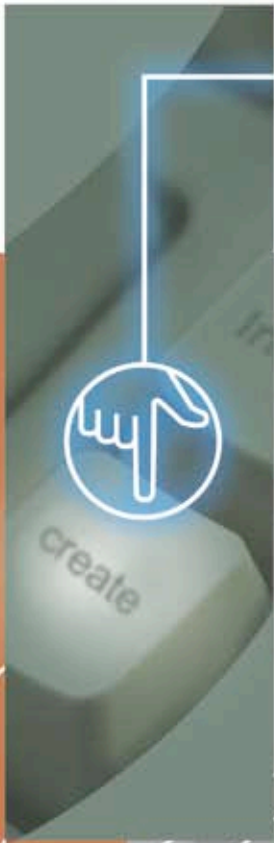
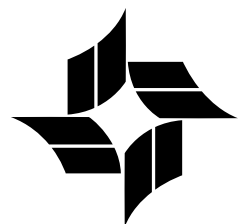


# content specifications framework



learning  
in an ONLINE world



**MCEETYA**

Australia - New Zealand



Agreed processes, standards and specifications enable cost-effective development, procurement, deployment and sharing of high quality 21st century digital curriculum content.

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*Contemporary learning – learning in an online world* describes the integrated nature of the highly technological and information rich world in which young people live and learn. It outlines ways in which this environment shapes student expectations and processes for learning. It discusses the innovative and effective uses of information and communication technologies (ICT) that empower teachers to personalise learning.

The online world enables a flexible, expansive learning paradigm where teachers can focus on individual learning needs and engage students in personalised, active and interactive learning. Quality digital curriculum content is critical to learning in this world. It is not only a source of

data and knowledge. It is also the currency that is discovered, researched, exchanged, debated, and extended by students. It is interactive, collaborative and readily shared in the processes of learning.

Collaborative work in Australia and New Zealand is building a supply of quality content that addresses identified curriculum priorities and underpins the processes of transforming pedagogies, empowering teachers and students. This content complements the vast body of content available to teachers and students through the world wide web, and the wide range of resources developed by jurisdictions, schools, teachers, students and commercial developers.

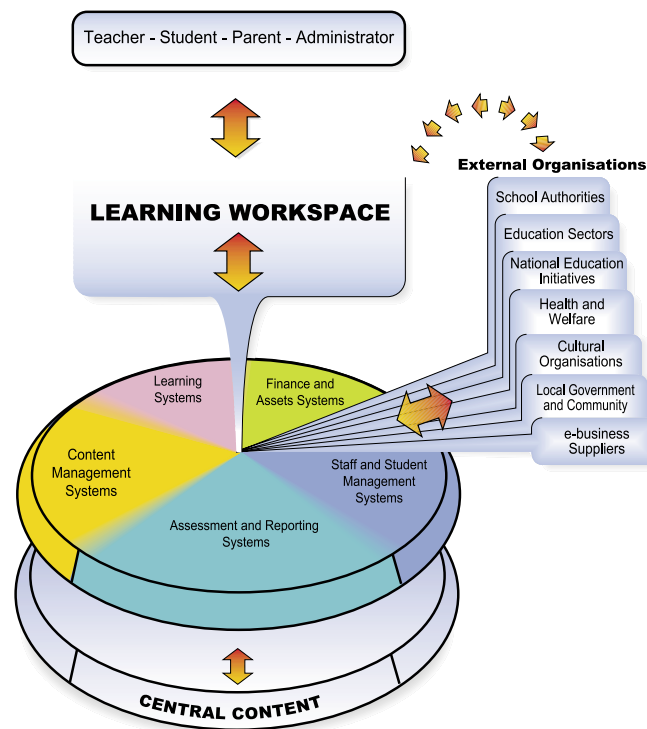


Figure 1: Overview of Content Flow



*The Le@rning Federation (TLF) is an initiative of the Australian Government, states and territories, and New Zealand. The project is creating online curriculum materials and supporting the development of the necessary specifications to ensure that teachers and students can use these materials to widen and enhance classroom learning experiences. To date, the TLF initiative has:*

- produced content in six priority areas: Science; Mathematics and Numeracy; Literacy for Students at Risk; Studies of Australia; Languages other than English (Chinese, Japanese and Indonesian); and Innovation, Enterprise and Creativity*
- worked with museums, libraries and cultural institutions to capture cultural content in learning objects and digital resources*
- established educational specifications aligned to the requirements of Australian and New Zealand curricula*
- established technical specifications for interoperability, facilitating the use of online curriculum materials on a range of computers and operating systems*
- developed specifications to optimise accessibility and technical performance*
- developed software systems to make online content available to jurisdictions for distribution to schools*
- conducted pilot studies and research on the use of TLF content in schools in all Australian states and territories and in New Zealand.*

*The TLF project has drawn on the strengths of many areas of the school education sector in Australia and New Zealand to build a broad collaborative operational framework that enables it to model best practice in all aspects of creation and procurement.*

[www.thelearningfederation.edu.au](http://www.thelearningfederation.edu.au)

# guiding principles

## Guiding Principles

The critical role content now plays and the potential ease with which it can be duplicated, re-used, shared with different groups or integrated into different educational products introduces new opportunities and challenges for educators. These can be met in a balanced and consistent way through the application of the following agreed principles that guide policy and practice for the development and procurement of content:

- **quality** – focusing on the quality of the resource and its links to student engagement and learning processes
- **design and re-use** – integrating content with multiple teaching and learning strategies in a range of education contexts to achieve a variety of learning outcomes
- **rights management** – ensuring an established, well understood, ethical and equitable approach to *ownership* and use of third party materials.

