Challenges - Interoperability

Within the information age revolution that the Internet is driving, there is a transformation underway of the Web technology itself. From its inception in the early 1970s until the early 1990s, the Internet was in a sort of Phase Zero, or Academia Phase. It was used mainly only within universities and was not well known outside academic circles. Phase One, or the Marketing Phase, came sometime around 1994-95 with the explosion of the Internet onto the public scene and companies of all sorts launched commercial Web sites. These sites featured read-only material, with marketing and promotional information and perhaps listings of jobs available within the company. Phase Two, or the Transactional Phase, began sometime around 1997 when businesses started to interact with their customers by accepting electronic forms, information requests and payments over the Web.

The public sector, without the same market pressures to compete, has been a little slower than the private sector to progress to each new stage but many organizations are now ready to move beyond the Marketing Phase and on to the Transactional Phase by allowing citizens and businesses to renew licenses, pay fines and taxes, and submit forms over the Internet.

Phase Three of the Internet is the fully-fledged digital economy. In this phase, people do no think of the Internet as individual computers and isolated Web sites and applications. The digital economy will be represented by new constellations of computers, devices and services that work together to deliver broader, richer solutions.

Interoperability is about much more just standards and technology. From the technology and market adoption perspective, key industry players are helping to drive this shift to distributed computing, taking the Internet far beyond the one-way transactions of today to a collaborative, interactive environment. Investments in Research and Development from Microsoft, IBM and others in the Industry are being provided to the standards community, providing the new foundation that changes the way in which software applications are developed and enables the creation of totally new kinds of services – web services. What are web services?
– A web service is any programmable application component, accessible via standard protocols.

This next generation of standards and the software implemented on these standards allow for coordinated communications with powerful information management and tools that transparently move between internal and Internet-based services, extending both the Internet and operating systems by making the Internet itself the basis of a new operating system. For the public sector, it means the ability to harnesses different applications, services and devices to create a personalized digital experience for citizens, businesses and government employees.
There are three conditions that must be met in order to make the next generation of distributed computing a reality:

- Everything needs to be a web service, so that it can participate in the connected network. This applies to both applications and to resources like storage.

- Web services must be easy to aggregate and integrate so that developers can quickly and efficiently create applications.

- Users must have a simple and compelling experience working with web services so that they will adopt the new applications and services.

The Internet has always been based on open, standard technologies. The first defined level of interoperability allowed computers to communicate, through connecting lines and routers. The second level protocol, HTTP, was established to enable the transfer of data. The newest standards allow applications to collaborate, so that a service provider can deliver web services, and the citizen can receive them, in a uniform way.

Extensible Markup Language (XML) is at the core. As opposed to HTML, which is static and designed only for presentation, XML allows programs to exchange information in a self-describing form, ensuring that structured data is uniform and independent of applications or vendors. This makes it ideal as a foundation for integrating web services. XML-based servers can, for example, defines process flows, transaction flows, and contracts, and enables deep integration across heterogeneous environments.

With XML, whenever a computer application receives a file, it includes codes that describe what the data actually means – whether it's a person's name, an address, a file number or whatever – and how it can be exchanged. XML description codes, or data schemas, for specific government services must be defined and published on the Web to enable service providers and public portals to provide the service and complete the government service network chain.

Another new Internet standard is the XMLP (XML Protocol) previously known as Simple Object Access Protocol (SOAP) which combines the flexibility and extensibility of XML with the proven Web technology of HTTP to provide a common messaging format to link together any applications and services anywhere on the Internet, regardless of operating system, object model or programming language. This is a key breakthrough in getting past the previous constraints of object programming that language, operating system, or other constraints. Now a program component can be written in any language, run on any operating system and support any database – the integration of the program
components is though XMLP, XML-based protocol. Additional information on XML and XMLP is available at www.wc3.org.

Another important Internet service required for businesses and organizations to interact programmatically is Universal Description, Discovery and Integration (UDDI) Project - a 220-member plus coalition of business and technology leaders committed to the acceleration and broadening of business-to-business integration and e-commerce. Every major technology company has now joined, endorsed, and included technology support for UDDI. It includes a platform-neutral set of specifications to enable organizations to conduct online transactions and establish a shared globally distributed business registry. Additional information on UDDI is available at www.uddi.org.

