message Encryption
  - Result represented in XML
  - W3C Candidate Recommendation

- **XML Digital Signatures**
  - Allows XML documents to be signed
  - Non-Repudiation
  - W3C Recommendation

- **XML Key Management**
  - Offloads key management to a trusted server
  - W3C Note
Other Areas

• Choreography
  – Valid sequences of messages
  – Relationships between messages and the business processes they initiate
  – Relationships between messages and the (external) contractual provisions they pertain to.
  – Examples:
    • BPEL4WS (BEA, IBM, Microsoft)
    • WSCI (BEA, Intalio, SAP, Sun)

• Transactions
  – BTP (OASIS Committee Specification)
  – WS-Transactions/ WS-Coordination (BEA, IBM, Microsoft)

• e-Business (ebXML)
# Web Services Landscape

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<th>Management</th>
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<td>Business Processes</td>
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<tr>
<td>Transactions</td>
<td>BPEL4WS, ebXML BPSS, WSCI</td>
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<td>Security</td>
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<tr>
<td>Reliability</td>
<td>Security</td>
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<td>XML Digital Signature, XML Encryption, SAML, WS-Security, XACML, SSL</td>
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<tr>
<td>Description</td>
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<td>WSDL, UDDI</td>
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<td>SOAP (XML Protocol), ebXML MRP</td>
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**Key:**
- W3C
- OASIS
- IETF
Will Web Services Succeed?
Web services: An industry effort

- SOAP submitted to the W3C in April, 2000, by 11 companies.
- W3C Web Services Workshop in April, 2001, attended by over 70 people.
- WS-I.org launched by 55 companies, 150+ now members – including Sun
- UDDI.org membership topped 300 companies before transfer to OASIS (July 2002).
- WS-Security submitted to OASIS by 18 companies, now over 50 companies involved.
Standardization Activity

“The nice thing about standards is that there are so many to choose from.”

Anonymous

http://www.zapthink.com/reports/poster.html

..\..\Standards\zapposter.pdf
WS-I.org

• Launched February 6, 2002

• Membership has grown to 150+
  – users and vendors
  – world wide representation

  http://www.ws-i.org/community.aspx

• Focus on member participation:
  – identify and define the issues,
  – staff the Working Groups,
  – approve the deliverables.

• First drafts out now for public comment
Conclusion

• Forty years of IT have resulted in a myriad of stovepipe business systems that communicate ineffectively, if at all

• The new business environment, made possible by the Internet, requires enterprises to integrate to efficiently deliver information to customers, partners and employees

• The successful companies in the 21st century will be those that solve their integration problem better than their competitors
Conclusion...

- Integration is a complex problem, but today’s solutions are more complex than they need to be.
- The convergence of application servers and integration servers offers the promise of a standards-based solution for the first time promising:
  - less complexity
  - reduced cost, and
  - “built-to-integrate” applications
Conclusion...

- Web services architecture is ideally positioned to address these business issues
  - Loosely-coupled architecture
  - Industry driving toward convergence, rather than divergence
  - Broad adoption enables more customer choice and lower cost

- If this continues, web services will enable business to realize the true potential of the Internet

Watch this space !!!