Taking B2B to the next level.

A business brief about Web services
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Executive summary

The emergence of Web services represents the next evolution of e-business. Web services are Internet-based applications that fulfill a specific task or a set of tasks, working with many other Web services to carry out their part of a workflow or business transaction. The modularity of the Web services allows businesses to mix and match them to create innovative processes and value chains that deliver superior customer utility and ultimately increase shareholder value. Users can access them online and offline through any touch point such as PCs, cell phones and personal digital assistants. Web services communicate with each other, sharing information about their functions and roles in an application workflow, the inputs they require and the outputs they generate. The result is just-in-time integration of business applications.

The advent of Web services will bring about new opportunities in the business landscape. Web services can help facilitate a dynamic, global marketplace where businesses rapidly create new innovative products and serve customers better. With Web services, every business, irrespective of its size, can participate in the e-marketplaces quickly enter into new markets and better integrate a variety of channels. Web services will accelerate outsourcing by giving businesses the ability to purchase interoperable Web services that fill their specific business needs such as billing, order management and customer relationship management. In turn, companies will be able to focus more of their energies and capital expenditures on building their core competencies to create customer and shareholder value. Application development will become similarly efficient through the ability to easily find and reuse Web services created in-house as well as by application vendors and other businesses.

Many of the technology requirements for Web services exist today: open standards for business-to-business applications; mission-critical transaction platforms; and secure integration and messaging products. To enable true dynamic integration, however, new industry standards and tools that extend the capabilities of today’s B2B interoperability are required. To this end, IBM, Ariba and Microsoft recently announced a joint effort to jump-start development of a new open standard called Universal Description, Discovery and Integration (UDDI). The three companies are accompanying this effort with the implementation of a Universal Business Registry that will serve as a global listing for Web services. These industry initiatives will be quickly augmented by new products and services designed to help companies Web service-enable their businesses.

To prepare for the opportunities and competitive threats Web services will bring, executives first need to understand what Web services are and how the market is likely to evolve. Next, they need to understand the technology requirements for Web services so they can invest in platforms and applications today that will enable them to quickly and effectively realize the benefits of Web services. Finally, successful adoption in an
enterprise requires a thorough understanding of how particular businesses — such as vertical e-marketplaces, e-procurement hubs and service providers — can use Web services to improve their profit models. This paper addresses the potential of Web services to address e-businesses challenges and how IBM helps customers design and implement solutions to make that potential a reality.

The evolution of e-business: Where do we go from here?
Companies have been able to offer innovative products and services through e-business; open new markets; cross geographic boundaries; improve operations; and strengthen customer, business partner and supplier relationships. Today, sharing information between businesses and consumers around the world is a reality largely due to the World Wide Web. The Web provides a universal platform for presenting and indexing information, increasing the dissemination of content to unprecedented levels. This universal platform has allowed companies to move beyond one-to-one business relationships and begin to realize the benefits of participating in an e-marketplace model. We see this trend manifested in independent e-marketplaces where companies participate with competitors to gain benefits such as industry-wide cost savings, in private corporate e-procurement solutions and in the greater Internet market where B2B commerce increasingly takes on the characteristics of syndication. Syndication is attractive because it enables a company to market its assets — such as news or stock ticker services — to many Web sites with, in theory, a minimal amount of new investment. In all these forms the e-marketplace model increases revenue opportunities, lowers costs, adds flexibility in bringing new products to market and offers customers increased and improved choices.

For the e-marketplace model to realize its full potential, e-businesses must be able to dynamically integrate rich business services. Today, business-to-business and business-to-marketplace connections cannot be established or altered on-the-fly to meet changing requirements, and syndication is largely confined to text-based information rather than transaction-based services.

Three primary challenges inhibit the evolution of B2B:

- Implementing business-to-business partnerships requires customized connections between each party. These connections are costly and time-consuming enough that they establish a practical limit on the number of partnerships that can be implemented reasonably.

- The opportunity to dynamically license online business services to other portals, Web sites or third-party services is limited because it is not easy to package and publish individual applications in a ready-to-use format.

