PREFERRED STANDARDS TO SUPPORT NATIONAL COOPERATION IN APPLYING TECHNOLOGY TO VOCATIONAL EDUCATION AND TRAINING

2000

WEB PROTOCOLS

FRAMEWORK FOR NATIONAL COLLABORATION IN FLEXIBLE LEARNING IN VOCATIONAL EDUCATION AND TRAINING 2000-2004

AUSTRALIAN NATIONAL TRAINING AUTHORITY
STRATEGY 2000 PROJECT 2/5.1

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Australian National Training Authority

This document forms part of a series of reports on

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Vocational Education and Training

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Executive Summary

This report makes recommendations on the use of web technology standards in the national provision of Vocational Education and Training. This report follows up on recommendations in the VET Preferred Standards 1998 report.

There are two main goals that the use of web technologies should help facilitate:

1. Enable training providers and clients to communicate easily and seamlessly, using commonly available software.
2. Enable training providers to exchange information simply and efficiently.

The primary focus of this report is to discuss technologies and protocols that address these goals. They are either independent standards, or propriety solutions that are so ubiquitous that they have become de facto standards. The recommendations are based on the belief that web technologies usage within the VET sector should:

- continue the existing policy of adhering to widely-supported, open standards as they become available,
- focus on supporting the ability of education providers and learners to simply make contact and communicate

There are nineteen recommendations of standards, operational guidelines and continuing work to help achieve these goals.

1 Introduction

1.1 Purpose

This report provides the background material and recommendations for updating the VET Preferred Standards for Web Technologies.

The aim of the VET Preferred Standards 2000 Project is progress towards a nationally agreed, standards-based environment for the use of online training experiences. The Project will produce a revised and extended version of a document called Preferred Standards to Support National Cooperation in Applying Technology to Vocational Education and Training.

The Project is part of the *Australian National Training Authority's Strategy 2000*, which commences the implementation of the *Framework for National Collaboration in Flexible Learning in Vocational Education and Training 2000-2004*, which, in turn, supports the broader scope of the *National Strategy for Vocational Education and Training*.

1.2 Assumptions and Scope

The area of web technologies is so broad that a focus is needed for this discussion. This report assumes that VET is interested in web technologies for the provision of online flexible learning to students. This is an important point as it reinforces the aim of the project – standards for the provision of online training to students. The project is not immediately concerned with standards related to administration or management of students or online content.

Additionally, this section of the project is concerned with web technologies at the client end. Technologies such as Perl CGI scripts, ASP and other back-end server technologies are deemed to be outside the scope of this section of the project.

1.3 Document Structure

The document provides an overview of some of the currently popular web technologies, an outline of the workshop discussions, and then lists the recommendations for Preferred Standards, Operational Guidelines and suggestions for Further Work and Projects.

2 Discussion

2.1 XML

The WWW started with HTML as its mark-up language, but not much thought was given to describing the data in its pages. This was fine for the earlier generation of web pages; however, it soon became apparent that to use the web in a more sophisticated manner i.e. not just for web pages but also for interactivity, site maintenance and transactions, demanded a more advanced method of data description. HTML was still fine for marking up the pages, but to facilitate the easy movement of data throughout the web, XML was born.

> XML is a method for putting structured data in a text file. For "structured data" think of such things as spreadsheets, address books, configuration parameters, financial transactions, technical drawings, etc. Programs that produce such data often also store it on disk, for which they can use either a binary format or a text format. The latter allows you, if necessary, to look at the data without the program that produced it. XML is a set of rules, guidelines, conventions, whatever you want to call them, for

> designing text formats for such data, in a way that produces files that are easy to generate and read (by a computer), that are unambiguous, and that avoid common pitfalls, such as lack of extensibility, lack of support for internationalisation/localisation, and platform-dependency. (W3C)

XML has generated an enormous amount of industry support since its inception, with all of the major software companies coming out very strongly in favour of it, and backing that up with solid tool support. Microsoft is using XML[1] as the underlying data format for its recently announced .NET framework[2], and is also in the process of converting its entire Office suite to using XML as the underlying data format[3]. SQL Server 2000 has the ability to read an XML document and directly convert the contents to rows and columns in its database[4].

Oracle is also using XML e.g. as the underlying data format for its Internet File System[5], and is currently making tools available to import and export data from its database in XML.

