



THE
le@rning
FEDERATION

schools online curriculum content initiative

THE LE@RNING FEDERATION

Quality Assurance Framework for Online Content Development

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1 Introduction

Why have a *Quality Assurance Framework*?

The Le@rning Federation has developed a *Quality Assurance Framework* to describe production and evaluation processes and content development methodologies for all commissioned online content development projects.

Many multimedia developers have technical systems, software and graphic design backgrounds that provide expertise and capability in terms of innovation and quality treatment of educational concepts and content, primarily in terms of technical application and graphical design. The resulting products may therefore exhibit finesse in performance, run time and ease of navigation, as well as flashy, exciting graphical and interactive interfaces. Educational domain experts, however, are often more concerned with the specifics of the content being presented. Consequently, many digital learning resources developed to date have either over-emphasised technical proficiency and exciting graphical design at the expense of sound pedagogy, or have presented sound content using traditional, non-digital models of instructional design, without innovative and educationally relevant exploitation of the media.

The Le@rning Federation's focus is on the development, design and delivery of learning resources for school-based users. User-centred design methodology has generally applied to computer product design and development for adult users. More recently, however, research in design and development of educational computer-based products has focused on the application of user-centred design for school students. Quality evaluation methodology and validation tools have also generally been developed for adults. The Le@rning Federation is therefore creating new design and evaluation heuristics to ensure quality student-focused educational multimedia.

An iterative approach to design and development involving users and experts at all stages is being employed. The concept of quality is firmly embedded in the application of technology to achieve educational soundness in terms of content integrity and the integration of domain knowledge and learner activity.

What does the *Quality Assurance Framework* do?

The *Quality Assurance Framework for Online Content Development* ensures that all products and deliverables meet The Le@rning Federation's requirements for quality design, development, delivery and maintenance of online content.

Quality assurance is a dynamic process, which builds an evolving body of knowledge. Each quality assurance procedure evaluates and provides feedback on product conformance to specifications and guidelines. This provides further information for improvement of the specifications, guidelines and processes for subsequent product development.

The *Quality Assurance Framework* describes the processes that ensure that content developed for Australian and New Zealand schools is:

- relevant to the needs and expectations of users
- accessible by the range of technology available to users
- useable and functional
- pedagogically sound and cohesive.

The main principles underlying the quality assurance processes are:

- the active involvement of users, such as practising teachers and students
- the collection of feedback from users at all stages of development, from simple paper storyboards and design brief reviews to online prototypes
- the use of multidisciplinary development teams to ensure both pedagogical and technical quality
- the use of the most appropriate media for the content, taking into account the profiles of learners and access to technologies.

The framework has been developed to assist:

- multimedia content developers and suppliers to build an understanding of the educational context
- focus groups and educational experts who will use the guidelines and specification indicators to comment on successive stages of work in progress
- key personnel in jurisdictions, eg: Contact Liaison Officers (CLOs); members of Reference Groups and Working Parties and the Learning Federation Consultative Committee (LFCC).

2 Quality control

The Le@rning Federation draws on international quality standards for project management; user-centred design of systems and products; and software development, deployment and delivery to ensure quality control. It has adopted the following definition of a standard:

'A Standard is a published document which sets out specifications and procedures designed to ensure that a material, product, method or service is fit for its purpose and consistently performs the way it was intended to.' *Standards Australia*

National and international standards underpinning the *Quality Assurance Framework* (see Appendix 1) have been used as a basis for developing tailored project specifications. The challenge is to balance specificity with flexibility to accommodate the diverse range of content being developed.

Quality refers to the totality of characteristics of a product or service that bears on its ability to satisfy stated and implied needs. The quality assurance specifications combine to ensure that quality content design, development, delivery and maintenance is achieved.

Each specification designates key performance criteria in relation to the quality characteristics. Each consists of quantitative and qualitative elements. Thus a concept of 'reasonableness' on balance is used in the application of the criteria and applied throughout the quality assurance processes.

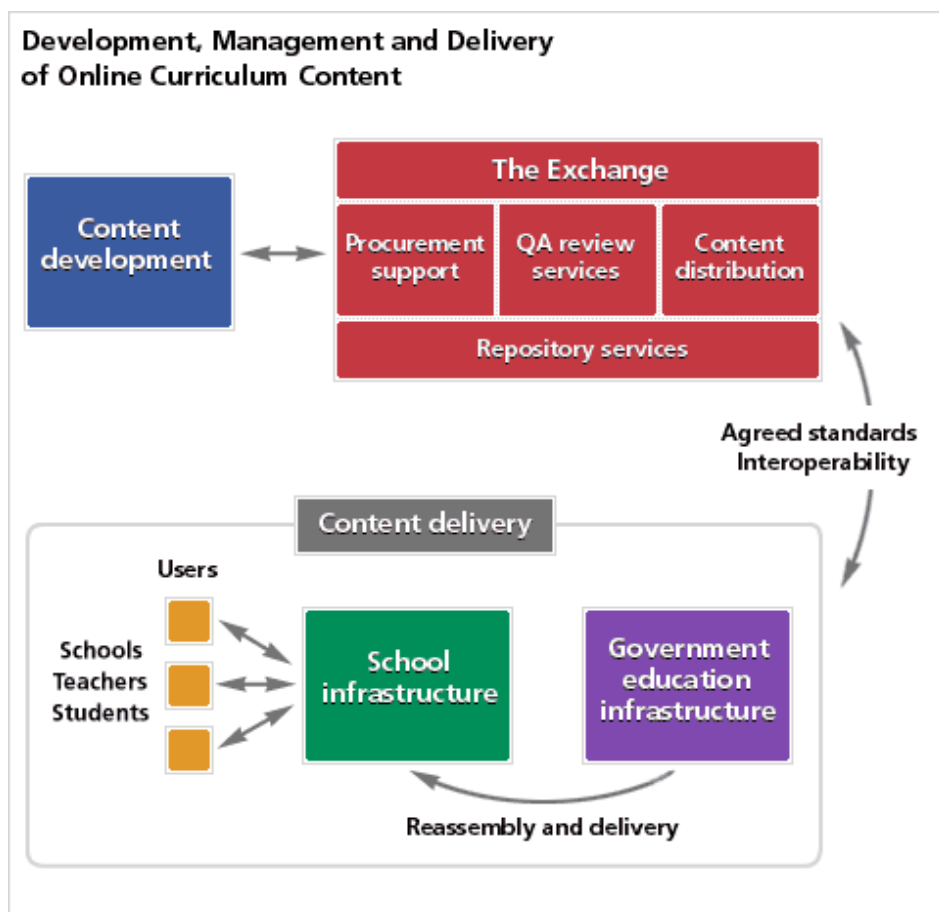
The requirements for each commissioned or non-commissioned project will be based on the version of specifications at the time the project commences. To a degree, the requirements are an interpretation and application of standards and measures within a specific project context.