- While business practices and technology are increasingly intertwined, today there is no global method for describing and finding business services, rather than just information, delivered over the Internet.
**Web services: building just-in-time solutions**

*Web services defined*

Web services are Internet-based, modular applications that perform a specific business task and conform to a particular technical format. A Web service can be anything from a restaurant review article to a real-time travel advisory to an entire airline ticket reservation process. The technical format ensures each of these self-contained business services is an application that will easily mix and match with other services (from the same or different companies) to create a complete business process. This interoperability allows businesses to dynamically publish, discover and aggregate a range of Web services via the Internet to more easily create innovative products, business processes and value chains.

*Friendlyloans.com: An example of Web services*

Both online processing of a loan application and credit verification, which represent single steps in the loan approval process, can be viewed as services (See Figure 1). From the loan applicant perspective, approval or denial constitutes the delivery of service. The bank approving the application on the other hand sees credit verification (which could be provided by a third party) as the delivery of service. Any functional need or benefit served by today’s packaged applications can be viewed as a service.

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*Figure 1: Friendlyloans.com: Outsourcing with Web services*
Building on today’s e-business platform

Web services are an evolution of e-business. They improve the ability to achieve e-business goals that IBM has been helping many of its customers address for years — get online fast, innovate to beat competitors to market, increase customer loyalty and improve supply chain performance. It is logical then that the foundation for Web services is already in some current e-business products and practices. For example, IBM provides the IBM WebSphere® software platform for e-business, a full line of standards-based products for B2B, B2C and e-marketplace business models and integrated rapid development tools. As the next section of this paper outlines, the industry must build new capabilities in order to fulfill the full promise of Web services. An important question for any business is the following: “How easy will it be for our e-business vendor to extend its current products to meet the requirements of Web services?”

Web services requirements

The value of open standards, including the new UDDI specification

The ability to automatically aggregate business services to create a process such as the Loan.com example requires that each Web service be developed according to an accepted universal format based on open industry standards. This format includes well-accepted industry standards such as XML and new evolving standards being created through collaboration of industry leaders. In total, these standards will allow each Web service to contain a description of the business function it performs and how it can connect and interact with other services.

IBM is leading the effort to define and adopt the open industry standards contributing to the Web services format. IBM continues to play an active role in defining standards such as XML and has taken an active role in championing the development of new standards that will help complete the Web services format. IBM recently began a joint effort with Microsoft and Ariba to jump-start creation of a new open standard coined Universal Description, Discovery and Integration (UDDI). IBM is committed to working with industry organizations to develop the UDDI specification and to creating an open source project around the implementation of the specification. The IBM Web Services Toolkit provides preview technology and documentation designed to help developers gain experience in Web services technologies and open standards in use today. The toolkit will soon include support for UDDI as well. It is available via download from www.alphaworks.ibm.com.
Eventually, the standardized Web services format will provide the ability to define and accommodate the different business needs of transacting parties including their role in the process, their legal requirements, and business rules. For example, banks approving mortgages may want complete reports that date back several years while rental property management companies may only want to know if there has been a problem in the last two years. Today, one of the value propositions of an e-marketplace is to provide these value-added services; standards increase its ability to do so.

The value of a Universal Business Services Registry
The UDDI founders, IBM, Ariba and Microsoft, are also implementing a public global registry for Web services. Registration is available to any company that wants to register its business or search for products and services offered by other companies. As Web services become prevalent, the universal registry will help businesses locate each other and the services they need, similar to the role fulfilled by search engines to find Web sites and information today.

In the Universal Business Registry, companies can capture and find three types of information:

- **“White Pages” data** - general contact information about the company including addresses, fax numbers and Web sites.
- **“Yellow Pages” data** - a categorization of the type of products and services the company provides along with the geographic locations they serve.
- **“Green Pages” data** - a new category of information to initially describe a company’s online payment terms. For example, the green page data might specify that a particular e-commerce site supports the RosettaNet standard for exchanging purchase orders.

Ultimately, any Web service transaction interface can be described.