> "The [XML Developer's] tool kit lets programmers extend iFS to manipulate a wide array of files, including XML. Among other things, the tool kit has a set of ""parsers" and "renderers" that, respectively, sift data from XML documents for storing in the Oracle8i database and export data from 8i into XML format.
>
> That's important because the XML standard is expected to be the common medium for sharing among different companies critical business-to-business data such as purchase order numbers, customer ID numbers, addresses, account information and product identifiers. Oracle's XML tools with iFS make it easier for enterprise customers to move such data between Web-based applications and centralized Oracle databases, where the data can be shared among back-end enterprise applications such as order fulfilment, inventory, manufacturing and shipping." (Oracle)

[1] "XML is a widely supported industry standard defined by the World Wide Web Consortium, the same organization that created the standards for the Web browser. It was developed with extensive input from Microsoft Corp. but is not a proprietary Microsoft technology. XML provides a means of separating actual data from the presentational view of that data. It is a key to the Next Generation Internet, offering a way to unlock information so that it can be organized, programmed and edited; a way to distribute data in more useful ways to a variety of digital devices; and allowing Web sites to collaborate and provide a constellation of Web Services that will be able to interact with each other" (Microsoft).

[2] "Microsoft .NET will allow the creation of distributed Web Services that will integrate and collaborate with a range of complementary services to serve customers in ways that today's dotcoms can only dream of. Microsoft .NET will drive the Next Generation Internet. It will make information available any time, any place and on any device. The fundamental idea behind Microsoft .NET is that the focus is shifting from individual Web sites or devices connected to the Internet, to constellations of computers, devices and services that work together to deliver broader, richer solutions... Computers, devices and services will be able to collaborate with each other to provide rich services, instead of being isolated islands where the user provides the only integration… The loosely coupled XML-based Microsoft .NET programming model introduces the concept of creating XML-based Web Services. Whereas today's Web sites are hand-crafted and don't work with other sites without significant additional development, the Microsoft .NET programming model provides an intrinsic mechanism to build any Web site or service so that it will federate and collaborate seamlessly with any others." (Microsoft)

[3] "Office 2000 uses XML and Cascading Style Sheets to preserve a document such that it can take a round trip to HTML and back to its original state, without losing data or formatting." (Microsoft)

[4] SQL Server 2000 supports the W3C standards of XML, XPath, XSL, and HTTP. With SQL Server 2000, it is possible to view relational data using XML techniques, to return XML from SQL queries, to access and update XML documents as if they were tables using Transaction SQL (T-SQL) and stored procedures, and to transmit and load data from any source into SQL Server 2000 relational tables. (Microsoft)

[5] Oracle Internet File System (*i*FS) provides enhanced capabilities for knowledge workers to manage and access all content. Versioning, check-in/check-out, event notification, and fine-grain access are all out-of-the-box functionality provided by *i*FS to manage content. *i*FS expands the database platform to present documents and media as files and folders that users can access through familiar interfaces such as Windows, the Web (HTTP), e-mail, and FTP… Users can also use *i*FS to customize a file server for specific application purposes. *i*FS includes an XML and a Java-based Developer's Kit that simplifies development and facilitates strong data integration." (Oracle)

IBM has also come out very strongly in favour of XML, providing several tools free of charge from its developer web site, and has recently "donated" its Java XML parser (IBM) to the open-source Apache web-server project, for inclusion in a future release of Apache. This is important because it means that the world's most popular web-server will have built in XML support (Apache XML).

The widespread acceptance of XML has also resulted in several other closely related technologies appearing. Those that are probably most relevant to VET are; XML Schema[6], for describing the data in documents; XSL[7], for formatting XML data; XML Query[8], for querying data; RDF[9], for meta data processing; and XML Signatures[10], for digitally signing and verifying XML documents.

2.1.1 XML Schema

The XML Schema definition language is poised to become the dominant way to describe the type and structure of XML documents. XML Schemas provide the basic infrastructure for building interoperable systems based on XML since they provide a common language for describing XML that is based on proven software engineering principles. (Microsoft)

XML Schemas express shared vocabularies and allow machines to carry out rules made by people. They provide a means for defining the structure, content and semantics of XML documents. (W3C)

Consider for example, a schema defined for student records. If everyone abides by the standard schema when creating the student record document, then all other training providers who also use that schema can import that document without any changes being needed. It provides a uniform way of defining a document so it is usable by all. Contrast this with a set of heterogenous databases, which will often have different fields, and even if they had the same set of fields, can often have different data formats, thus making data sharing difficult. XML Schemas do away with all that. If two training providers use the same schema for defining documents, they can share those documents seamlessly.

2.1.2 XSL

The XSL Transformations (XSLT) specification[11] defines an XML-based language for expressing transformation rules that map one XML document to another. XSLT has many of the constructs found in traditional programming languages, including variables, functions, iteration, and conditional statements. (W3C)

> "… the expressiveness of XML Schemas makes it possible (if not likely) that multiple organizations modelling the same set of domain-specific abstractions will come up with different schema documents. Yes, this problem could be solved via industry consortia defining canonical schema for each domain, but until that happens, dealing

[6] XML Schema, http://www.w3.org/XML/Schema
[7] XSL, Extensible Stylesheet Language, Version 1, 27 March 2000, http://www.w3.org/TR/xsl/
[8] XML Query, http://www.w3.org/XML/Query

[9] RDF, Resource Description Framework, http://www.w3.org/RDF/
[10] XML Signatures, http://www.w3.org/Signature/
[11] XSLT Version1, 16 November 1999, http://www.w3.org/TR/xslt

with multiple schema definitions of the same basic information will be a fact of life.