Published specifications, procedures, guidelines, indicators, templates and tools are provided to support implementation of the specifications. These quality assurance instruments are used by various personnel involved in quality assurance at different stages of a project and are also available to jurisdictions for their use and application.

The Le@rning Federation specifications cover:

- A. Educational soundness
- B. Technical specifications for content development
- C. Rights management
- D. Accessibility
- E. Metadata (discovery, management and maintenance).

The diagram on the following page outlines the process of content developed and distributed by The Le@rning Federation. The process highlights a life cycle where content is developed by developers and uploaded into the Exchange system. The content is then distributed to state and territory systems and sector infrastructure to be managed and distributed to schools. At the school the content will be discovered and repurposed by teachers to be presented to students in the classroom.



The Exchange system supports:

- **Procurement support:** Content submission, breaking down into Learning Objects, assigning IP and educational metadata and managing workflow and processes.
- **QA review services:** In-school evaluation, quality assurance testing and acceptance testing of content.
- **Content distribution:** Distribution and management of learning objects. This includes importing learning objects into downstream Learning Content Management Systems that are operated by school sector agencies to provide services for teachers to use and generate tailored learning experiences for students.

All of the steps in the distribution chain have specific requirements and if content and infrastructure are not developed to agreed specifications, then there is significant risk that content will not be reliably distributed to students.

The Le@rning Federation works collaboratively with teachers, information technology and curriculum education officers to develop specifications and systems that meet the Initiative's distribution requirements. The Le@rning Federation Consultative Committee (LFCC) is the primary forum for these collaborative discussions. The LFCC includes representatives from every State & Territory, New Zealand, the independent schools sector, the Catholic schools sector and DEST. It meets quarterly.

A. Educational soundness

The specifications for educational soundness are based on the convergence of instructional design theory and contemporary learning theory.

The specifications are used to assess online curriculum content in terms of the following principles:

- learner focus
- integrity
- useability
- accessibility.

Learner focus

Online content will have learner focus when it has purpose, meaning and relevance for the students, and when it:

- enables students to interact with, organise, represent, interpret and manage the process of learning and the information flow
- makes explicit the intended process of learning
- contextualises student learning by making connections with prior learning and likely future learning.

Integrity

The integrity of the content is a critical component of educational soundness. Integrity will be achieved when the content is authentic and when learning object design takes account of:

- the ways knowledge is conceptualised within the domain
- the skills and competencies of the domain
- the ways of communicating both within and outside the domain
- the knowledge and understandings valued by various user groups and communities.

Useability

Useability means that the learning object:

- is relevant in terms of the curriculum
- supports the process of learning
- enhances the ability of the student to engage with its content.

Accessibility

The principle of accessibility recognises the range of contexts in which teaching and learning take place, and the diversity of teacher and student populations. Online content is designed, developed, evaluated and delivered so that students have access to educationally sound content regardless of age, socioeconomic status, race, culture, disability, gender or geographic location.

Measures and specification

The *Educational Soundness Specification* defines the principles on which success and performance indicators are developed. These are the proposed specifications for content development, deployment and delivery at the time of publication. These specifications apply to all learning objects commissioned as part of the Initiative.

Monitoring and evaluation

The quality assurance processes applied during content development, deployment and delivery enable continuous monitoring of the applied specifications in terms of their relevance, reliability and viability. Specifications, related guidelines and indicators are regularly reviewed

and documented. The specification documents are published on the website <<http://www.thelearningfederation.edu.au>>

B. Technical specifications for content development

Technical specifications are required to achieve interoperability of learning objects across a range of delivery platforms and systems.

The technical specifications are used to assess the online curriculum content in terms of the following principles:

- accessibility – the ability to access learning components from one remote location and deliver them to many other locations in a variety of user-specified formats
- interoperability – the ability to use learning components developed in one location with one set of tools on a platform in another location with a different set of tools or platform
- flexibility – the ability to mix and reuse learning components from a range of sources into multiple applications
- durability – the ability to withstand technology changes without requiring redesign or recoding
- scalability – the positioning of the Initiative so that it can benefit from both growth in demand for its services and an increase in new input, such as technologies that may enhance the re-use of the resources collected.

At a minimum, the specifications address interoperability requirements for:

- the content model
- streamed media
- learning objects
- client devices
- accessibility.

Monitoring and evaluation

There is regular monitoring of the educational and technical needs of the Initiative. National and international technical specifications for content development initiatives are monitored and reviewed to inform these specifications. The Initiative is expected to further inform these national and international initiatives.

The items specified in the *Technical Specification for Content Development* have been developed in collaboration with representatives from the school education systems and sectors.

The specifications are reviewed regularly, allowing for developments in technology together with changes to the infrastructure in education systems.

