Australian Flexible Learning Framework
supporting e-learning opportunities

THE le@rning FEDERATION
schools online curriculum content initiative

Comparison of TLF and VET E-standards

The Learning Federation and the Framework's E-standards for Training

Final Version 1.0

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Document version

Version	Details
0.1	Initial Draft by Simon Lismann (Framework)
0.2	Initial Draft Edited by Kristena Gladman (TLF) and Mark Gladman (TLF)
0.3	Impact Statement added and ANZ-LOM/Vetadata comparison referenced
0.4	Proof-read and edited by Steve Sunter (TLF)
0.5	Changes accepted, minor text update, Web services and Repository section combined – Framework
0.6	Final comments by Steve Sunter (TLF) addressed, Metadata and Vocab section combined - Framework
0.7	Joint review following discussion at EEG [2] by Framework and TLF
0.8	Comments from Felicity Farr (Framework)
1.0	Final version

1. Document purpose

This comparison of the e-learning standards for The Learning Federation (TLF)[1] and the vocational education and training (VET) sector (through the Australian Flexible Learning Framework's (Framework)[2] E-standards for Training business activity[3]), aims to identify where differences in e-standards may cause technical issues with content interoperability and exchange.

It should be noted that if no significantly large amounts of content or metadata are to be shared, then the practical result of the considerations listed in this document are nominal.

2. Content formats

Table 2.1 - Recommended e-standards used by TLF and VET

Recommended standard(s)	TLF	E-standards for Training (Framework)	Notes
Common web content	▪ XHTML 1.1 ▪ XML 1.0 ▪ DOM Level 2 ▪ UTF-8 ▪ SVG 1.0 ▪ SMIL 2.0 ▪ MathML 2.0 ▪ QTI 1.2	▪ XHTML 1.0	Flexible Learning Toolboxes (Toolboxes)[4] - specify UTF-8 document encoding. Refer to Consideration 2.1 and 2.3 below.
Style sheets	▪ CSS 1 ▪ CSS 2.1	▪ CSS1 ▪ CSS2	Refer to Consideration 2.2 below.
Text document formats	▪ Text files (.TXT) ▪ PDF ▪ Microsoft Word, Excel and PowerPoint	▪ RTF ▪ DOC ▪ PDF	TLF - text document usage is only permitted for storage of variables and small quantities of data. Toolboxes - Additional requirements for Toolboxes are that DOC must be viewable in MS Word 97, and PDF

[1] The TLF develops digital curriculum content for all Australian and New Zealand schools; for more information: http://www.thelearningfederation.edu.au

[2] The Framework is the national training system's e-learning strategy; for more information: http://www.flexiblelearning.net.au

[3] E-standards for Training is focused on developing national standards to underpin essential e-learning infrastructure, conducting research into new technology areas and providing guidance materials and tools to support the effective use of emerging technologies; for more information: http://www.flexiblelearning.net.au/e-standards

[4] Flexible Learning Toolboxes (Toolboxes) are high quality, cost effective interactive e-learning and assessment resources featuring scenarios, images and activities that simulate real-life; for more information: http://www.flexiblelearning.net.au/toolboxes

	(subject to approval)		viewable in Adobe Reader 6.0. Refer to consideration 2.4 below.
Graphics (still)	▪ JPEG ▪ PNG ▪ SVG 1.0	▪ JPEG ▪ GIF ▪ PNG	Refer to consideration 2.4 below.
Graphics (animated)	▪ MNG 1.0	▪	
Video	▪ QuickTime (playable in QuickTime player v7.16 ▪ MPEG-4 ▪ SWF (Playable in Flash Player v9)	▪ MOV ▪ MPEG-2 ▪ MPEG-4 ▪ AVI ▪ SWF ▪ FLV	TLF- As the Flash player cannot handle externalised MPEG-4, it is expected that video content used within Flash will be supplied within a SWF. Toolboxes – Addition requirement is that SWF content is playable in Flash Player v9. Refer to consideration 2.4 below.
Audio	▪ MPEG-1 Audio Layer 3 (MP3)	▪ MPEG-1 Audio Layer 3 (MP3) ▪ AU	Refer to consideration 2.4 below.
Interactive content	▪ ECMAScript Revision 3 (JavaScript) ▪ ActionScript ▪ Lingo ▪ Java Applets (J2SE Runtime Environment (JRE) 5.0) ▪ SWF (Playable in Flash Player v9) ▪ DCR (Playable in Shockwave Player v10.1r11 full installer)	▪ JavaScript v1.3 ▪ SWF ▪ FLV	TLF/Toolboxes - All content is expected to function if scripting is turned off in the browser. Refer to Accessibility Checkpoint 6.3 (http://www.w3.org). TLF - Due to client delivery constraints FLV isn't an acceptable format for TLF content. However FLV may be used to improve compression provided that it is embedded in a SWF for delivery. TLF - Functionality is added with ActionScript and Lingo however .as and .lng files are not commonly found as assets in compiled learning objects or delivered with content. TLF- Although Flash Player 9 is backward compatible there are some compatibility issues with content developed for earlier versions of the player. TLF- Director objects that have external assets require the full installer version of the Shockwave Player. TLF- There is a known incompatibility between Safari 2.0 and Director content that is embedded in XHTML 1.1 Refer to consideration 2.4 and 2.5 below.