The XSLT specification defines an XML-based language for expressing transformation rules from one class of XML document to another. The XSLT language can be thought of as a programming language, and there are at least two XSLT execution engines currently available that can directly execute an XSLT document as a program. But, XSLT documents are also useful as a general-purpose language for expressing transformations from one schema type to another. In fact, we could imagine using an XSLT document as one form of input to an arbitrary XML translation engine."(Microsoft)

2.1.3 XML Query

The aim of XML Query is to provide flexible query facilities to extract data from real and virtual documents on the Web (W3C).

Example usages of XML Query are as follows

- Perform queries on structured documents and collections of documents, such as technical manuals, to retrieve individual documents, to generate tables of contents, to search for information in structures found within a document, or to generate new documents as the result of a query.
- Perform queries on the XML representation of database data, object data, or other traditional data sources to extract data from these sources, to transform data into new XML representations, or to integrate data from multiple heterogeneous data sources. The XML representation of data sources may be either physical or virtual; that is, data may be physically encoded in XML, or an XML representation of the data may be produced.
- Perform both document-oriented and data-oriented queries on documents with embedded data, such as catalogs, patient health records, employment records, or business analysis documents (W3C).

2.1.4 RDF

The World Wide Web was originally built for human consumption, and although everything on it is *machine-readable*, this data is not *machine-understandable*. It is very hard to automate anything on the Web, and because of the volume of information the Web contains; it is not possible to manage it manually. The solution proposed here is to use *metadata* to describe the data contained on the Web.

Metadata is "data about data" (for example, a library catalogue is metadata, since it describes publications) or specifically in the context of this specification "data describing Web resources". The distinction between "data" and "metadata" is not an absolute one; it is a distinction created primarily by a particular application, and many times the same resource will be interpreted in both ways simultaneously.

Resource Description Framework (RDF) is a foundation for processing metadata; it provides interoperability between applications that exchange machine-understandable information on the Web. RDF emphasizes facilities to enable automated processing of Web resources.

RDF can be used in a variety of application areas

- in *resource discovery* to provide better search engine capabilities
- in *cataloguing* for describing the content and content relationships available at a particular Web site, page, or digital library,

- by *intelligent software agents* to facilitate knowledge sharing and exchange,
- in *content rating*,
- in describing *collections of pages* that represent a single logical ""document", for describing *intellectual property rights* of Web pages,
- for expressing the *privacy preferences* of a user as well as the *privacy policies* of a Web site.
- RDF with *digital signatures* will be key to building the "Web of Trust" for electronic commerce, collaboration, and other applications.

RDF and XML are complementary: RDF is a model of metadata and only addresses by reference many of the encoding issues that transportation and file storage require (such as internationalisation, character sets, etc.). For these issues, RDF relies on the support of XML. It is also important to understand that this XML syntax is only one possible syntax for RDF and that alternate ways to represent the same RDF data model may emerge.

The broad goal of RDF is to define a mechanism for describing resources that makes no assumptions about a particular application domain, nor defines (a priori) the semantics of any application domain. The definition of the mechanism should be domain neutral, yet the mechanism should be suitable for describing information about any domain. (W3C)

2.1.5 XML-Signatures

XML-Signatures are a way of digitally signing, and verifying, an XML document. For example, if a student was doing a web-based exam, he would use XML-Signature to sign his answer document, so that the marker would be sure that it came from the student concerned. Similarly, a lecturer returning marked documents, etc, would sign it, so that the student knew that it did come from the lecturer, and not someone masquerading as them.

At the moment, this technology is still very much in the development phase, however it is hoped that in the near future, there will be working solutions available.

2.2 HTML

HTML 4.00 has been around for several years, (W3C released the recommendation in December 1997). It has been updated once, to version 4.01, in order to apply some bug fixes. The latest mark-up language specification is XHTML 1.0 (January 2000) which has been introduced to allow more flexibility in the presentation of web pages, as well as bind more tightly with XML, thus bringing in its benefits of extensibility. Although XHTML is not yet well supported by browsers, its core components are, due to their origins in standard HTML. Therefore, it is possible to start marking up pages that conform to XHTML, although it is not possible to use its full power yet.

Using XHTML for page mark-up would therefore allow the use of the newer XML related tools for such things as sophisticated searching (RDF), and changing the format of pages very easily (XSL). Two different institutions could present the same course, but with very different formats, just by clever use of XSL on XHTML compliant web pages.

> "Document developers and user agent designers are constantly discovering new ways to express their ideas through new markup. In XML, it is relatively easy to introduce new elements or additional element attributes. The XHTML family is designed to accommodate these extensions through XHTML modules and techniques for developing new XHTML-conforming modules (described in the forthcoming XHTML Modularization specification). These modules will permit the

combination of existing and new feature sets when developing content and when designing new user agents.