C. Rights management

The *Rights Management Specification* is based on national and international best practice in the emerging area of digital rights management. It aims to ensure that the curriculum content will meet with relevant statutory and contractual obligations and optimise the creation, trade and use of online content.

The specifications for rights management will be used to assess whether the creation, trade, and use of the intellectual property rights conform to the following principles:

- equitable rights licensing
- authoritative rights branding
- flexible rights trading
- legal rights compliance.

Equitable rights licensing

The negotiation of intellectual property licensing is undertaken in a balanced manner to benefit the education sector and investment shareholders, as well as stimulating the education resource development market.

Authoritative rights branding

This principle recognises the significance of stakeholder and user trust in the management, documentation and publication of rights information in the marketplace. Enactment of this principle is dependent on agreement to a common structure, format and expression of rights information.

Flexible rights trading

This principle derives from the digital, modular and dynamic nature of the learning content, and its envisaged uses. User assemblage of learning objects, through to the capacity for future commercial trading, will be supported through the streamlining of rights licensing and provision of a digital rights management system within the Exchange.

Legal rights compliance

This principle enshrines commitment to honouring:

- rights owners' licensing requirements
- support for rights trading
- containment of risk to shareholders.

Obligations of The Le@rning Federation

The Le@rning Federation and the shareholders will fulfil the following legislative and leadership obligations in undertaking and delivering the Initiative's outcomes:

- To protect copyrighted material from unauthorised usages and to honour the exclusive rights that are exercised by owners of the online content, as specified under the *Copyright Act 1968*.
- To ensure that the digital rights management model and attendant technology enhance the capacity of the schools sector to cost-efficiently meet its statutory obligations under the Copyright Act.
- To ensure that the model informs the Australian education sector's performance in this area.
- To contribute to national and international specifications development in the area of intellectual property rights management and digital assets through the evolving body of knowledge and practice generated under the auspices of the Initiative.

Measures and specification

The *Rights Management Specification* documents the generic specifications for content submission, deployment, development and maintenance at the time of publication. However, each project specification will be based on an adaptation of the available licensing models, legally enacted through contract. Technology, through the provision of a digital rights management system, will streamline and automate many other modules associated with meeting the quality assurance requirements for the rights management specifications.

Monitoring and usage

The rights management specifications apply to all learning objects commissioned as part of the Initiative. The specifications also apply to non-commissioned content that is proposed for inclusion in the Exchange. The items specified in the *Rights Management Specification* address the following aspects of rights management:

- digital rights licensing models
- rights management information model

- rights metadata
- agreed description specifications for users, roles, and digital objects.

D. Accessibility

The accessibility specifications conform to Australian laws concerning accessibility. They ensure that project online resources and services are inclusive of a range of teaching and learning capacities, contexts and environments. They also affirm policy commitments by state and territory education systems to inclusive educational provision.

The accessibility specifications are based on international best practice in the emerging area of device-independent design. Achievement of the specifications is informed through multimedia design that pursues flexibility in the range, expression and representation of educational content.

The specifications described within the *Accessibility Specification* document are a component of The Le@rning Federation's suite of quality assurance specifications and are embedded within the larger context of educational soundness.

The accessibility specifications are used to assess whether the creation, delivery and use of the learning objects/items conform to the following principles:

- legislative compliance
- appropriate learning object design
- access-device independence
- flexibility of operation and presentation
- communication of accessibility information with content
- equitable user system requirements.

Legislative compliance

The first principle aims to ensure that The Le@rning Federation complies with the *Disability Discrimination Act 1992* (Cwlth), and it supports education systems in complying with state and territory laws pertaining to online content accessibility.

Appropriate learning object design

This principle enshrines The Le@rning Federation's commitment to providing exemplary online curriculum content in formats that meet both pedagogical and accessibility aims. This principle upholds the necessity of creating content that meets the needs of users with varying capabilities and individual learning differences. It also encompasses the need for all content produced by the Initiative to be designed for accessibility, including content that cannot be made to comply with universal accessibility standards. In such cases, equivalent or alternative curriculum content may be required.

Access-device independence

This principle recognises that teachers and students will use a range of devices, within a range of situations, to access online learning content. In particular, it acknowledges that some users with disabilities rely on assistive devices to harness the capacity of computer technology in both educational and personal environments. Device-independent content is designed to work effectively across the widest range of access devices.

Flexibility of operation and presentation

This principle optimises teacher and student interaction with online content through flexible operation and presentation, which accommodates diverse learning contexts and varying user constraints. It recognises the need for users, especially those with disabilities, to determine what will make their access easiest in a given set of circumstances. It also recognises that online content should allow graceful transformation of content into different renderings for different devices and easy re-purposing of content for different users.

Communication of accessibility information with content

This principle acknowledges the role of metadata in the communication of accessibility information. It requires the definition of accessibility metadata and the incorporation of accessibility metadata into online content.

Equitable user system requirements

This principle acknowledges the range of users with either low-end machines and/or low bandwidth. It also provides for the determination of a minimum specification of user hardware and software for equitable and inclusive provision of project resources and services.

Obligations of The Le@rning Federation

The joint venture companies and the shareholders will fulfil the following legislative and leadership obligations in undertaking and delivering The Le@rning Federation outcomes:

- To develop learning content that meets the relevant provisions of the Disability Discrimination Act.
- To proactively review and, as appropriate, incorporate relevant accessibility guidelines not yet specified in legislation.
- To ensure that the accessibility specifications meet the online communications obligations of the schools sector under the Disability Discrimination Act and to improve the Australian education sector's capability in this area.
- To contribute to national and international standards development in the area of accessibility and educational multimedia through the evolving body of knowledge and practice generated under the auspices of the project.
- To consult with relevant organisations and user groups in establishing, implementing and reviewing accessibility specifications.
- To draw on accessibility expertise in the formulation and enactment of content design methodology and quality assurance processes.