Impact statement:

The differences in standards specified in this section should not pose any major practical barriers to the interoperability of content, however consideration to the following should be made. The most notable differences are in the areas of web content and style sheets.

Consideration 2.1

TLF use XHTML 1.1, and VET e-standards recommend XHTML 1.0. Internet Explorer 6 and 7 do not inherently support all functionality available via the XHTML 1.1 DTD. However, TLF use the .HTML extension, therefore these browsers will interpret the code as HTML and it will render correctly. Using HTML that meets to the XHTML 1.1 specification ensures that future work in conformance will be reduced.

Consideration 2.2

TLF use CSS 2.1, and VET e-standards recommend CSS 2.0. CSS 2.0 is not forward compatible with CSS 2.1. In addition, CSS 2.1 is more likely to be better supported by existing web browsers, and expected to be more easily updated to conform to the CSS 3.0 standard when introduced.

Consideration 2.3

As noted above, Internet Explorer 6 and 7 do not inherently support all functionality available via the XHTML 1.1 DTD and they also don't support DOM Level 2 or the full scope of the CSS 2.1 recommendation. However content produced using these recommendations should render correctly if appropriate workarounds are implemented.

TLF applies the W3C recommendations to ensure that content can withstand technology changes and can be easily interpreted and translated into future technologies without requiring redesign or recoding. For example: TLF uses XHTML 1.1 to ensure that all code provided strictly conforms to established XML coding methods. This is intended to facilitate interoperability with other W3C recommendations and will make the transition to XHTML 2.0 easier in the future should that be appropriate.

Before implementing these technologies the VET sector should investigate the appropriateness of the technologies and methods for the content being developed. End-user manipulation of content may be more difficult due to the strict requirements of XHTML 1.1 for validity and well-formed mark-up.

Consideration 2.4

The TLF content repository does not serve the MIME types for resources other than those acceptable under their recommendation. A number of content format types are recommended by VET e-standards, but not acceptable by TLF. However, for the purposes of the content exchange, VET content will not be stored in the TLF repository, so there will be no technical impact.

Consideration 2.5

Testing would be required to confirm that VET systems can serve the correct MIME types for PNG, MNG, SVG and DCR.

3. Metadata and vocabularies

A comprehensive comparison of the ANZ-LOM (TLF) and Vetadata (VET) metadata application profiles was undertaken in April 2008. Please refer to the comparison document *Metadata Elements Comparison – Vetadata and ANZ-LOM*.

Table 3.1 - Metadata Elements Comparison – Vetadata and ANZ-LOM publishing location

http://e-standards.flexiblelearning.net.au/docs/ANZLOM-VETADATA-comparison-v1-0.pdf	Metadata Elements Comparison – Vetadata and ANZ-LOM: Version 1.0
http://e-standards.flexiblelearning.net.au/vetadata/index.htm	Vetadata (E-standards for Training website, viewed 28 May 2008)
http://www.thelearningfederation.edu.au/metadata	ANZ-LOM (TLF website, viewed 28 May 2008)

Impact statement:

The metadata comparison identified potential interoperability issues with the exchange of ANZ-LOM and Vetadata. The considerations to be made for the successful exchange and use are outlined below. Further recommendations on how to proceed with application profile harmonisation are available within the *Metadata Elements Comparison – Vetadata and ANZ-LOM* document.

If the TLF/VET sector content exchange strategy is to include the harvesting of each others metadata, technical work will be required to improve consistency between these systems. Analysis in Section 3 'Metadata' is the first step in this process.

Consideration 3.1

The metadata comparison identified that elements are recommended in the ANZ-LOM application profile, but not included in the Vetadata application profile. For example, if the TLF harvested metadata from LORN (Learning object Repository Network[5]), the unused fields (i.e. elements such as Educational Objective) could not be utilised in a search engine. As they contain no data, they would return no results for a search focused on such a field. The TLF have indicated that these are unlikely to be commonly searched fields, therefore the practical impact of this will be nominal. It is however, important to have identified these elements. This will assist in any work done in metadata harvesting and exchange.