Alternate ways of accessing the Internet [eg. cell phones, televisions, cars, wallet sized wireless communicators, kiosks, and desktops] are constantly being introduced. Some estimates indicate that by the year 2002, 75% of Internet document viewing will be carried out on these alternate platforms. The XHTML family is designed with general user agent interoperability in mind. Through a new user agent and document profiling mechanism, servers, proxies, and user agents will be able to perform best effort content transformation. Ultimately, it will be possible to develop XHTML-conforming content that is usable by any XHTML-conforming user agent

XHTML is modular making it easy to combine with mark-up tags for things like vector graphics, multimedia, math, electronic commerce and more. Content providers will find it easier to produce content for a wide range of platforms, with better assurances as to how the content is rendered.
The modular design reflects the realization that a one-size-fits-all approach will no longer work in a world where browsers vary enormously in their capabilities. A browser in a cell phone can't offer the same experience as a top of the range multimedia desktop machine. The cell phone doesn't even have the memory to load the page designed for the desktop browser.

XHTML 1.0 is the first step and W3C's HTML Working Group[12] is busy on the next. XHTML 1.0 reformulates HTML as an XML application. This makes it easier to process and easier to maintain. XHTML 1.0 borrows the tags from W3C's earlier work on HTML 4, and can be interpreted by existing browsers, by following a few simple guidelines. This allows you to start using XHTML now!" (W3C)

2.3 HTTP

There are several working groups looking into different aspects of HTTP. However all of these are only concerned with very low-level details of the protocol which are really only of interest to web-server and browser vendors.

2.4 Java

Java has enjoyed enormous growth in the last few years, initially as an Internet programming language, however more recently because of its abilities as a cross-platform development language. It is because of this that it has also been picked up by several major players in the software industry and used as a basis for their future software development. Companies such as Sun, Oracle, and IBM are all solidly pushing Java now with the result that it has become one of the most popular development languages around.

Noticeably missing from the above array of industry giants is Microsoft, who are pursuing their own agenda, mainly to prevent too many people abandoning their operating systems, Windows NT/2000. It has recently announced its .NET initiative which does include some steps towards becoming more cross platform, but these are very small steps, and require other third party companies (very few of whom have come forward) to develop the non-Windows aspects of the framework.

[12] HTML Working Group, http://www.w3.org/MarkUp/Group/

Java can be used in two ways. The first is as applets, in which the Java code is downloaded from the server, and all the work done on the client machine. This is how Java was originally used; however, this method has since fallen into disfavour. This is for several reasons, the main two being the time it takes to download the applet code can be excessive, especially over a slow link, and the Java GUI (Graphic User Interface) can be time consuming to create. The modern Java GUI toolkit, Swing, is very sophisticated, and a marked advance over its predecessor, the AWT (Abstract Window Toolkit[13]), but it is still difficult to create GUIs with it.

The new approach to using Java is the Java servlet approach, in which all the Java code stays back on the server, and the clients interact with it thru standard web pages. This has the benefit of greatly simplifying the GUI code (it is now just standard HTML/XHTML which is quick and easy to write) as well as being easily understood by the users. This method does not have the sophistication of a standard GUI, however this is more than made up for in ease of creation, speed of delivery, and ease of use and understanding. A good example of this approach is the Flex-eL system[14], developed at the University of Queensland. This uses Java servlets and the Enhydra open source development tool[15] to dynamically create the pages. This resulted in a significant reduction in the development time compared to using the standard GUI approach, as well as reducing the learning curve for users.

2.5 JavaScript

JavaScript is usually used for smaller scale problems which lend themselves to a several lines of code embedded in a web-page (client-side JavaScript), such as field validation, error dialogs, a simple product order page etc. It can also be used as a server-side solution; however again, its use is mainly limited to relatively simple applications. For anything beyond that on the server side, Java is a much more suitable solution.

> "JavaScript is a very free-form language compared to Java. You do not have to declare all variables, classes, and methods. You do not have to be concerned with whether methods are public, private, or protected, and you do not have to implement interfaces. Variables, parameters, and function return types are not explicitly typed.
>
> Java is a class-based programming language designed for fast execution and type safety. Type safety means, for instance, that you can't cast a Java integer into an object reference or access private memory by corrupting Java byte codes. Java's class-based model means that programs consist exclusively of classes and their methods. Java's class inheritance and strong typing generally require tightly coupled object hierarchies. These requirements make Java programming more complex than JavaScript authoring.

[13] AWT is "a class library from Sun that provides an application framework and GUI routines for Java programmers. AWT was the first user interface development system included in the Java Foundation Classes (JFC). In 1997, Swing was introduced, which provides more capabilities and is written entirely in Java" (TechWeb).