Measures and specification

The Initiative commits to maximising the accessibility of all learning objects/items through specified content development requirements and a rigorous quality assurance process. It will not, however, be possible to make every learning object equally accessible to all students. Achievement of accessibility will be assessed on the overall Initiative service and resource provision, rather than on an object-by-object analysis.

The *Accessibility Specification* documents the generic specifications for content submission, deployment and development at the time of publication.

Monitoring and usage

The accessibility specifications apply to all learning objects/items commissioned as part of the Initiative. The specifications will also apply to non-commissioned content that is proposed for inclusion in the Exchange. The items in the accessibility specifications address the following levels of accessibility throughout the life cycle (creation, storage, delivery and usage) of the resource provision:

- technical requirements for the creation, behaviour and delivery of learning objects/items
- interface requirements to ensure user access device needs
- personal requirements to respond to user preference needs.

E. Metadata

The purpose of The Le@rning Federation *Metadata Application Profile* is to support the access, search, selection, use, trade and management of learning objects.

Specification of common metadata ensures a high degree of semantic interoperability between learning objects produced by the Initiative and other learning objects available to teachers and students. It allows interoperability between the information systems that manage and deliver those learning objects.

The following principles apply to the metadata specifications for The Le@rning Federation:

- Adoption of international metadata standards that are compatible with existing standards used by Australian and New Zealand education sectors.
- Adoption of metadata standards that do not compromise school education systems and sectors in achieving their own educational priorities.
- Recognition that optimisation of the learning value of digital learning objects is fundamental in establishing interoperable metadata specifications for The Le@rning Federation.
- Recognition that metadata needs to support the access, search, selection, use, trade and management of learning objects.
- Recognition of the tension between the processes involved in the international and national standards initiatives and the pragmatic solutions required for The Le@rning Federation.

Measures and specifications

The *Metadata Application Profile* consists of metadata elements drawn from one or more existing namespaces, combined and optimised for a particular application. A namespace identifies the management authority for particular metadata schema.

The namespaces used for The Le@rning Federation *Metadata Application Profile* are:

- Dublin Core Metadata Element Set, v1.1 (DCMES v1.1)
- Dublin Core Qualifiers, 2000-07-11 (DCQ)
- EdNA Metadata Standard, v1.1 (EDNA v1.1)
- IEEE Standard for Learning Object Metadata (IEEE 1484.12.1) (LOMv1.0).

Monitoring and usage

Throughout application and implementation, The Le@rning Federation monitors and reviews the metadata specification. It also actively monitors national and international metadata activities and, where appropriate, influences and/or is informed by them.

The Le@rning Federation works closely with the EdNA Schools Metadata Collaborative Group, the MCEETYA ICT Taskforce, the AICTEC Standards Committee and The Le@rning Federation Exchange Consultative Committee to support interoperable metadata standards across the Australian education sector.

The application profile defines the metadata elements for describing resources, organisations or learning objects. It is not appropriate for all elements to be applied to all resources, organisations or learning objects. Compliance is differentiated by the context of the asset, for example:

- the asset type: whether it is a resource, organisation or a learning object
- the quality assurance status of the content
- the subset of metadata exported from the Exchange.

The *Metadata Application Profile* also applies to any non-commissioned content that may be proposed for inclusion in the Exchange.

3 Implementing the Quality Assurance Framework

The *Quality Assurance Framework for Online Content Development* covers:

- commissioned content
- non-commissioned content
- content publishing and distribution
- content maintenance.

Commissioned content is all the content developed or procured to meet the requirements of each of the agreed curriculum priority areas. This content may be new content, specifically commissioned content, or existing content that has been modified to meet The Le@rning Federation's requirements.

Non-commissioned content is the content contributed or licensed via third-party agents, such as cultural institutions, government departments, not-for-profit organisations, commercial entities or content development initiatives similar to The Le@rning Federation. This content is usually directly related to the curriculum priority areas and may take several forms, including:

- existing content that can be used in its current state
- existing content that needs to be modified, either to meet the Initiative's requirements or to provide a richer learning experience for students
- material that needs to be digitised to make it available to teachers and students.

Content publishing and delivery refers to content publishing in the Exchange and distribution to education systems.

Content maintenance refers to maintaining, upgrading and archiving content in the Exchange.

3.1 User input

Development of quality educational multimedia is a resource-intensive activity, as it requires a continuous and rigorous process of expert-user input. In-context testing and evaluation are all dependent on time, budget, technology and professional expertise, to enable an iterative approach to instructional and functional design. This methodology is based on the international standard for user-centred design: *Human-centred design process for interactive systems*, ISO 13407:199(E).

The main principles of user-centred design are:

The active involvement of users

To use people with real insight into the context in which the product will be used (academics, professional associations, teachers, students).

Iterative design and development

To use feedback from end-users at all stages of development – from simple paper mock-ups, scripts and storyboards to semi-functional prototypes run on computers (teachers and students).

Multidisciplinary design teams (developer teams)

To involve education experts, multimedia developers, instructional designers, and technical experts for production of materials.

Appropriate use of media for treatment of content

To understand and specify the context of use and audience capabilities – environmental and social – with representative user input across all content projects.

User input provides the mechanism for determining the value or merit of the content, how good the content and structures of the product are, and how well designed and appropriate the tools are for achieving the learning objectives. The evaluation criteria focus on evaluating

the multimedia content within the context of use: the level of innovative educational and technical treatment of the content domain to support knowledge acquisition by users within meaningful learning contexts.

User input is provided by the Reference Group or Working Party for the content priority area, and by Teacher and User-Focus Groups. User involvement informs the design and development of the content in terms of learner focus, useability, accessibility and content integrity. The specifications for content design directly relate to the needs and expectations of users, specifically, learner characteristics, learning needs and objectives, and the learning environment.