The Universal Business Registry will provide a way for businesses to begin to implement Web services simply by filling out an online form. The registry will provide a central repository that provides global visibility for businesses of all sizes. It could be regularly culled for new vendors and services that meet particular needs and monitored for the popularity and growth of particular types of connections. The registry will serve as an e-commerce directory with rich entries that accelerate the ability for businesses to interact with each other. Information about Web services and registration can be accessed through the IBM Web site at [ibm.com/services/uddi](http://ibm.com/services/uddi).
Credit verification company: An example of UDDI put to work

The friendlyloans.com example (Shown in Figure 1.) illustrates how Web services can be combined to create an integrated business process. A closer look at the integration process between the credit verification company, which we’ll call CV, and its clients such as friendlyloans.com helps illustrate the benefits of new open standards and a universal registry. Today, CV establishes relationships with certain finance and mortgage companies such as friendlyloans.com. CV engineers the integration of its application with each of its partner’s systems on an individual project basis. Using open standards-based Web services will allow CV to publish in a universal format the types of electronic connections it supports. Its customers then conform to one of those connection types (or choose another verification vendor) and more easily integrate with CV out of the gate. Each of the companies in the friendlyloans.com example can also leverage the universal directory by executing period searches to identify potential new business partners.

While direct business-to-business connections are facilitated by standards and the directory, many other benefits can be realized through use of an e-marketplace. For example, let’s assume CV subscribes to an e-marketplace. In this case, the universal format helps CV package its verification application as a self-describing stand-alone service and publish that service to the e-marketplace, greatly expanding its market. Because the universal format allows any member bank or mortgage company to find and evaluate CV’s service for possible integration with its own application process, the result is a larger customer base and increased revenue for CV, and better choice at lower costs for the consuming banks.

An e-marketplace can also leverage the Universal Business Registry to provide CV with value-added services such as prescreening of prospective clients according to the company’s e-marketplace profile and creation of business intelligence reports that help CV decide what new connection types and business services its clients need. Other types of third parties can provide value as well. For example, a service provider might guarantee different levels of qualities of service for transactions while a vertical real estate portal might combine CV’s credit verification process with supplementary services such as real estate lawyers and escrow companies to increase the use of CV’s offering.

IBM is expanding on the UDDI specification and registry in its products and services to help its customers quickly leverage Web services technology into useful business applications. For example, IBM products such as the IBM WebSphere Commerce Suite, including Service Provider and e-marketplace Edition, already focus on meeting the needs of value-added brokers and the IBM Websphere software platform will naturally evolve to incorporate new business-to-business standards and tools.
Value of a mission-critical transaction platform
Decreasing the friction associated with finding and integrating business services will result in an increase in the number of transactions executed. The ability to manage and respond to transactions depends on the infrastructure a business chooses, whether it is managed in-house or outsourced. For an e-business software platform to meet the transactional demands of Web services, it should have a proven track record in handling large and unpredictable levels of transactions. It should operate across a number of platforms, so that as the needs of the business grow — it participates in more e-marketplaces, publishes more services — the applications can be expanded to new types of hardware and operating systems. Integration technology should provide assurance that the transactions will connect with legacy systems — both yours and your partners’.

The IBM WebSphere software platform for e-business is based on an award-winning foundation including WebSphere Application Server and IBM MQSeries®. The application server is fine-tuned to reliably handle the tremendous volume of transactions these players experience today and will need to manage with the advent of automated Web services. The MQSeries family provides industry-leading reliable messaging and integration products. Foundation extensions in the WebSphere software platform include WebSphere Edge Server for managing Web server performance across a network and WebSphere Personalization for personalizing the end-user experience.

Value of maximizing development resources
Maximizing development resources is a critical business factor in every e-business project. The following guidelines will help your company generate better returns with its development time and money as Web services emerge:

• Explore what vendors will allow you to leverage existing skills by exploiting new technologies like Web services through evolving current tools and development models. This not only leverages a company’s current investments but generates more predictable results by relying on proven tools and practices. Consider that Web services are a natural extension of web application programming so look for leaders in this space and evaluate their tools strategies.

