

*Web Services – Could Marketing Be Reduced To A Set of “Objects”?*

## **Web Services – Could Marketing Be Reduced To A Set of “Objects”?**

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**Table of Contents**

Abstract .....	3
Introducing XML Web Services .....	4
An Illustration of the Application of Web Services .....	4
The Object-based Distributed Computing Architecture of Web Services .....	5
Finding Web Services .....	6
Applications of Web Services in Organisations .....	6
Future Developments .....	7
Conclusion .....	8
References .....	8

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**Abstract**

By enabling an affordable and efficient way of communication between servers of different platforms and locations using standard Internet technologies, Web services are on the way to be a tool that could revolutionise the way business is performed and how businesses are discovered by customers and business partners. However, a lot of work is still required in the development community in order for this type of communication to be secure. Necessary components such as user authentication still require standardisation by the community at large.

## **Introducing XML Web Services**

The introduction of XML (Extensible Markup Language) in the world of Internet technologies has seen a new milestone towards higher connectivity between computers. With XML, computers that were previously unable to exchange data because of dissimilarities, such as different operating system platforms, are now able to use XML as an intermediary tool of data interchange (Brunner et al, 2002). Although this language is coded using ordinary ASCII characters, the idea behind XML is far from simple.

Officially standardised by the W3C (World Wide Web Consortium) in 1999, XML has many advantages and capabilities that have led to its popularity as a standard format to transport and represent data. Firstly, XML is independent of platform, application or vendor. This means that it is not limited to run on any specific operating system such as Windows, Linux or MacOS, and it is not bound to any software application in the same way as, say DOC files are to Microsoft Word. Secondly, XML is highly “extensible” in its design. (Brunner et al, 2002) Extensibility basically means that it is dynamic and not “fixed” in anyway. An example of a “fixed” language would be HTML. HTML is in general only a language used by web browsers to display data and it cannot be theoretically “extended” onto, so enabling it to run on other applications. XML on the other hand is highly extensible because it is capable of “describing” its own data and allowing rules to be embedded into the code so that applications reading the XML code would know what type of data it describes and how the data should be handled. In fact, if you used the correct XML grammar rules, you may write HTML documents with XML! This type of HTML is commonly known as XHTML.

Because of the extensible nature of XML, Internet developers see it as a powerful toolkit that would forever stay with the web, rather than just another fad computer language. As a toolkit, XML has started another revolution of networked computing. It is now possible to use XML as a high-level data transport protocol instead of only a document format to describe data. A new XML protocol that has been on the lips of developers from all over the world is SOAP (Simple Object Access Protocol). The emergence of SOAP and its closely related cousin, XML-RPC (Remote Procedure Calls), have given birth to the XML Web services movement (Brunner et al, 2002).

Here is a definition of Web services given by IBM: “Web services are a new breed of Web application. They are self-contained, self-describing, modular applications that can be published, located, and invoked across the Web. Web services perform functions that can be anything from simple requests to complicated business processes.” (Tidwell, 2000) From this definition, we could see that Web services are web-based applications that are created so that other entities over the network may access it. Those who are new to this concept should consider the normal understanding of the word “service”. A service is something conducted by one entity for the benefit of another entity, in which there may be something given back in return. Web services have adopted its name because of this concept of services in a web-computing environment. Computers within the same network, such as a local Intranet or the Internet, as the Web service are able to invoke it if given the permission. Like real-world services, Web services are either free or paid for use. When payment is required for that service to be done, the service provider would need to devise a suitable method for that to occur according to its business model.

## **An Illustration of the Application of Web Services**

An illustration of a sample Web service application is as follows. Mary owns an ISP (Internet Service Provider) company and has a large customer base, all of which is subscribed to use the company’s dial-up and broadband services. Because Mary wanted to add another revenue stream into her company by allowing other companies to advertise on the company’s website, she therefore wanted more fresh and updated content on that website so that her customers would more likely set it as their default home page and visit more often. However, to employ people to continually create fresh content such as news and weather information for her company would be very costly. As a cost-effective solution, Mary decides to utilise a few Web services to provide the content. By paying a small monthly fee per service, this

## *Web Services – Could Marketing Be Reduced To A Set of “Objects”?*

would certainly save her a lot of money because she would not need to pay staff to create content and to update it on the website. The content from the Web services are downloaded from the providers' websites in real-time using XML format and then converted automatically into HTML to fit into the design of Mary's website. Since all these processes are performed within the software on the ISP's web server, visitors may not even realise that the content was from another provider.

### **The Object-based Distributed Computing Architecture of Web Services**

Web services are, in fact, not limited to “two-tier” communication. At first sight, it may seem that the above scenario is surely just a communication between the Web-server of the ISP and the servers of the Web service providers. However, possibility exists that there may be a greater number of unseen Web services that may have participated in the content transferral process before this data has reached the ISP's system. The news Web service that Mary has subscribed to may probably rely on other Web services, such as other news agencies or freelance journalists, to supply the service with content. This service may have just been a central repository for storing news articles from different news suppliers within the same network. In a nutshell, this exciting concept of Web services allows a very powerful multi-tier (or N-tier) infrastructure (Infravio, 2002).

