

Web Services, Portals and eXtensible Markup Language (XML) An Organisational Perspective – Leura Cathcart

Web Services

As a fundamental component of business integration, Web services provide a way for organisations to integrate business processes externally, as well as internally, and extend their core competencies to the outside world. This faster, easier, and more cost effective method of integration, using the Internet or intranet in a modular fashion, makes Web services the stepping stone to business integration. A Web service is a technology component built, on open standards, that allows communication and interoperability with other applications over the internet. Using a specific set of industry standard protocols and the pervasive Web infrastructure, Web services offer a cost-effective and technology-independent way for organisations to integrate with each other.

For educational organisations moving to a more flexible model for educational delivery, web services allow a single data exchange to occur, with the ability to then process that information into multiple systems. This gives students a single, seamless process, instead of having to interact with multiple exchanges of data.

At their core, Web services simply leverage the Internet infrastructure, formats, and protocols to let diverse applications inter-operate in a simple, standard way. Business models driving the integration will not change immediately, but the wiring connecting applications will become cheaper and easier to install. In essence, Web services are about solving application interoperability challenges. (Software AG The XML Company)

In the future, Web services will also impact the way information technologies will be used and delivered. As the architecture evolves, an organisation can use business services, delivered as Web services from external providers, to extend its offering and capabilities. Over time, some information technologies will be delivered as services over the Internet, instead of being resident on the organisation's own hardware and software.

Web services provide an organisation with the ability to:

- ❖ provide efficient interactions for their clients;
- ❖ provide a seamless integration of multiple learning services to improve the e-Learning service by integrating payment, communication and facilitation tools;
- ❖ protect and maximise existing IT investments;
- ❖ externalise core business functions in a secure manner in order to increase revenue and service levels;
- ❖ remove the dependency on underlying technology;
- ❖ improve access to information through easier integration of information sources;
- ❖ improve developer productivity by spending less time on custom integration and maintenance;
- ❖ define the functions needed to execute business processes;
- ❖ choose which functions should be supported by in-house IT and which by external services;
- ❖ ensure that all functions work together seamlessly while providing the flexibility to change providers or replace individual functions;

- ❖ use established functions, or implement new ones, without being held hostage by previous IT investments.

In addition web services can provide the organisation with the power to:

- ❖ make employees more productive by providing them with the information they need, when and where they need it
- ❖ increase customer-service levels to improve customer retention and grow market share
- ❖ integrate suppliers in order to reduce costs and accelerate the procurement process
- ❖ tighten integration with strategic business partners.

XML – eXtensible Markup Language

XML is a key technology within Web services, enabling organisations to meet business goals, such as integrating external and internal business processes faster, and more easily, than with any other technology.

XML is a standard for describing the content of documents and is the key technology that enables Web services to communicate with other applications. As a meta language, XML makes it possible to include information about data with data, allowing applications to understand and process data from other systems. This eliminates the need for costly conversion of the data from one application's format into another and custom interface programming work.

XML and XML based applications have gained prominence in the world of business, as enabling technologies that help companies meet their business goals. There are emerging XML based standards, one of which is UBL (Universal Business Language), which enables companies of all sizes to participate in global internet trade and business transactions based on open standard. Another standard is XBRL (Extensible Business Reporting Language) which enables the preparation, publication, exchange, and analysis of business reporting documents, such as financial reports.

There is wide agreement amongst technology experts (XML World, 2002) that XML will be at an enterprise level, not content management level, in the future because it is believed that content management cannot be done without XML. XML enables the gathering of information from other applications, therefore it could be termed a *content management system*. Portability of information is most important as frame sets do not allow the re-purposing of content.

The advantages of XML for an educational organisation is that staff can write once, and then publish in many formats, for example, Hypertext Markup Language (HTML), Portable Document Format (PDF), Wireless Application Protocol (WAP), and through accessibility tools such as text to speech.

Building XML-Based Smart Content Solutions

Content is unstructured information that people create and consume. It can include web pages, documents, spreadsheets, presentations, and rich media, which are digital assets. Smart content is what you create when you use XML. It is defined by what it is, not how it appears and is always available. Smart content is interoperable with any person, technology or process. The dynamics are based on conditions, environment and other content.

XML should be used for content so that it can be personalised. It enables single source publishing, thus saving money, and can be easily found and re-used. Quality is improved and the information reaches the market sooner. Research by eXcelon Corporation claims that there is immediate return on investment (ROI) including 70% reduction in publication costs and 75% reduction in cycle time for variants. XML templates and XML applications are now available, so that as the function of XML changes, organisations can use an XML application that can change its form to match. Xcentral focuses on Government organisations and it is believed that eLearning will embrace XML because it allows digital chunking.

Smart content solutions are as flexible as XML itself because they allow interaction with any person, technology or process and are able to react to conditions, environments and other content.

The role of XML in Enterprise Content Management

Within an organisation the need for content and process integration includes:

- ❖ the ability to develop fast solutions to solve specific business problems
- ❖ comprehensive process management across the enterprise
- ❖ integration with content from multiple sources and repositories
- ❖ ability to leverage existing IT infrastructure and achieve ROI
- ❖ re-usable business logic and
- ❖ to support industry standards.