Consideration 3.2

The metadata comparison identified that ANZ-LOM and Vetadata use different vocabularies for the element 'Classification'. The classification element in the Vetadata for a learning object in LORN contains NTIS[6] codes relating to the specific unit of competency within a training package. The ANZ-LOM application profile uses the school

[5] LORN is an easy to use portal that allows teachers and trainers to access quality resources for the VET sector; for more information: http://www.flexiblelearning.net.au/lorn

[6] National Training Information Service (NTIS) is the official national register of information on VET training packages, qualifications, courses, units of competency and RTOs in Australia; for more information: http://www.ntis.gov.au/

sector's KLA (Key Learning Area) codes. The different vocabularies used will not cause any technical interoperability issues. However, how this could impact on the discoverability of objects in VET and TLF systems should be investigated.

Consideration 3.3

The ANZ-LOM application profile recommends the 'Relation' element to describe the relationship of the learning object to other learning objects or resources. TLF uses persistent identifiers to link the related resources.

Currently, VET e-standards do not provide any mechanism for using the relation element. Research conducted by the Framework in 2007 explored whether relational metadata could be registered and linked via a metadata registry. Such an implementation in the VET sector may be different from the TLF implementation, but not necessarily incompatible. Both the TLF and VET might need to implement a strategy to translate relationship information if required.

Consideration 3.4

The method used to register multiple versions of a resource will affect the ease with which each user obtains the best available copy of any given resource.

For the 'Technical location' field, TLF generates resolvable handles. Local repositories register the locations of their objects via a Handles server. Users searching a metadata repository are redirected to local copies of suitable content (where content is available and registered).

Vetadata recommends a URL is used for the technical location. The VET sector is exploring methods for implementing persistent URLs. The VET sector should monitor developments in the school sector to ensure compatibility. Both organisations should liaise to raise awareness of technical issues.

Consideration 3.5

The ANZ-LOM and Vetadata application profiles use different vocabularies for the element '5.2 Learning resource type'. ANZ-LOM uses an extension of the Dublin Core Metadata Initiative (DCMI), and Vetadata uses and extension of an IMS vocabulary. The terms are easily translated, and the implementation of a simple technical system could achieve this.

Table 3.2 – TLF and VET vocabularies (recommended in ANZ-LOM and Vetadata respectively)

ANZ-LOM	Vetadata
▪ DCMI Type; TLF Learning resource type ▪ Schools Online Thesaurus ▪ Statements of Learning [Optional] ▪ edna-kla; TLF Strand ▪ edna-userlevel; AQF ▪ TLF Student activity ▪ Curriculum Corporation Technical requirements ▪ TLF Access profile	▪ IMS; Vetadata Educational Use Vocabulary ▪ VOCED (Vocational Education Thesaurus) ▪ NTIS ▪ MyFuture Industry Classification Scheme ▪ AQF (Australian Qualifications Framework)
http://www.thelearningfederation.edu.au/metadata (TLF website, viewed 29 May 2008)	http://e-standards.flexiblelearning.net.au/topics/vocab.htm (E-standards for Training website, viewed 29 May 2008)

4. Content packaging

Table 4.1 - TLF and E-standards for Training (Framework) content packages

TLF	E-standards for Training (Framework)
▪ IMS Content Packaging ▪ SCORM 2004 2nd Edition v1.3	▪ IMS Content Packaging v1.1.4 (used in LORN) ▪ SCORM 1.2 (Flexible Learning Toolboxes)
http://www.thelearningfederation.edu.au/standards (TLF website, viewed 28 May 2008)	http://e-standards.flexiblelearning.net.au/topics/packaging.htm (E-standards for Training website, viewed 28 May 2008)

Impact statement:

Interoperability issues between objects created in different IMS Content Packaging standards are unlikely. These standards are well-established and well-supported by the vast majority of commonly used learning management systems and browser content package players. However, implications for the exchange of content in SCORM 1.2 and SCORM 2004 formats would need to be investigated.

Consideration 4.1

TLF include metadata in the imsmanifest.xml, the Framework's E-standards for Training recommend a separate metadata.xml file (requirement for LORN), however both are acceptable IMS Content Packaging formats. This needs to be noted in a physical exchange of content, as TLF and VET systems will read metadata from the content package in different ways.

Consideration 4.2

Learning management system support for SCORM 2004 objects varies. There is a possibility that VET e-learning systems may have issues with this content. Testing in this area is required. If required TLF can supply content packages as non-SCORM IMS packages.

VET need to specify the content packaging format required for the TLF content for the content exchange.

5. Repositories and web services

Table 5.1 – TLF and E-standards for Training (Framework) repositories and web services

TLF	E-standards for Training (Framework)
▪ Learning Object Repository Access and Exchange v4 (LORAX) ▪ Content Rights Information System Project (CRISP)	▪ IMS Digital Repository Interoperability (IMS DRI) Framework ▪ Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) ▪ RSS feeds ▪ APIs (Google etc) ▪ AEShareNet (Automated licence transactions)
http://www.thelearningfederation.edu.au/standards (TLF website, viewed 30 May 2008)	http://e-standards.flexiblelearning.net.au/topics/repositories.htm (E-standards for Training website, viewed 30 May 2008)

Impact statement:

If TLF metadata is to be harvested, then TLF needs to support OAI-PMH queries via web services.