Reference Groups and Working Parties

The Reference Groups and Working Parties comprise education system curriculum experts, content domain experts and personnel with ICT expertise. They are responsible for the quality of the 'project scoping brief', which sets out the requirements for online content development within the content priority area. The role of the reference group or working party is ongoing for the content priority area throughout the life of the project. Evaluation reports on content in development assist the reference group or working party to refine and improve the quality of the project scoping brief over the life of the Initiative.

Teacher Focus Groups

For each project within a content priority area, a Teacher Focus Group (TFG) is established. The TFG draws teachers from states and territories to participate in each of the quality assurance evaluation and review phases for a project, providing in-context user feedback to the development process.

User Focus Groups

The development phase is iterative. When content is partially developed, learning design and useability reviews are undertaken in schools with students and teachers.

There is a User Focus Group (UFG) for each project within the curriculum priority areas. They are an integral component of the in-school learning and useability testing, evaluation and review of content during development. These groups consist of teachers in schools with students/classes related to the project area. The membership of these groups changes throughout the content development cycle to meet the needs of each of the quality assurance testing and evaluation events.

Teachers and students are actively involved in evaluating and reviewing the design scripts, storyboards, paper prototypes and mock-ups, and this feedback is provided to the content developers. The final learning object design specifications provide the basis for commencing.

Advertisements for schools and teachers to express interest in participating in both TFGs and UFGs are sent to the education systems and professional associations, including subject and principal associations. Selection is based on content domain knowledge and expertise, learner characteristics and learning environment.

Subject area specialists

Education and subject matter experts review the content against the educational soundness indicators. The feedback obtained from iterative tests and reviews at various developmental stages assists design improvement and further development. The focus of these tests and evaluations is on quality in terms of educational soundness: specifically learner focus, content integrity, useability and accessibility. Technical performance testing is also carried out prior to and in conjunction with the user-based test cycle.

Other feedback mechanisms

The data and information collected throughout the quality assurance process provide important feedback to developers on the design and development of the product in development. They also provide information that will help to structure future content development projects. This approach to the achievement of quality based on continuous improvement enables the development of an effective quality assurance mechanism for demonstrating best practice in educational digital resource design, development and delivery.

Implementation projects are also being undertaken in a range of classroom environments to evaluate the impact, application and effectiveness of the online digital content in use.

4 Content procurement

4.1 Commissioned content

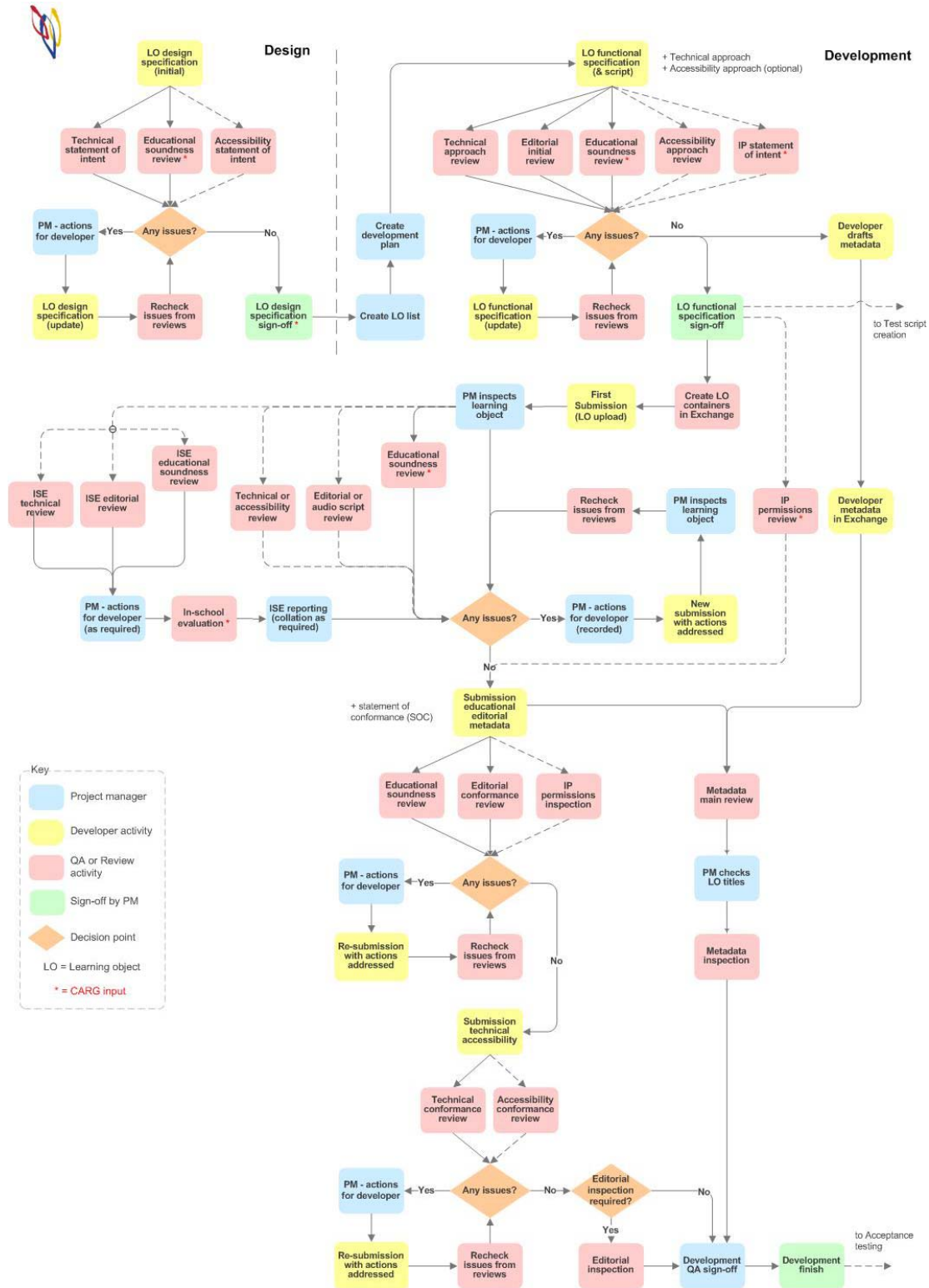
Quality of content is assured via the application of specifications, guidelines, indicators and processes at each of the content development stages. This is managed via templates, guidelines and checklists, which specify procedures and criteria.