Visionaries of Web service technology believe that many businesses throughout industry would benefit from this, especially SMEs (small/medium enterprises) that may never have been able to afford Business Partner Integration technology previously. Low cost of development and maintenance is one of reasons why there is so much hype over Web services in the e-business industry. The cost is low because Web services are built using standard technologies that are cheaply available. In the past, if businesses wanted their systems to communicate with other systems that were different in application platform, they need to rely upon middleware technologies such as CORBA, RMI and DCOM. Although these traditional technologies have been successful when implemented on private networks such as LANs and Intranets, there are a few disadvantages to them that have hindered its successful implementation on the Internet at large. One of these is the difficulty of implementation, which equate to high costs involved. Web services provide a good solution because it is easier to implement and offers high flexibility since XML is used as the base foundation (Snell, Tidwell, Kulchenko, 2002).

The distributed nature of Web services allows clients to access functions (also known as “methods”) from different systems. For example, the software running on Mary's company website invokes the methods on a news Web service to grab news headlines back to the website. The idea behind this framework has its roots from Object-Oriented concepts from systems design and programming. Objects, otherwise known as components, are modular and functional elements that are applied to an application whenever it is needed. When a Web service is running on the Internet, it can be accessed by potentially all different sorts of applications throughout the world at a real-time, on-demand basis. This is the essence of object-based systems.

With the right implementation, Web services can open the door for great inter-operability between computer systems and even handheld devices. Wireless handheld devices such as WAP phones receive a different data format to that received on normal PC Internet browsers (i.e. WML as opposed to HTML). However, handheld devices are still able to access Web services in the same way as PCs to get data such as news, weather and stock market information and the XML data received from the Web service can be rendered to WML format, or whatever format that is understandable on that device. This demonstrates that Web services do not care whatever platform the client is on, as long as it speaks the same XML languages, which are SOAP and WSDL (Web Services Description Language – more on this in the next section) (Snell, Tidwell, Kulchenko, 2002).

## **Finding Web Services**

The design of Web services has some special features that allow the service to be described and discovered by people or maybe even other Web services wishing to use that service. First of all, each Web service has a description written in WSDL (one type of XML-based language) disclosed to Web service clients so that when they want to call that service, they would know what data and what format is required. Back to the illustration above, when Mary decided to use a particular Web service provided by another company, she would have subscribed to their service and in return obtains a WSDL description and a login and password. After reading the WSDL description, a web developer working for Mary would build some compatible code that runs on the website so to call the Web service as instructed in the WSDL (Snell, Tidwell, Kulchenko, 2002).

Once a Web service is described using WSDL, it can then be placed on a directory so that it could be easily searched for and discovered. A good analogy would be like a business registering itself on Yellow Pages directory to expose its phone number, street address and web address, for the sake of making it easier for people to find and use that information. A standard directory designed to store WSDL information is the UDDI (Universal Description, Discover and Integration) service. UDDI has not yet evolved to a form that has generated worldwide take-up, but as it will be further discussed later, the future of UDDI looks promising. Businesses that wish to promote their Web services over the web should register with a UDDI to expose their WSDL references and describing their services and company. On a conceptually level, there are three separate components required for UDDI registration descriptions (Snell, Tidwell, Kulchenko, 2002):

- White pages – Describes the company such as, company name and contact information.
- Yellow pages – Describes the industry category/taxonomy of the organization.
- Green pages – Describes the technical details of the Web service.

Once this information is compiled together into a UDDI business entry record, it can be submitted to the registry using SOAP.

A UDDI registry can be set up so that it is publicly accessible or it could be made private. Public UDDI registries have the ability to link up with other UDDI registries in the network, and hence provide businesses, especially small companies, with greater visibility on a global scale. Private implementations of the UDDI can sit within intranets, extranets and private networks over the Internet (Accenture et al.2000).

## **Applications of Web Services in Organisations**

Microsoft, one of the major contributors to the rise of Web services, saw the many benefits that Web services can provide and has quickly embraced this new technology, basing their future business strategy around it. We can see this from the introduction of Microsoft's .NET framework which, relying on Web services technology, can enable organizations the ability to seamlessly integrate their systems with those of their partners and customers. Microsoft had spent at least US\$200 million on the “One Degree of Separation” advertising campaign to promote this capability of .NET (Microsoft press, 2002). This “One Degree of Separation” concept promotes the idea that businesses can expose their Web services so that there exists an open communication channel between the systems of business partners and customers. With a streamlined channel between different parties, a lot of unnecessary procedures in the middle, which usually includes a lot of manual processing, can be discarded from the process. The result of this efficiency would see a great saving of time and money, and closer relationships between business partners and customers.