There are baseline requirements for integrating content and processes. The first requirement is the ability to manage and interact with digital assets and versioning of processes and content. The solution should be event-driven, that is, triggered by external and/or internal events. It is recommended that there be a visibility and accountability layer for analysis and reporting and any solution should be standards-based, for example XML.

There are content and process integration gaps within organisations and many solutions have been developed including adding one layer of infrastructure rather than solving specific business problems. This requires timely, complex integration and customised software development to deploy, but does not allow for the integration of process and content across multiple content sources and systems. It is believed that this solution has low-level capabilities and cannot support long-term complex or human-factor processes.

The solution proposed for content management needs to be one that is able to manage any type of content and have consistent object storage. It should also be able to aggregate on demand with no data redundancy. In relation to process management, the solution should have the ability to capture, model, share, manage and optimise processes and facilitate long-life cycle, human-factor and complex processes. The system will also need to integrate with legacy systems and integrate "home grown" business systems as well as support standards.

Key business benefits for content and process integration include a lower cost of ownership of new business applications and lower operational costs through shortening cycle times, reduction in error rates, and lower support costs. Key technology benefits include lower cost of integration into legacy systems with support for leading Enterprise Application Integration (EAI) technologies. It can also

lower the cost of application development through component reusability and the use of business objects. Finally it will futureproof the organisation with a flexible architecture based on standards such as Simple Object Access Protocol (SOAP) and XML.

It is predicted that the next big thing in information technology is Super-Integration. Organisations will be required to aggregate, analyse, and activate. XML is helping knit together components, networks, legacy systems, from a consumers' perspective, however time and attention are the real commodities. Super integration demands that massively integrated systems exhibit unrestricted flexibility and almost complete fault tolerance through the effective interaction of automation and human intervention. FUSION is the **F**ocused **U**se of **S**tandards for the **I**ntegration of **O**rganisations and **N**etworks. Super integration is the key, with XML encapsulating the technology domain, to deliver comprehensive "service envelopes" to meet requirements.

The role of XML in Portals

There is recognition that for Portals, XML is the holy grail of information management, because it facilitates effective and simple reuse of data. There are five aspects to consider when designing a portal which include:

- ❖ visual presentation – the site must be appealing to hold the audience;
- ❖ interactivity- static websites are boring, must have a level of interactivity, and be able to personalise information;
- ❖ utility – consider how effective the site is in helping the user to understand and retrieve the information they want. If the portal is too static it will have low utility, however if it is too dynamic it will be too complex to use;
- ❖ breadth/scope – what is it that you are covering? It is important not to try to cover everything – information has to be understood up front, and developers must decide where the boundaries are;
- ❖ depth – how deep can you go on the piece of information? Make sure there are not gaps in the information.

When developing portals, organisations also need to understand where the information is, and what it looks like. This requires huge human intervention and the focus for portal development should be firstly getting the people to where the information is (the browser has done that), and secondly deciding what is going to be provided for people to view. Therefore it is important to ascertain:

- ❖ is the information being provided the right information, that is, the right information to the right person?
- ❖ how is the information being used, and by whom? Is the single sign-on effective across varying platforms? Monitor the usage and then analyse these findings;
- ❖ what are the typical paths users are taking to locate enterprise information. Visual users and computer users, need to be monitored to ascertain what they do. Logging on alone will not provide this.

The role of XML in portals includes:

- ❖ data aggregation, XML provides neutral unit code;
- ❖ data transformation, XML provides large scoping of tools;
- ❖ management of important metadata. This is critical. XML is simple but XML technology is complex, however it is still easier than running java code;

- ❖ information analysis, XML schema definition allows us to define data, eg 1 is one, numbers to numbers, strings to strings;
- ❖ systems integration, XML web services, SOAP technology can teach people to write in XML very easily. (SAP has this technology developed). It is predicted that XML Query will supercede XML.

The Case for Enterprise Portals

There are both benefits and concerns with having centralised data, however many issues also need to be addressed with decentralisation. With centralised data it can often be easier to manage information because it can be controlled by a single organisation, with report based systems. Client licences are often held by very few and there is a strong emphasis on homegrown applications. Also, with centralised data systems departmental automation is often not a priority because it is too expensive.

With decentralisation there can be frustration with duplicate information in enterprise departments and widespread availability of Local Area Network software and personal computers. Departments often take the responsibility for, and control of, their own data and automation.

If an organisation wishes to change, the drivers will usually be the need to **communicate**, the need to **analyse** information, the need to **integrate** systems and the need to **automate**. Communication and analysis should be looked at first, while the integration of systems is really only a means to an end. Organisations often focus on the need to integrate, instead of focussing on the business needs. In the final analysis it is the automation where benefit is realized that is important.

As businesses become more competitive, there is a sharp rise in the need for departments to **communicate** with other departments as well as outside the organisation. Information needs to be disseminated to customers, through advertising, to employees, such as human resources, corporate mission information and contact information, and to the CEO of the organisation.