The stages for commissioned content are:

- 1.1 Project set-up
- 1.2 Design
- 1.3 Development
- 1.4 Acceptance testing
- 1.5 Post-production

The following diagram (figure 1-1) details the quality assurance workflow process for commissioned content.

Figure 1-1 Commissioned content quality assurance workflow



The following table 1-1 describes the quality assurance workflow design and development process.

Table 1-1: Commissioned content quality assurance (QA) process

Stage	QA processes and reviews
<p>1.1 Project set-up</p> <ul style="list-style-type: none"> The Le@rning Federation (TLF) establishes the scope and priorities for the project within the curriculum priority area. TLF selects an educational design team, which consists of subject matter experts, writers and an instructional designer. TLF selects developer/s via a request for tender process. 	<ol style="list-style-type: none"> The Reference Group or Working Party develops the project scoping brief. The Reference Group or Working Party creates a detailed set of educational soundness indicators for the project. The following specifications are defined for the project: <ul style="list-style-type: none"> Educational soundness Technical specifications for content development Rights management Accessibility Metadata
<p>1.2 Design</p> <ul style="list-style-type: none"> The educational design team prepares design briefs, which detail the proposed learning outcomes, educational concepts and suggested contexts for the content. The development team creates the learning object design specifications from the design briefs. 	<p>The following reviews occur during this phase:</p> <ul style="list-style-type: none"> Education specialist review: learning outcomes, educational concepts and suggested contexts for the content are evaluated against the specific educational soundness indicators for the project. Teacher Focus Group review: learning outcomes, educational concepts and suggested contexts for the content are evaluated against the specific educational soundness indicators for the project specification. In-school user evaluation of educational concepts includes review of storyboards and proposed learning activity treatment of interaction design. The QA technical unit reviews technical and accessibility statements of intent. The project manager evaluates all reports, reviews the budget and project schedule, and signs off the final learning object design specifications.
<p>1.3 Development</p> <ul style="list-style-type: none"> The development of the content is phased, with the content suppliers producing components of learning objects. The content suppliers progressively load the content in development into the Exchange. This is an iterative process. 	<p>During this phase, the partially developed learning objects are evaluated and tested in terms of educational soundness, useability and content integrity. The content supplier provides a technical and accessibility conformance report and uploads content into the Exchange for technical, accessibility, and editorial conformance testing. This testing involves:</p> <ul style="list-style-type: none"> Education specialist review: the project education specialist reviews the content in development against the project educational soundness indicators. Teacher Focus Group reviews and in-school evaluation: teachers and students within schools undertake in-school testing and evaluation using test and evaluation instruments, guidelines and tools. Intellectual property reviews Editorial reviews Technical and accessibility reviews
<p>1.4 Acceptance testing</p> <p>Acceptance testing is undertaken by an independent testing agency. The agency is</p>	<p>Each learning object, as well as its related items and resources, undergoes acceptance testing. It involves functional conformance testing to ensure that the learning</p>

Stage	QA processes and reviews
engaged to perform functional, compatibility and performance testing on each learning object.	<p>object functional specification has been implemented correctly. It also includes testing in target browsers and operating system environments.</p> <p>Before publishing the content:</p> <ul style="list-style-type: none"> • The independent acceptance testing agency sends a final report to the project manager. Logged issues are attended to by the developer. • The project manager provides a final report to the Manager, Online Content Development for sign off.
1.5 Post-production	As learning objects successfully complete the acceptance testing process, they are migrated to the Exchange and the metadata is finalised. A final check is made to ensure that all content can be explored within the basic e-learning tool set (BELTS) environment.

4.2 Non-commissioned content

A major objective of the Initiative is to develop relationships with industry, cultural institutions, government departments and not-for-profit organisations in order to enable quality online content to be made available to Australian and New Zealand schools. Content exists that, with modification or enhancement, would be of great value to schools. The Initiative aims to form partnerships of mutual benefit with the owners of such content. Ultimately, it is envisaged that the enhanced content will be included in the Exchange.

An even greater amount of valuable material exists in non-digital forms. The Initiative aims to support the digitisation of such material and its inclusion in the Exchange, again through partnerships of mutual benefit.

The three additional quality assurance events for non-commissioned content are:

- 2.1 Review of supplier proposal
- 2.2 Cost-benefit analysis
- 2.3 Development and acceptance testing

The following diagram (figure 1-2) details the quality assurance workflow for non-commissioned content.