[14] The aim of the Flex-eL project is to provide a state-of-the-art multimedia learning environment that will realise the full potential of flexible learning by combining workflow technology and innovative learning strategies to achieve a range of objectives. Flex-eL is a new way to deliver and manage higher education courses. It demonstrates the concept of flexible learning by removing time constraints and deploying workflow technology to support the integrated study process. Flex-eL will be tightly integrated into the student record management system and will use the DSTC Workflows technology team and Automatic Video Indexing technology from DSTC. For more information, contact Wasim Sadiq at wasim@dstc.edu.au

[15] Enhydra Open Source Java™/XML application server, http://www.enhydra.org/software/enhydra/index.html

> In contrast, JavaScript descends in spirit from a line of smaller, dynamically typed languages such as Hyper Talk and dBase. These scripting languages offer programming tools to a much wider audience because of their easier syntax, specialized built-in functionality, and minimal requirements for object creation." (Netscape)

Note that JavaScript has no relationship to Java, apart from the name. Both languages were developed completely independently of each other.

Netscape has recently submitted JavaScript to ECMA (European Computer Manufacturers Association[16]) as a standard (ECMA–262[17]) and it has also been approved as an ISO[18] standard, ISO-16262[19]. This has minimal effect on anything, and Netscape will continue to develop, and refine JavaScript as it sees fit.

> JavaScript was created by Netscape to be a portable language independent of the underlying operating system as well as a secure language that would protect the user from unwanted system access. Netscape has submitted JavaScript to ECMA, the European standards consortium, for formal adoption as an international standard and is working with ECMA today to define the standard. Netscape continues to enhance the JavaScript language to provide greater power and ease of use. JavaScript 1.2 contains new features including a capabilities-based security model and support for the use of regular expressions. (Netscape)

For a more thorough treatment, see the JavaScript Overview at
http://developer.netscape.com/docs/manuals/js/client/jsguide/intro.htm

2.7 PDF

(From www.adobe.com)

> Adobe® Portable Document Format (PDF) is the open de facto standard for electronic document distribution worldwide. Adobe PDF is a universal file format that preserves all of the fonts, formatting, colors, and graphics of any source document, regardless of the application and platform used to create it. PDF files are compact and can be shared, viewed, navigated, and printed exactly as intended by anyone with a free Adobe Acrobat® Reader™. You can convert any document to Adobe PDF, even scanned paper, using Adobe Acrobat 4.0 software.

Adobe has also done significant work in ensuring that PDF documents can be machine read[20].

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[16] European Computer Manufacturers Association, Geneva, Switzerland, is an international association founded in 1961 that is dedicated to establishing standards in the information and communications fields. ECMA is a liaison organization to ISO. http://www.ecma.ch

[17] http://www.ecma.ch/ecma1/STAND/ECMA-262.HTM

[18] The International Organization for Standardization, Geneva, is an organization that sets international standards http://www.iso.ch

[1919] The standard is available from ISO at
http://www.iso.ch/projects/project.html?132000-6000%13516262%13%138EN%13

[20] From www.adobe.com - **PDF Access for the Visually Impaired**
Adobe offers the following methods for visually impaired users to convert Adobe Acrobat PDF (Portable Document Format) files for use with screen reading programs.
1. Access.adobe.com
The visually impaired can access information in PDF files through a free service from Adobe called Acess.adobe.com at access.adobe.com/ Access.adobe.com is a Web server that converts Web-based PDF files to HTML, a format that screen-reading programs support. All you need is a Web browser. There are three options for using Access.adobe.com to convert PDF files into HTML:

2.8 Other Web Initiatives

2.8.1 Web Accessibility Initiative

Improving access to the web through the WAI (Web Accessibility Initiative[21]) is not occurring via a web protocol. However, this standards area is relevant to VET web resources. In particular, WAI is relevant to Australian law covering advertising, equity and government information services. Information about WAI and its Australian application may be found at the Human Rights and Equal Opportunities website[22].

WAI is an initiative of W3C that is also being considered by software vendors such as Sun: "The Java™ Accessibility API is the technology launch pad that's opening new doors for people with physical disabilities and the greater population at large". (Sun)

2.8.2 Internationalisation

W3C is also working on ways to provide for an international web[23], ie. providing a set of standards that support documents in languages that are not presented in the Latin 1 character set eg. Hebrew, Mandarin.

Although this is a separate working group within W3C, much of this effort falls under other standards such as HTML. For example, below is a recommended inclusion in all HTML documents (where "en" may be replaced by the relevant language):

```
<META HTTP-EQUIV=Content-Language CONTENT=en>
```

Internationalization features have been successfully incorporated into a variety of W3C web protocols including HTTP/1.1, HTML 4, CSS2, XML, RDF, SMIL, DOM, XPath, and XSLT.