• Look for a vendor that can improve your time to market. For example, IBM publishes best practices based on thousands of customer engagements. These e-business patterns provide businesses with a blueprint for developing solutions in particular industries and according to particular business models. IBM development tools themselves also feature rapid application development through high-level rules-based products that generate code for the developer and tight integration with the runtime products to shorten testing and deployment cycles.
Impact of Web services on your e-business
Web services technology allows companies to focus on their core business needs by providing flexible, best-of-breed application infrastructure that can accommodate rapidly changing conditions. By invoking and managing Web services that exist on the Internet and working seamlessly with existing applications and data sources, organizations can create innovative products and services that enhance their differentiation and competitive advantage. For example, when a company puts out a purchase request, its suppliers that have agreements and guidelines in place would be notified of the request, read it, decipher it, match it against their capabilities and respond with a proposal electronically. Web services on the Internet can enable all of these transactions without extensive programming and customization.

Web services exist to help e-businesses run at electronic speeds. In essence, they enable just-in-time application integration. Various applications available on the Internet can be accessed and invoked at runtime. IBM can provide tools and services to help companies rework existing applications into Web services as well as create new ones from scratch. Extending current applications into Web services provides a new source of ROA and new revenue opportunities. And with Web services architecture, as new and better applications emerge, they can replace specific components of the enterprise application integration (EAI) chain without disruptions. This is analogous to using Lego blocks to build a structure. Replacing one block doesn’t require dismantling the entire structure.

As mentioned earlier in this paper, Web services do not demand replacement of today’s e-business systems and processes. Web services represent an evolution of e-business that can open new revenue opportunities, lower costs and shorten time-to-market for new products and services. Although these goals will not be realized overnight, it is prudent to begin to plot a route that will allow a company, whether just starting up or well-established, to capitalize on Web services as it evolves.

A Web services road map: Where to start, how to grow
Phase I: A smoother on-ramp
In the first phase of adoption, Web services will ease the on-ramp or initial barrier to participating in the e-marketplace model in its various forms. Many business partners will still choose each other and negotiate terms primarily through human interactions,
but the standard format of Web services will lower the costs associated with establishing business-to-business commerce interfaces and encourage an increase in the number of partnerships. This will be true for businesses of all types and sizes. For example:

- Once a small business places an entry in the Universal Business Registry, it will receive global visibility. It will be able to immediately leverage the registry to find and sell goods and services with other small businesses. Public and private e-marketplaces that leverage the Universal Business Registry will also be able to provide economical on-ramps for their small business members benefiting all parties involved.

- Large enterprises, e-marketplaces and vertical portals that begin to use the standard registry process to facilitate the connection of businesses to their services will decrease the resources needed to facilitate the on-ramp process.

Many of the Web services will be reworked versions of existing applications. Developers can immediately experiment with the Web services model by accessing information at www.developerworks.ibm.com or downloading the IBM Web Services Toolkit at www.alphaworks.ibm.com.

Phase II: Value-added explosion
During the second phase of adoption, e-marketplaces, portals and ASPs will be able to connect to each other much more seamlessly, providing each of their member bases with access to more services and a greater number of selling opportunities. In addition, both private and public e-marketplaces will build on the Web services standards and implementations (like the UDDI registry) to free up a greater portion of their resources for development of premium services that perform tasks such as matching buyers and sellers, providing encryption and delivering business intelligence analysis.

Long-term: Just-in-time integration
In the long-term, as open standards become pervasive, their scope will encompass security features, authentication and payment systems. Automated search and discovery of services out on the Internet will become more commonplace. Software and hardware products will incorporate full support for creating and invoking Web services according to predefined filters, and fully dynamic just-in-time business processes and application development will begin to emerge.
Leveraging the phases of adoption
Following are some key questions to help you plan for implementing and using Web services in your business to build and sustain a competitive advantage.