Figure 1-2: Non-commissioned content workflow

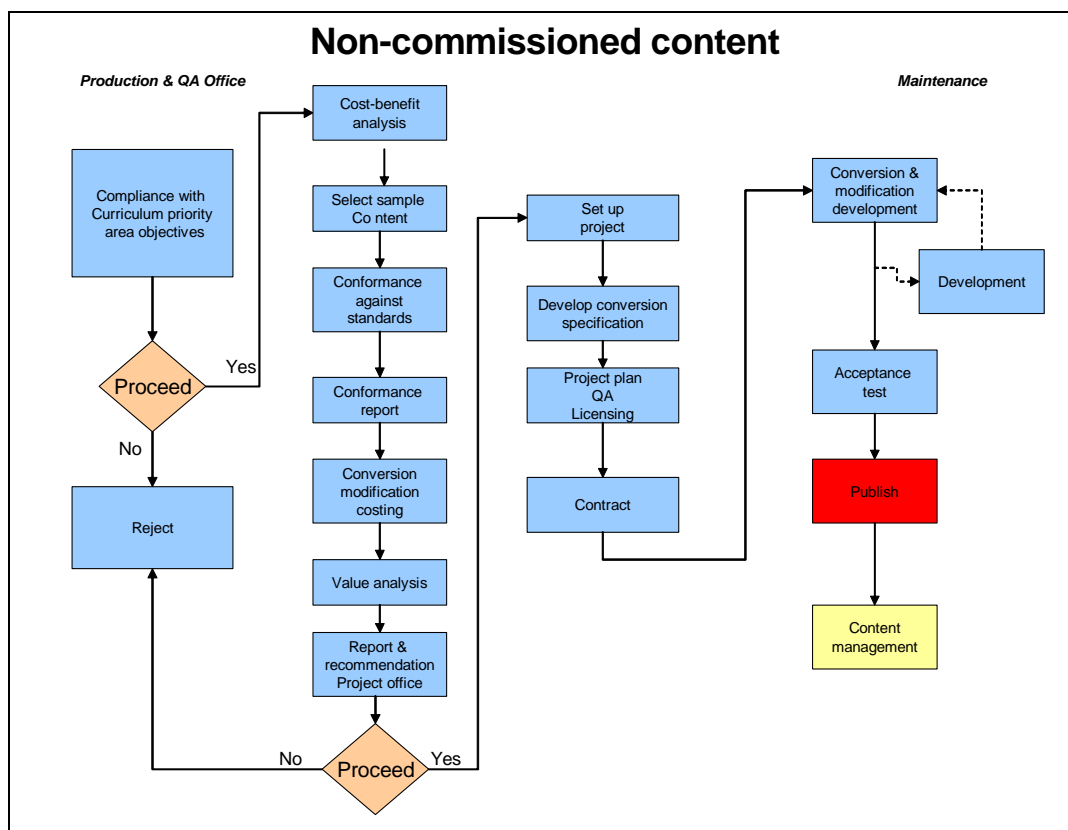


Table 1-2 describes the non-commissioned content workflow process and the application of specifications for each of these events.

Table 1-2: Non-commissioned content process

Step	QA process
<p>2.1 Review of supplier proposal</p>	<p>Proposed content is first considered in relation to content priority area objectives. Where the proposal is considered to be consistent with achievement of the curriculum priority area objectives, it is then reviewed against the educational soundness, technical and rights management specifications. Inappropriate proposals may be rejected at this stage.</p>
<p>2.2 Cost–benefit analysis</p>	<p>Where the broad aspects of the proposal are considered to have possible merit for further consideration by the Initiative, a cost–benefit analysis will be undertaken to ascertain the possible value of the content or materials to the Initiative.</p> <p>The cost–benefit analysis of content involves:</p> <ul style="list-style-type: none"> • selecting sample content • testing sample content for conformance with educational soundness, technical, and rights management specifications • developing a modifications costing • undertaking a value analysis. <p>The cost–benefit analysis of materials involves:</p> <ul style="list-style-type: none"> • gauging the materials' significance for the curriculum priority areas and/or school education • developing a digitisation costing • undertaking a value analysis. <p>As a result of the cost–benefit analysis, decisions may be made to reject or</p>

Step	QA process
	progress the proposal. The Manager, Online Content Development signs off recommendations in relation to the proposal.
2.3 Development and acceptance testing	Prototype and acceptance testing is based on quality assurance events 1.3, 1.4 and 1.5 in table 1.1 for any commissioned or modified content or material digitised as part of an approved project.

4.3 Content publishing and delivery

The Initiative publishes all the approved commissioned and non-commissioned content and manages the distribution of the content to approved agents and education systems.

Content publishing

Approved content, both commissioned and non-commissioned, is published by the Initiative and available for distribution.

Only content approved by quality assurance procedures for commissioned and non-commissioned content will be published.

Content delivery

The approved published content is delivered to distribution agents. Initially, these will be education systems.

Learning objects are released to jurisdictions' repositories via the Exchange. Access by jurisdictions to the packaged learning objects is via the LORAX interface to the Exchange or through the basic e-learning tool set (BELTS).

4.4 Content maintenance

All content procured for the Initiative and deployed via the Initiative infrastructure will be managed and maintained by the Initiative throughout its life cycle and reviewed to ensure ongoing conformance to all quality specifications.

The four key quality assurance events for content maintenance are:

Usage review

The Exchange will assist in monitoring and tracking jurisdictions' uptake, downloads to users and school and individual use.

Specifications review

- Regular scheduled reviews against the existing specifications will occur within a 6- to 12-month cycle.
- Reviews will be date- or event-triggered. Examples of triggers include a rights licence expiry or a change to technical specifications.

Consequences of specifications reviews may include:

- Renewal of the existing content to comply with specifications.
- Modification of content to meet the specifications, including updating or renewing rights or migration to new software formats.
- Retirement of content from the system when it is no longer deemed to be of value due to a lack of compliance with specifications. The retirement action will include archiving and reporting. Impact on users may result in recall, substitution, termination or setting up usage protocols.

Fault review

Fault reports may be generated by the system and/or by users.

A fault reporting process operates to investigate the report and determine the action required.

System change

The infrastructure development and implementation strategy will consider the impact on content and provide impact-analysis statements prior to implementation of major changes to the system.

A change management strategy would be developed to minimise the impact of infrastructure changes to content within the system.

Figures 1-3 and 1-4 describe the major steps in this process.