The W3C standard for internationalisation is the Reference I18N Model for characters[24]. W3C recommends ISO 10646/Unicode to identify and describe characters, and to enable conversion between different character encodings. W3C has also developed

- "Ruby Working Draft which defines XHTML markup for Ruby, for use in Japanese, Chinese, and other East Asian scripts (see also the section above), to be integrated into XHTML 1.1, the modular variant of XHTML 1.0 (see the HTML Activity Statement).

- International Layout which proposes a number of style properties for internal layout. This Working draft is no longer pursued actively, but its

- by proxy
- by form
- by e-mail

2. Acrobat Access Plug-in for Acrobat Reader 4.0 (Windows Only)
Adobe Acrobat Access is a plug-in for Adobe Acrobat Reader (Windows 3.1, Windows 95, Windows 98, or Windows NT) that enables screen-reading programs to interpret the content in PDF files. For more information, or to download the Acrobat Access plug-in, visit Adobe's Web site at http://access.adobe.com. You can also download Acrobat Reader from Adobe's Web site at www.adobe.com.
3. Adobe Document Server
Adobe Document Server is a server-based tool that lets you view PDF files within a Web browser without having to use Acrobat Reader or other client software. Adobe Document Server converts PDF files into HTML text that can be interpreted by conventional screen-reading software. For more information, see Adobe's Web site at www.adobe.com/products/docserver/main.html

[21] WAI at W3C, http://www.w3.org/WAI/
[22] HREOC and WAI, http://www.hreoc.gov.au/disability_rights/standards/www_3/www_3.html
[23] Internationalisation at W3C, http://www.w3.org/International/
[24] Character Model for the World Wide Web, Working Draft 29 November 1999, http://www.w3.org/TR/charmod/

components are being integrated into CSS3, XSL, and SVG, to be usable for styling HTML and XML.

- Unicode in XML and other Markup Languages which contains guidelines on the use of the Unicode Standard in conjunction with markup languages such as XML. This document is jointly developed by the W3C I18N WG/IG and the Unicode Technical Committee.

Work is ongoing to integrate Ruby support as a module into XHTML 1.1, and to integrate support for International Layout into SVG, XSL, and CSS3" (W3C).

2.8.3 Other developments

Developments in web technologies are proceeding at a very fast pace. Many of these developments are highly relevant to Flexible Learning and VET would be wise to monitor the development of standards in the following fields

- Access to web resources by a variety of devices such as mobile phones, palmtop devices, TVs, kiosks etc. W3C's Mobile Access and Television Working Groups are considering this[25] [26].
- Electronic commerce (EC) including standards for payments, micropayments, and government legislative requirements including tax. EC is considered by a range of industry and government groups including CommerceNet[27], OECD, United Nation's CEFACT group[28], and Australia's Tradegate[29] and NOIE[30]. Standards for micropayments were considered by W3C but are on hold, awaiting further industry developments.
- Security including authentication, privacy, confidentiality, and intellectual property. Several W3C groups are addressing security aspects of the web including Platform for Privacy Preferences (P3P) Project[31] and Platform for Internet Content Selection (PICS)[32]. Another major international organisation for security standards is IETF[33].
- Multimedia formats and metadata – please see the Multimedia Discussion Paper for further information.
- Voice navigation of the web. W3C's Voice Browser Working Group is considering this.[34]

3 Workshop

3.1 Attendance

The workshop was held 1:30 – 4:30pm on 2 October 2000. The attendees were:

Number	Name	Email	Jurisdiction
1.	Tony Barry	a.j.barry@dtir.qld.gov.au	QLD

[25] Mobile Access at W3C, http://www.w3.org/Mobile/
[26] Television and the Web at W3C, http://www.w3.org/TV/
[27] CommerceNet (and RosettaNet), http://www.commercenet.com/
[28] UN/CEFACT http://www.unece.org/cefact/
[29] Tradegate, http://www.tradegate.org.au/
[30] E-commerce at NOIE, http://www.noie.gov.au/projects/ecommerce/index.htm
[31] P3P, http://www.w3.org/P3P/
[32] PICS, http://www.w3.org/PICS/ and DSig, http://www.w3.org/TR/REC-DSig-label/
[33] IETF Security Groups, http://www.ietf.org/html.charters/wg-dir.html#Security_Area
[34] Voice Browser at W3C, http://www.w3.org/Voice/

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4 Preferred Standards - Recommendations

This section lists the Preferred Standards recommended by the participants of the Web Technologies workshop.

4.1 XML Version 1.0

There was some doubt expressed on the email list (re Jeremy Thompson: Tue, 12 Sep 2000), about using XML, because of its recent introduction and lack of usage experience in large-scale deployment in real world situations. The adoption of XML would be transparent to most users, and would mainly serve to greatly simplify the sharing of data between VET organisations. All of the major software vendors are either writing tools with which to simplify the usage of XML, and/or rewriting their own software to use XML as the backbone.

1. [*Preferred Standard*] VET should adopt XML Version 1.0.

4.2 XHTML Version 1.0

2. [*Preferred Standard*] VET should adopt XHTML Version 1.0.