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<th>PHASE I</th>
<th>PHASE II</th>
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<tr>
<td><strong>Business Questions</strong></td>
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<tr>
<td>Can Web services shorten project times and lower costs when creating</td>
<td>What assets can be packaged into syndicated services? How should they</td>
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<td>connections with chosen partners?</td>
<td>be priced?</td>
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<td>Are there areas to search for additional, possibly new or</td>
<td>Where in the organization does it make sense to exploit e-marketplaces</td>
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<td>specialized, suppliers? Or channels for our services?</td>
<td>as the connection costs come down?</td>
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<tr>
<td>What basic services should be advertised in the global UDDI business</td>
<td>What new aggregated, integrated services can be offered to increase</td>
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<td>directory?</td>
<td>customer acquisition and retention?</td>
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<tr>
<td><strong>Technology Questions</strong></td>
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<tr>
<td>Does our technology vendor understand our business?</td>
<td>Can my technology platform handle very large and unpredictable volumes</td>
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<td>of transactions?</td>
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<tr>
<td>Is our e-business technology built on open standards with a history of</td>
<td>Do our development tools and runtime products make it easy to leverage</td>
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<td>strong integration capabilities?</td>
<td>Web services technology standards?</td>
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<tr>
<td>Is our e-business transaction platform support highly scalable and</td>
<td>Does our e-business platform vendor show a clear evolution path to Web</td>
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<td>reliable?</td>
<td>services technology?</td>
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<tr>
<td>Does our technology vendor set new e-business trends or follow them?</td>
<td>Are application providers and integrators building Web services on our</td>
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<tr>
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<td>e-business vendor’s platform?</td>
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How IBM can help you profit from Web services
Because Web services are all about enabling technology and open standards to accelerate measurable business success, IBM is uniquely positioned to implement these next-generation application building blocks. IBM will help companies utilize Web services in four primary ways: development and use of open standards, software that exploits Web Services, consulting services and support for IBM Business Partners.
Leading open standards and practices
As IBM’s history with XML, tpaML — and now UDDI — and active participation in the Java™, Linux® and Apache projects demonstrate, IBM is a leader in setting e-business standards and advocating an open process for wide adoption of those standards. IBM will continue to dedicate resources to developing and implementing universal standards to remove the barriers of doing e-business in a heterogeneous world.

Enhancements to our software products
Current IBM software products are well-positioned to help customers leverage Web services opportunities. These products lead the industry in incorporation of open standards, scalable transaction support and integration capabilities. Future versions of WebSphere software platform offerings, including IBM VisualAge® tools and MQSeries products, will support the necessary technology to enable Web services. Today, a preview version of a Web services tool kit is available for download on the IBM AlphaWorks® site and as that technology is rolled into shipping products, an integrated set of tools for developing B2B services will be delivered. IBM is also exploring ways to enhance our servers and tools to make it easy for developers to expand UDDI taxonomy to build custom registries for use in e-procurement, e-marketplaces and portals.

Consulting services
IBM Global Services has a venerable track record in helping customers become e-businesses. Its consultants help companies leverage their existing infrastructure to enter new markets and become more efficient. They advise companies about how to establish an e-business platform that will take them to market quickly and grow with them over time. Expertise in e-business models and industry dynamics is now more valuable than ever.

The IBM jStart team has a proven track record in helping companies adopt new technologies. jStart consulting recently introduced a new Web services practice designed to help business executives and developers exploit this new technology. The jStart team will work with companies to define a road map and will leverage other IBM resources such as Global Services to best serve its clients.

Support for IBM Business Partners
IBM will focus on Web services in its IBM Business Partner program, helping businesses and developers to quickly leverage this opportunity with new solutions. Building on its strong existing partner network, IBM will provide software, hardware and hosted services that deliver business results to startups, small businesses, large corporations and developers. Existing programs such as the ASP Prime program, which helps software companies optimize their application for a hosted environment, are well positioned to extend their services to assist with Web services deployment.
Summary
Web services is an evolution of e-business that will enable the dynamic integration of business services, facilitating B2B and e-marketplace transactions; and supplier, customer and business partner collaboration. IBM provides a road map to guide the creation or evolution of your e-business so you can seize today's opportunities while positioning your business to profit from tomorrow's innovations.

For more information visit ibm.com/services/uddi.