Figure 1-3: Content maintenance proposed workflow

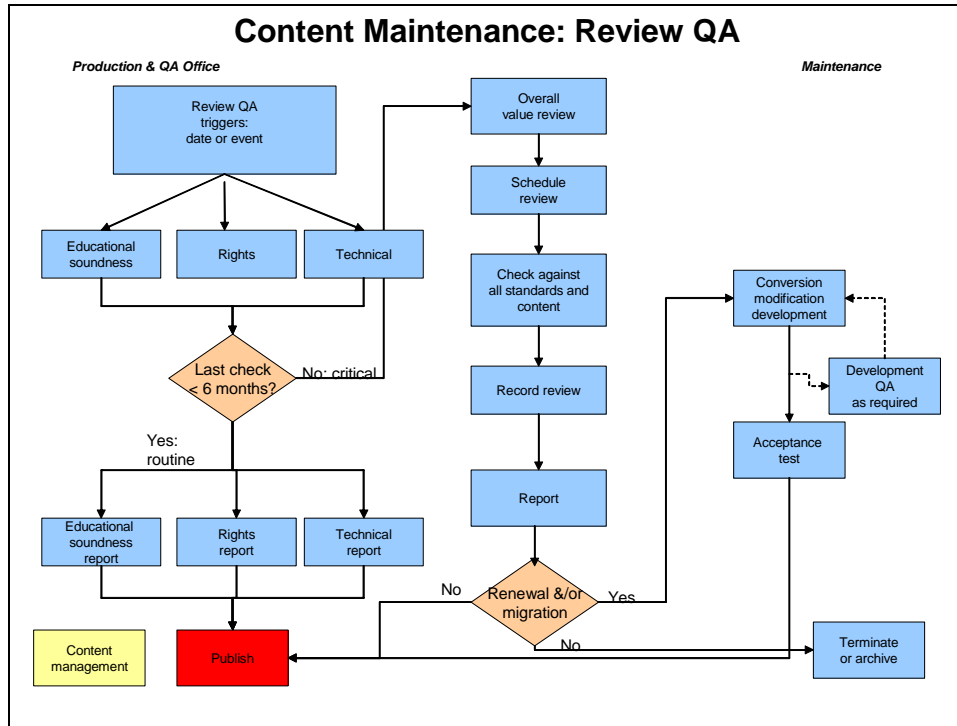
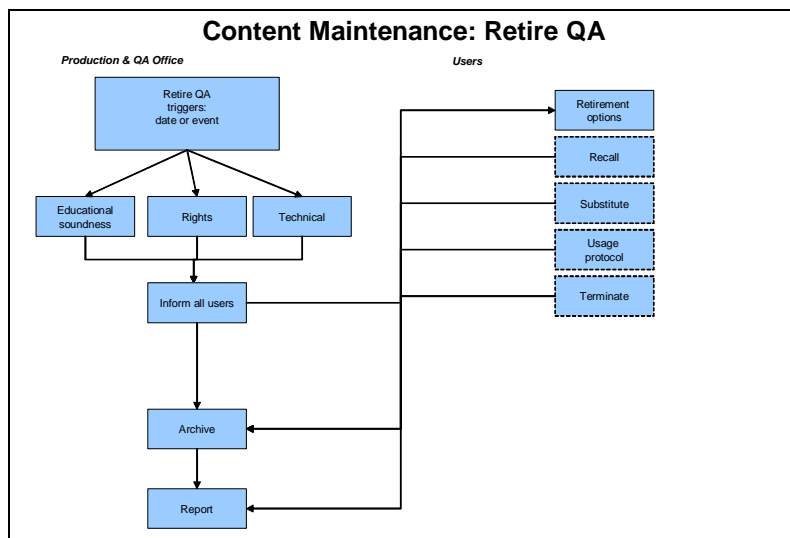


Figure 1-4: Retirement of content proposed workflow



Appendix 1

Standards and specifications underpinning the *Quality Assurance Framework*

International and nationally recognised standards

Software quality characteristics ISO/IEC 9126

Guidance on useability ISO DIS 9241-11

Human-centred design processes for interactive systems ISO DIS 13407

Evaluation of software products ISO DIS 14598-1

Australian Institute of Project Management 1996, *National Competency Standards for Project Management*, PMI, USA

Australian Institute of Project Management 1996, *A Guide to the Project Management Body of Knowledge*, PMI, USA

IMS Global Learning Consortium for developing standards for e-learning systems

Office for Government Online 1999, *World Wide Web Consortium's Web Content Accessibility Guidelines*,

<http://www.govonline.gov.au/projects/access/Access/accessibility.htm> (5 May 1999)

Rural Industries Research and Development Corporation 2000, *Web Sites for Rural Australia: Designing for Accessibility*, Publication No. 00/13

Accessibility standards

W3C Web Content Accessibility Guidelines 1.0

<http://www.w3.org/TR/WAI-WEBCONTENT/>

W3C Authoring Tool Accessibility Guidelines 1.0

<http://www.w3.org/TR/WAI-AUTOOLS/>

W3C User Agent Accessibility Guidelines 1.0, W3C Candidate Recommendation, 12 September 2001

<http://www.w3.org/TR/UAAG10/>

Metadata standards and specifications

Dublin Core Metadata Element Set, v1.1

<http://www.au.dublincore.org/documents/dces/>

Dublin Core Qualifiers, 2000-07-11 <http://www.au.dublincore.org/documents/dcmes-qualifiers/>

EdNA Metadata Standard, v1.1 <http://standards.edna.edu.au/metadata/index.html>

IEEE Standard for Learning Object Metadata (IEEE 1484.12.1)

<http://ltsc.ieee.org/wg12/index.html>

Intellectual property rights

The Open Digital Rights Language (ODRL) Initiative

<http://odrl.net/>

MARC Code List: Relators, Sources, Description Conventions

<http://lcweb.loc.gov/marc/relators/>

vCard and vCalendar

<http://www.imc.org/pdi>