Here is another illustration of how exposing Web services can allow greater integration between business partners and customers. Suppose ABC Travel Agency and its partners share communication over Web services channels. When a customer surfs onto the travel agency's website, he may want to order a travel package to an overseas destination that includes a rental car and accommodation. After submitting the order, the travel agency's

## *Web Services – Could Marketing Be Reduced To A Set of “Objects”?*

computer system would automatically book an airline ticket, a rental car, and accommodation from three separate Web services of its business partners. In response, those Web services would send a receipt back to ABC Travel Agency's Web service. Moreover, if the customer wishes to pay with his credit card at that point in time, the details may be sent to a payment gateway Web service that authenticates the card details and approves the transaction.

This illustration points out that Web services can provide an amazingly flexible B2B (Business to Business) and B2C (Business to Consumer) framework. In the past, large corporations may have had to spend literally millions of dollars on EDI (Electronic Data Interchange) networks for similar, or even the same, level of efficiency for B2B transactions. EDI was very costly because it was difficult to implement and it uses a private network as the B2B channel. This basically meant that only enterprises of a reasonably large size could afford to implement it. With Web services on the other hand, it is much cheaper to implement as it uses the Internet as the channelling platform and that it utilizes standard web technologies as explained earlier. The implications of this are enormous. No longer do SMEs need to spend huge amounts of money to have their business B2B-ready. With more and more improvements in web-based communications security by the day, we will soon see secure and robust Web service B2B channels that match up to its predecessor EDI at a fraction of the cost (Brunner et al, 2002).

Times are certainly getting exciting for smaller businesses as the slowly maturing Web service technology opens more doors for them to the market. Using UDDI services that were mentioned previously would certainly be a great way of marketing the business's services. However this would only happen when SOAP and UDDI achieve industry standard status. Through exposing Web services to potentially interested parties, suppliers and customers may readily conduct business with them and this would consequently result in having another revenue stream for the business. Some businesses may prefer to use a private and exclusive UDDI to share Web services with trusted business partners.

In early 2002, the popular search engine Google announced (Olsen, 2002) that they were willing to let users access their search functions via Web service calls in a service known as "Google Web APIs". While this service is still free of charge at the time of writing under the agreement that it would be only used for "personal, non-commercial" purposes, analysts believe that once this service becomes widely used by IT developers, Google would start charging businesses for the use of this service on a subscription basis. This would be an alternative revenue opportunity for the company compared to its regular paid-listing service.

## **Future Developments**

In an online news article written in September 2002 (Ricciuti, Cooper, 2002), one of Microsoft's top executives, John Allchin, admits that his company is frustrated by the slow take-up of consumer-oriented Web services. Heavy promotion campaigns of the Microsoft .NET framework and the development of Web services such as the .NET Passport was the strategy the company hopes would give Microsoft the upper hand when businesses around the world begin to see the need for Web services. However, the slow adoption of Web services by businesses has delayed Microsoft's initial plans. Here are some good reasons why businesses and consumers are yet reluctant to embrace this technology:

1. Web services are still relatively new technology and businesses are still waiting for clear benefits of other adopting companies (through figures) before investing in it themselves.
2. Privacy and security issues have not been resolved through standards. With Microsoft services such as .NET Passport, customers are yet to have full trust in the system by saving their private information there (Snell, Tidwell, Kulchenko, 2002). Only recently in May 2003, has another security flaw been discovered in this Passport authentication service (Lemos 2002).
3. Web services are still lacking authentication standards, enabling both parties of Web service conversations to really know the real identity of each other. Authentication is necessary and very important, especially when service providers are found on a UDDI. Currently, it is possible to register your business on a UDDI under a fake

## *Web Services – Could Marketing Be Reduced To A Set of “Objects”?*

name or pretend to be another company, such as Microsoft (Snell, Tidwell, Kulchenko, 2002).

Although UDDI has yet a lot of improvements to be made (the current specifications that needs standardisation is UDDI version 3 (Harrah et al, 2002)), once authentication standards are in place, it is set to become the next big Internet registry technology since the search engine. Many industry heavyweights, such as Microsoft, IBM, Sun Microsystems, Accenture, SAP, Oracle, have worked together to design the functional specifications of UDDI. From the names of the people involved in this project, we can easily foresee that UDDI is headed towards wide adoption.

### **Conclusion**

In the future, businesses that wish to employ e-business marketing strategies to promote their services would use Web services on top of their existing website. Web services certainly open up opportunities for B2B transactions that were previously unavailable for companies of a small or medium size. Developing Web services would be affordable for SMEs and hence worldwide adoption is predicted to come. In fact, many businesses are already using this technology within their private networks. Web services would also cut down on a lot of processes in the normal day-to-day business operations that could be automated, and additionally generate a lot of new opportunities to do business.

Marketing would not yet be reduced to a set of “objects” because there are still a lot of technical issues that need to be resolved in order for businesses to have great demand for it. Authentication, security and privacy issues are currently the issues that need to be solved using standards that are widely accepted by the Web services research and development community. However, once many of these issues are resolved, IT and non-IT based companies would naturally see the benefits of employing Web services. Consequently, greater acceptance would be inevitable.

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*Web Services – Could Marketing Be Reduced To A Set of “Objects”?*

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