Simplicity is essential to ensuring the success of distributed computing. Using XML-standards-based development systems, developers can quickly and easily write programs and create Web services that run on any platform using open technology standards. Data will live securely on the Internet and transcend device boundaries so that all specialized interactive devices – PC, Web-enabled TVs, Web kiosks, phones, PDAs, game consoles, the refrigerator and any future device that's on the horizon – will be mixed and matched and linked together online. This means that individuals and organizations do not have to rely on stand-alone PCs or a corporate LAN; all technologies will be widely available and all pieces of a Web service will interoperate with all the other pieces. Rather than expecting citizens to adapt to technology, the technology will adapt to them.

With the ability to access services through many devices and distribution channels, citizens will control how, when, and what information and services are delivered to them. They will have a simple and compelling user experience. People will interact with government, service providers and public portals through handwriting, speech and visual technologies. The technology will guide them, so expertise in computing will not be necessary.

Almost all Internet users have experienced the need to log into different Web sites and enter multiple passwords many times during any given session. The lack of a coherent identity across Web services prevents applications from exchanging meaningful data relevant to users and their individual preferences. To address this, the industry has developed and is continuing to develop a building block services such as identity, notification, search, and schematized storage so agencies can published data schema and make it available to their business partners and service providers.

Building block services will also benefit program developers because they don’t need to duplicate these services every time they write an application. Because the building blocks are guaranteed services residing on the Internet, developers can take advantage of them and focus their efforts on those areas where they can add the most value to their applications. Foundation Services enable the
development of public web services such as credit card statement services, geographic map services and Greenwich Mean Time services. And they allow developers to create government Web services for citizen data, including patient records, tax records, court records, social benefits, motor vehicles, and so on.

By exploiting industry’s building block web services, government integrated services can move online – agency, service provider and public portal can interact with each other using web services. A service provider wanting to issue fishing licenses, for example, can submit an online query to UDDI which will respond with the Web site of the government department responsible. Another query will tell if a government Web service is available for issuing fishing licenses and, if so, what the service provider has to do to interact with the government back-end system and what business protocols are required to provide the service. The service provider will have to, for example, establish the identity of the citizen applying for a fishing license, which can be accomplished using a web service.

A government web service such as filing a tax declaration will require a stronger identification service, but the mechanisms will be the same. A business or citizen might file a return through their accounting firm, which will use Passport together with a digital signature and an authentication code obtained from government.

The fastest moving e-government application is probably e-procurement. Using the web services, contractors do not have to visit the Web site of every municipality, regional authority, and central government department to see what each has put out tender. Instead, vendors can go to the Web and see requests related to their expertise from all organizations and all levels of government. XML indexing, through UDDI, enables the ability to search and find services and information automatically, without the need for a middleman to pull everything together. The technology matches the services and people who are interested in each other.

The public sector is a service by definition, so it is in one of the best positions to leverage the web service approach. Organizations can start today to build their e-government solutions, first by using XML-based Servers to secure and extend their government infrastructure. Pushing an existing corporate LAN or WAN out to provide citizens with Internet access, email and services available through multiple channels over a range of devices will help government bridge the digital divide and manage their customer relationship.

Then, in a world where people use a family of complementary devices in their everyday lives, governments can scale fast by using XML-based web services that Microsoft, IBM, and other key industry leaders and its partners will provide. Government web services on top of the new infrastructure will help governments achieve service standardization and integration. By including value-added
solutions, government will reach its final objectives to empower communities and foster economic development.

Another key area of importance for interoperability will be collaboration among government organizations around the implementation of standards. Organizations such as the Congressional Internet Caucus, the Federal CIO Council’s Interoperability Working Group, the Government Information Clearinghouse, and the Council for Excellence in Government are proving to be invaluable environments for creating the synergy necessary for government organizations to learn from each other and to collaborate on the basic use and adoption of standards necessary for the move to E-Government.