6. Intellectual property

Table 6.1 - TLF and E-standards for Training (Framework) intellectual property standards

Recommended standard(s)	TLF	E-standards for Training (Framework)
Copyright	▪ Content Rights Information Project (CRISP) ▪ Single copyright statement in the start file of the learning object with a link to a Conditions of Use html file that describes the terms of use relevant to the licensee's use of the learning object ▪ Rights xml file distributed with learning object package, expressing Conditions of Use in machine readable form ▪ Acknowledgements for third party copyright material included in-situ, on-screen for relevant learning objects.	▪ AEShareNet ▪ LORN Rights Statement

Impact statement:

The discussion on resolving cross-sectoral copyright arrangements is out of scope for this technical comparison. However, is important to recognise that some technical work may be required in a content exchange.

Consideration 6.1

Some work may need to be done to add or modify custom copyright notices where appropriate.

Consideration 6.2

The open nature of VET systems will impact the on which TLF content can be added to its collections.

7. Accessibility

Table 7.1 - TLF and E-standards for Training (Framework) accessibility standards

Recommended standard(s)	TLF	E-standards for Training (Framework)
General	▪ Refers to conforming with relevant Commonwealth Law ▪ WCAG 1.0 (W3C Web Content Accessibility Guidelines)	▪ WCAG 1.0 (W3C Web Content Accessibility Guidelines)
Screen resolution	▪ Optimised for 1024x768, scalable web objects	▪ Optimised for 1024x768, scalable web objects ▪ Toolboxes - Further to this no HTML object (including images included using the <img> tag) should exceed dimensions width=”748” and height=”425”, to allow for usage within a LMS frameset.
Device independence	▪ All content should be device independent and accessible with both keyboard and pointing devices.	▪
Colours	▪ Requirements derived from WCAG Checkpoint 2.1 Colour-alone should not be used to convey information, foreground and background colour combinations provide sufficient contrast, all interactive elements must indicate a change of state that does no use colour-alone	▪ Checkpoint 2.1

Impact statement:

Differences in accessibility requirements are not likely to create and technical interoperability issues. There may be legal obligations for TLF or the VET sector to meet

specific accessibility requirements. However, this subject matter is out of scope in this technical standards comparison.

8. Client platforms

Table 8.1 – TLF and E-standards for Training (Framework) client platform standards

Recommended standard(s)	TLF	E-standards for Training (Framework)	Notes
Operating systems	▪ Windows 2000 (with East-Asian fonts) ▪ Windows XP (with East-Asian fonts) ▪ OS X	▪ Windows 2000 ▪ Windows XP ▪ Windows Vista ▪ OSX 10.3	TLF – Requirement for East-Asian fonts is an artefact from early LOTE development and now applies to very limited amounts of content.
Plug-ins/auxiliary software	▪ Flash Player 9 ▪ Shockwave Player 10.1r11(full installer) ▪ Adobe Acrobat Reader v5.0 ▪ Quicktime 7.1.6 Player ▪ Adobe SVG Viewer Plug-in	▪ Flash Player 9 ▪ Microsoft Word for Windows 97 ▪ Adobe PDF Reader v6.0	
Browsers	▪ Firefox 2.0 (on Windows) ▪ IE 6.0 (on Windows 2000) ▪ IE 7.0 (on Windows XP) ▪ Safari 2.0	▪ Firefox 2.0 ▪ IE 6.0 ▪ IE 7.0 ▪ Safari 1.3	

Hardware	As per an averaged platform supplied but the O/S, browser and plug-in vendors.	▪ IBM Compatible PC
		  ▪ Pentium III 1GHz
		  ▪ Pentium IV
		  ▪ 256MB RAM
		▪ Apple Macintosh
		  ▪ 500MHz
		  ▪ 256MB RAM
		▪ CD-ROM
		▪ Internet access	

Connectivity	▪ Standard web pages should load within 10 seconds with either a 64kbit/s or 256 kbit/s connection. ▪ All content must operate from a stand-alone connection	▪ Bandwidth equivalent to downloading a 65K HTML file within 30 seconds	

Impact statement:

The client platforms recommended are very similar, and unlikely to pose any barriers to content interoperability and exchange. However it should be noted that as Flash components in VET content may have been authored for earlier versions of the Flash player there is a possibility of compatibility issues with Flash Player 9. VET users will need the full installer version of Shockwave Player 10.1r11 for guaranteed playback of TLF Director content.

Consideration 8.1

Updates to personal computer plug-ins and applications should be made or allowed by network administrators and managers of desktop environments.

9. For more information

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