4.3 HTML Version 4.1

HTML 4.1 is supported by the vast majority of browsers now in use. The XML 1.0 recommendation demands support for HTML 4.0 as a minimum.

3. [*Preferred Standard*] VET should adopt HTML Version 4.1.

4.4 HTTP Version 1.1

HTTP 1.1 is the latest version of the HTTP protocol. There are several areas where it has been improved over HTTP 1.0, most notably in the areas of connection management, and caching. Some questions were raised about whether the latest version would correctly display the latest version of HTML, however the changes were implemented to improve the efficiency of the Internet and have no effect on how the pages are rendered.

4. [*Preferred Standard*] VET should adopt HTTP Version 1.1.

4.5 Java Version 1.1

It is recommended that all browsers be upgraded to at least version 4.0 of either MS Internet Explorer or Netscape Communicator, because Java support in previous versions of both of these browsers is patchy and unreliable. When writing applets to be run in a browser, it is recommended to stick to Java 1.1, because this is still the version supported by the largest number of browsers. While Java 1.2 is a significant improvement over Java 1.1, it is not supported by enough browsers to make it the preferred option.

5. [*Preferred Standard*] VET should adopt Java Version 1.1.

4.6 JavaScript Version 1.2

6. [*Preferred Standard*] VET should adopt JavaScript Version 1.2.

4.7 Data Packaging

7. [*Preferred Standard*] VET should Include all Data Packaging formats as listed in the Multimedia Technologies Preferred Standards e.g. AU, MP3.

4.8 Adobe Portable Document Format Version 4

Adobe PDF is used where it is required to preserve formatting. Some doubts were raised about whether PDF was suitable for the visually impaired; however, Adobe has done considerable work to ensure that it can be machine read.

8. [*Preferred Standard*] VET should use Adobe PDF format for documents whenever the document's format needs to be preserved. Whenever, documents are provided in PDF format, they also need to be provided in RTF format.

4.9 Graphic Formats

9. [*Preferred Standard*] VET should use graphic formats as listed in the Multimedia Technologies Preferred Standards e.g. PNG, JPEG.

4.10 Metadata

10. [*Preferred Standard*] VET should adopt metadata standards as recommended by the Resource Locators Preferred Standards.

5 Operational Guidelines - Recommendations

5.1 Web Content and Form

1. [*Operational Guideline*] Content on VET webpages should be separated from form by the use of style sheets.

5.2 Browser compatibility

2. [*Operational Guideline*] All pages to display to the author's satisfaction in Netscape Navigator 4.6, Microsoft Internet Explorer 4.01 Service Pack 2 for PCs and 5.0 for Macintoshes, and Opera 4.x.

5.3 Web publishing

3. [*Operational Guideline*] It is recommended that VET support the following standards for web publishing, rather than creating their own standards

- W3C Web Accessibility Guidelines (http://www.w3c.org/TR/WAI-WEBCONTENT).
- W3C guidelines for maintaining backward compatibility of XHTML with HTML.
- Guidelines for Commonwealth information published in electronic formats[35]
- Guidelines for web publishing[36] (from the ANTA toolbox project)

6 Continuing Work - Recommendations

6.1 Browser compatibility

1. [*Continuing Work*] VET should monitor website usage statistics to determine when to change the versions of popular browsers that should be supported and listed in the Preferred Standards.

[35] http://www.ausinfo.gov.au/guidelines/index.html
[36] http://www.toolboxcentral.com/search.cgi?T=j&Ft=dev_webpub&S=All&Q=All&TK={D669EA09-591F-11D3-9ACA-DF06DB42AA6F}

6.2 XML

2. [*Continuing Work*] It is recommended that the development of XML schemata required for the Australian VET sector be commenced. These developments should accompany all relevant initiatives in the VET Sector. This concept was further extended by other Working Groups to an electronic student record and the XML schema to support it. This project is described in a separate report, *Proposed Projects pursuant to the VET Preferred Standards Project.*

6.3 Security

3. [*Continuing Work*] It is recommended that a project be proposed which addresses security standards including those for secure delivery of information, authentication of student submissions (eg. online examination responses) and server authentication. Several Working Groups identified the issue of security, and the proposal for this project is detailed in a separate report *Proposed Projects pursuant to the VET Preferred Standards Project.*

6.4 Wireless and Mobile Access

4. [*Continuing Work*] It is recommended that a project be proposed which addresses standards for wireless and mobile access. As such, a project is outside the scope of this Working Group, the proposal is detailed in a separate report *Proposed Projects pursuant to the VET Preferred Standards Project.*

6.5 Transmission Methods

5. [*Continuing Work*] It is recommended that the various methods for transmitting content for online delivery be investigated further. This would include satellite, frame relay, ISDN, ADSL etc, as well as their effect on the streaming and compression of content. Continuing The Maintenance Process

As the web technologies area continues to mature, the feasibility of biennial discussion groups and workshops (such as this one) to decide on which standards to adopt will decline. They could be effectively replaced by a small, permanently available panel who would use electronic and physical means to discuss how to approach the new standards/technologies that have arisen, and who could meet regularly (6 monthly).

