Category: Concepts, Trends, and Challenges

Web Services and B2B Collaboration

Susy S. Chan
DePaul University, USA

Vince Kellen
DePaul University, USA

INTRODUCTION

Web service technology is moving into the mainstream. HTTP-based integration is proving more useful than prior approaches for integrating heterogeneous and distributed systems. Web service architectures are quickly advancing beyond and becoming more complex than their initial XML (extensible markup language)/SOAP (simple object access protocol)/UDDI (universal description, discovery, and integration) architectures. With added specifications, Web services are creating a service-oriented computing paradigm with their attendant terms and concepts, such as Web service networks, Web service management platforms, and service-oriented architectures (SOA), among others. Aided by Web services, business-to-business (B2B) integration topologies are growing in diversity to support various options for B2B collaboration. Web services are now the primary technical direction enabling this diversification of B2B collaborations (e-collaboration) among value chain partners and customers. They form the foundation for the development of a new generation of B2B applications and the architecture for integrating enterprise applications (Kreger, 2003). Web services promise to increase these partnering companies' flexibility, agility, competitiveness, as well as opportunities to reduce development cost and time.

BACKGROUND

B2B Collaboration

The Internet has reshaped industry value chains and redefined e-business as collaborative commerce. In this environment, companies collaborate with suppliers, distributors, service providers, and customers to produce value for customers. Such collaboration turns participating companies into virtual enterprises that emphasize rapid exchange of information among participating companies and inter-organizational systems to facilitate communication, coordination, and collaboration. A new IT-enabled intermediation and an integrated virtual value chain are emerging. The Internet facilitates supply chain integration through greater coordination and collaboration among all members of a company's supply chain (Lee & Whang, 2001). Such integration emphasizes information sharing, transparency, data integrity, and flexibility. Its benefits are clear: cost and time reduction, real-time communication, lead-time reduction, and improved collaborative planning and forecasting.

Web Services Growth

Businesses have indicated strong interests in deploying Web services in the near future. A recent Yankee Group survey of 437 companies reports that 48% of respondents have already deployed Web services and another 39% expect to deploy the technology within a year (Scurmacz, 2004). The top reasons for early adoption include: (1) the ability for an enterprise to enhance its capability to collaborate with external partners (77%); (2) the ability to reduce complexity in distributed applications (66%); (3) the ability to drive increased revenue in the next two years (66%); and (4) the ability to lower development costs (58%).

In a February 2002 Gartner survey, 27% of the IT respondents indicated that they would be using Web services in a systems integration project within 12 months. By February 2003, that number had risen to 42% (Cantera, 2003). The technology research firm, IDC, predicts that Web services will spur software, hardware, and service sales of $21 billion in the U.S. by 2007 (Muse, 2003).

WEB SERVICES TODAY

B2B e-commerce is entering a phase of technological maturity in which major open standards are adopted to enable inter-firm integration and collaboration. Web services are a significant enabler of this move toward inter-firm cooperation by promoting technology trust between enterprises through their deployment and use. The role of Web services in B2B e-commerce builds technology trust and indirectly influences performance outcomes.

Types of B2B Collaborations

Companies have various options in pursuing B2B collaborations (Ranganathan, 2003). Web service technology can be implemented to support these collaborations through various means. Table 1 identifies these options and the opportunities to adopt Web service technology for each option.

Web Services Standards

Web services can be thought of as a means by which an application service may be provided to other applications on the Internet. XML is the foundation technology in Web services, as all access to the services are delivered in XML documents via HTTP. Web services are described in the Web services description language (WSDL). Web services can optionally be registered in the UDDI repository where other applications can both register and discover services. Web services can be revealed and accessed within a company and between companies, as well as on the public Web.

Web service technologies address heterogeneity problems that previous technologies could not overcome. For years, IT organizations have sought increased system reuse and interoperability between systems (Lim & Wen, 2003). Since Web services operate via the HTTP protocol, they are more firewall-friendly than older object-oriented technologies. With UDDI, Web services have a consistent approach to introspection that older object-oriented technologies do not. And with SOAP, access to objects can be standardized as well, unlike object-oriented technologies such EJP, CORBA, and COM+.

Web services are now increasing in sophistication. Service-oriented computing and architectures are taking Web services beyond supporting simple XML interactions to more robust business interactions within and across enterprises (Curbera, Khalaf, Mukhi, Tai, & Weerawarana, 2003). Specifications for quality of service and service composition such as business process execution language (BPEL) for Web services (BPELWS) currently authored by IBM, Microsoft and BEA, WS-Coordination, WS-Transaction, WS-Security, WS-Reliable Messaging, and WS-Policy will allow for far richer, higher-level delivery of computing services via a Web services management platform (WSMP). Papazoglou and Georgakopoulos (2003) describe three layers of services: basic services, composite services, and managed services. Basic services manage publication, discovery, selection, and binding. Composite services facilitate coordination, conformance, monitoring, and quality of service. Managed services provide market certification, rating, service-level agreements, and operations support.

Business Drivers for Web Services

Because Web services can be layered on top of existing software applications and accessed across a value chain, Web services are a modest, incremental technology investment with a fast return. Development time for solutions spans weeks, not months. Different industries will have different drivers for Web services. For example, financial services will need business process improvements over the next four or five years. Web service solutions that support supply chain integration and collaboration first require streamlining business processes. Some companies will find a way to offer their core competencies as Web services to customers, enhancing their revenue streams (Boynton, 2003).

Organizations can benefit from Web services at three levels—infrastructure, operations, and strategic (Huang & Hu, 2004). Infrastructure values stem from using industry-accepted standards and protocols to ensure interoperability among diverse systems. Standardization facilitates information sharing and knowledge transfer within and across firms. Operational values stem from efficient applications development and reuse, based on standards, resulting in efficient and effective business operations. Strategic values relate to SOA, which facilitates the adaptation of IT functions to exchange data internally and with collaboration partners. A flexible IT infrastructure can enhance organizational agility. The

Table 1. Web services for B2B collaboration: Options, requirements, and value propositions

Collaboration Options	Requirements	Values of Web Services
Buyer-based, one-to-many private exchange	Forge a strong collaboration with supply chain partners	Lower cost of transactions, increased integration
Seller-based, one-to-many private exchange	Foster collaboration with the end customers	Customer retention
One-to-one proprietary linkages	Extend a firm's traditional EDI- or EAI-integration	Enhanced application integration
Independent, public many-to-many exchange	Strengthen the role of intermediary in the exchange	Economies of scale, security, access
Consortia-based many-to-many exchange	Attain common goals of participating companies	Process integration, flexibility