For the **analysis**, organisations need to evaluate where their business is currently, especially in relation to accounting systems and business processes. It is then important to analyse where the business is going. In many cases executives have a vision but this vision needs to be supported by an appropriate infrastructure, supported by plans that are achievable. There will be a requirement to build bridges between the centralised and decentralised data. In most organisations some information will be sitting in Oracle data bases, while other information is in SAP. Organisations can use a digital dashboard to illustrate its overall health, displaying only relevant information. For an educational organization, this information could include current student data, profile target and achievement, inventory of assets, and the organisation's logistics.

Adoption rates have been very high for public portals such as Yahoo and an understanding is emerging of what it takes to provide this class of functionality. If an organisation wants to have simple aggregation of data, this is done by aggregating access to existing systems via a single entry point, a single sign-on environment. Some organisations require complex aggregation with information displayed being composed of information from multiple systems, however this approach does not readily allow the data to be changed to cater to individual user

needs. Another solution for organisations is to aim for an aggregate layer, such as middle tier caches, which give an aggregated view of the customer, irrespective of who looks at the information.

For educational organisations portals provide personalised interaction for their clients, including students, faculty staff, and management. Users get access to what they require based on their portal profile. Once again multiple uses for the same data, reducing duplication and providing consistency.

Another solution is for the organisation to create portlets. These are new applications comprised of existing systems' functionality and information, allowing users to add, update, and/or delete information. This approach allows users to view and manage input through a new application, providing more than a read only facility.

There are several frameworks that organisations can utilise in relation to enterprise portal technologies. These frameworks provide services for connecting to legacy systems and applications, and are for transforming information as well as ensuring data integrity. While different applications focus on different aspects of portals, that is, the front end or the back end, in all cases, data cleansing is of vital importance.

It is important to acknowledge that data set owners are protective, they often have their own portals. Therefore to progress a portal project the following must happen:

- ❖ policies must be made first, these need to be owned by key stakeholders
- ❖ a set of guidelines must be developed at departmental level
- ❖ in a decentralised approach there has to be a set of standard interfaces.

Web services standards

There are currently so many acronyms and standards that organisations are often confused. Emerging standards that apply to Web services standards include:

- ❖ simple Object Access Protocol (SOAP), an XML-based envelope format for messages
- ❖ Universal Directory Discovery Interface (UDDI), a common way of accessing directories of service providers in a common format
- ❖ Web Services Description Language (WSDL), which defines parameters to be sent to a Web service and the result that is returned.

The key point to understand about Web services standards is that they only describe the surface appearance of an underlying service. There are many simple applications using SOAP, WSDL and UDDI to find one another and communicate. These applications support both asynchronous and synchronous messaging. Using XML and other Web standards to provide a platform for application integration, within and across organizations, is a solid model, however the details of how it will work best are still evolving.

To date there has been little attention paid to how one connects the Web surface to the underlying IT infrastructure that must deliver actual value. The Web services standards provide just the visible tip of the iceberg, but the bulk of the work lies out of sight below. Effective deployment requires tools and wizards to generate the surface appearance of a service that an organisation wishes to expose to the Internet. It also requires careful attention to present the Web services as a process that is integrated into the business itself.

Conclusion

It is possible that most enterprises with a significant Web presence already have most of the necessary skill sets among their current employees. For example staff would already be skilled in the supporting technologies such as Internet/intranet network administration; HTTP server optimisation; network security monitoring and remediation, XML usage and Web application design. In addition, to meet customer needs, top-tier vendors are adding robust integration server and XML server technology to the Web services implementation stack.

Web services and XML are tools that allow organisations to match technology with their business process requirements resulting in increased client service. This also supports the move to more flexible options for learners and educational deliverers.

REFERENCES

Bailey, N. and Treloar, A. (2001), "What's under the threshold? Portals and Portal Infrastructures". Proceedings of AusWeb01, pp 49-62.

Gartner Research, 2001. SPA 14.5679. Calculating the ROI of Your enterprise portal.

Gillett, Frank E. Forrester Report. Making Enterprise Portals Pay.

Grejtak, C. (2001) "Unifying the Extended Enterprise", E-Vision Report. n.d.

"Making Enterprise Portals Pay" (2001), Forrester Research Inc. Cambridge, MA.

Mears, J. (2001), "Corporate portal vendors ready for wireless", Network World, Vol. 18, Iss. 15, Apr 9, pp10,81. (2001).

META Group, Inc, 2001. Web & Collaboration Strategies. "How much is that Portal Worth"

"Electronic Records Management – framework for strategic planning and implementation" Public Record Office, Surrey. UK.

Richtberg, M. (2002) "Bringing Applications to the Enterprise Portal: Application Access in the Digital Economy". Information Today Inc. White Paper, KMWorld.

Subramanian, L (2002) "Message Sequence Validation: XML Approach", Wipro Technologies White Paper, CA.

Websites

<http://www.searchwebservices.com/>

<http://www.xpandcorp.com>

<http://xmlworld.com>

<http://www.CareerOneStop.org>