6. [*Continuing Work*] It is recommended that VET maintains the Preferred Standards by establishing a Standing Committee who would regularly review (at least 6 monthly) the standards and developments in these areas.

7 Products Compatible With Standards

Most of the standards are in general use, e.g. HTML, Java, JavaScript, with only XML not yet being commonly used on a day to day basis so the following is a short list of some of the products which support XML and related technologies.

Xmetal, a XML editor from www.softquad.com/xmetal
Apache web-server now has built in XML support (www.apache.org)

Microsoft has several example programs, and tutorials at
http://msdn.microsoft.com/xml/default.asp

Continually updated lists of XML related software and tools can be found at
http://www.w3.org/XML/#software and at http://www.oasis-open.org/cover/publicSW.html.

8 Appendix

This section includes the candidate recommendations, which were sent to the Web Technologies email list. There were several emails highlighting areas for discussion, however, only one candidate recommendation (from Jon Henry) was received.

Candidate Recommendations
By Jon Henry

Standards

XML Version (http://www.w3.org/TR/html4)

XHTML Version 1.0 (http://www.w3.org)

HTML Version 3.2 including Cascading Style Sheets (http://www.w3.org/MarkUp/)

Xforms (http://www.w3.org/MarkUp/Forms)

HTTP Version 1.1 (http://www.w3.org/Protocols)

Java Version 1.1 (http://java.sun.com/docs/books/jls/html/)

JavaScript Version 1.2 (http://developer.netscape.com/tech/javascript/index.htm)

Adobe Portable Document Format Version 3
(http://www.adobe.com/prodindex/acrobat/adobepdf.html)

JPEG

GIF

AVI

Metadata standards as recommended by the Resource Locators Working Group

Operational Guidelines

W3C Web Accessibility Guidelines (http://www.w3c.org/TR/WAI-WEBCONTENT).

World Wide Web Consortium's guidelines for maintaining backward compatibility of XHTML with HTML.

All pages to display to the authors' satisfaction in Netscape Navigator 4.x, Microsoft Internet Exploder 4.x, and Opera 4.x.

Pages should display without the need for horizontal scrolling on a monitor of 800x600 resolution.

Navigational pages should
Load within 15 seconds via a 28.8k modem,

Have a search facility and/or site map link visible at all times,
Have a link to the home page visible at all times.

Users should be warned of the need for plugins to display formats other than those listed above and should be offered the opportunity to download the appropriate plugin.

Graphic sizes should be specified in the HTML code.

Pages should download in such a way that loading progress is obvious to the reader.

File and directory names should be lower case and contain no space.

Each page should include metadata as recommended as recommended by the Resource Locators Working Group (i.e. EdNA metadata as a minimum with additional IMS metadata where appropriate).

Each page should show
title,
date of last update,
contact details.

Pages linked from other sites should open in a new window and not appear within the frames of the original site.

Background sound should not play for more than ten seconds after a page is displayed and should be capable of being turned off by the user.

Fonts in HTML pages should be limited to those provided by conventional installations of the common browsers (any ideas on which these are?).

Continuing Work

Monitor site usage statistics to determine when to change the versions of popular browsers that should be supported.

XML schema for Australian VET.

Other

ANTA CEOs should be asked to endorse the Web Interoperability Pledge (http://www.zdnet.com/anchordesk/wip/index.html). The pledge is a promise to adhere to current HTML standards without proprietary extensions.

9 References

W3C
This site contains links to the official pages for all the technologies mentioned, apart from Java and JavaScript
http://www.w3.org/

HTTP
http://www.w3.org/Protocols/

Java
http://java.sun.com/

Sun's Java Accessibility API
http://www.javasoft.com/features/2000/07/access.html

JavaScript
http://developer.iplanet.com/tech/javascript/index.html
http://developer.netscape.com/tech/javascript/index.html
http://www.ecma.ch/ecma1/MEMENTO/tc39.htm
ftp://ftp.ecma.ch/ecma-st/Ecma-262.pdf (specification)

Microsoft .NET
http://www.microsoft.com/NET/

Microsoft and XML
http://www.microsoft.com/Office/evaluation/solutions/keyfile.htm
http://www.microsoft.com/Office/evaluation/solutions/datachan.htm
http://www.microsoft.com/Office/evaluation/prodinfo/applhtml.htm
http://www.microsoft.com/SQL/productinfo/sql2ktec.htm

Oracle and XML
http://www.nwfusion.com/news/2000/0508oracle.html
http://www.oracle.com/xml/
http://www.oracle.com/database/options/ifs/

Apache XML
http://xml.apache.org/

IBM and XML
http://www.alphaworks.ibm.com/tech/xml4j