Digital curriculum content development and procurement embracing these principles and an agreed framework will assist jurisdictions, schools, institutions, teachers, students, and developers to:

- create, evaluate, customise and share content
- enhance the quantity, quality and educational relevance of available content
- understand, adopt and develop appropriate standards and specifications
- apply consistent and ethical approaches to management of intellectual property.

Australia and New Zealand have demonstrated leadership in digital content creation and procurement in the schooling sector through national collaborative, jurisdiction and school-based initiatives. The experience and expertise developed through these initiatives provide a sound basis on which to build a broad, consistent and collaborative framework for ongoing content creation and procurement. The *Content Specifications Framework* supports jurisdictions, schools, institutions, teachers, students and commercial developers as they engage in accessing, creating, procuring and distributing digital content in educational settings.



# content specifications framework

The *Content Specifications Framework* informs high level strategic considerations that underpin digital curriculum content development and procurement projects. It spans generic processes that apply to both small and large-scale projects to achieve educational and cost-effective products. The framework guides formal business and project planning for major content creation or procurement projects, and for content creation and adaptation by teachers. Consideration of the key issues addressed through the framework will lead to improved project outcomes at all levels of complexity.

The *Content Specifications Framework* is centred on six overarching considerations: educational quality, design and re-use, useability, ownership, lifecycle and professional learning. The overarching considerations are viewed through three key decision making layers:

- the business layer
- the educational community layer
- the technical layer.

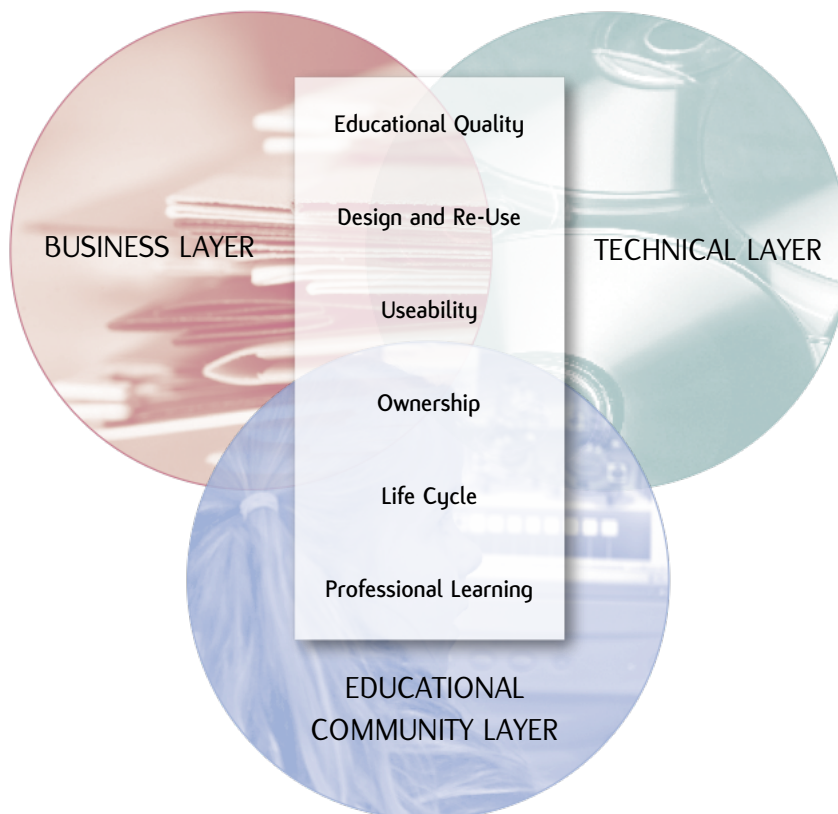


Figure 2: Content Specifications Framework

# content specifications framework



## The Business Layer guides processes and decisions which:

- articulate the educational need and link this to appropriate design options and product specifications
- detail business planning processes to ensure the anticipated level of product investment is commensurate with the intended outcomes.
- document project methodology and project management processes.



## The Educational Community Layer guides processes and decisions which:

- align the product design with agreed educational quality specifications
- address learner needs, including accessibility and useability
- assess the potential for sharing and collaborative use and re-use of the product within the wider learning community
- address the business, ethical and legal issues arising from intellectual property rights associated with the ownership and use of the product
- inform product lifecycle issues, particularly product maintenance.



## The Technology Layer guides processes and decisions which:

- assess the technical environment and platform issues impacting on useability, accessibility and interoperability of the product
- address the technical issues arising from the linking of the content to systems for management of the content, including trading, rights management and re-use of the content in multiple learning contexts
- govern alignment with established external technical standards and specifications.

# content specifications framework

The online world provides unlimited opportunities for innovation and creativity in the development and procurement of digital curriculum content. Communication, collaboration and sharing within an agreed *Content Specifications Framework* will increase the value, use, and cost effectiveness of content development by:

- influencing the educational, business and administrative processes applied in content development and procurement projects
- enhancing the quality and growing the quantity of content readily available to teachers and students
- supporting educational communities where collaborative development and sharing of resources occurs naturally, through enhancing awareness of key issues such as technical interoperability and intellectual property rights
- helping manage copyright costs associated with increased use of content, through encouraging the development of a community of users committed to a philosophy of sharing and collaborative development and enhancement
- influencing the local and international vendor communities so commercial products increasingly integrate and interoperate with content produced by jurisdictions, schools, teachers and students
- informing the ongoing processes of institution, jurisdiction, national and international standards development.

The argument for collaborative work to determine standards, both technical and educational in the Australian market for online curriculum content is very strong, both from an educational delivery and business perspective.

*Sustainable Provision of Online Curriculum Content Beyond 2005*

*The Le@rning Federation Steering Group November 2004 <http://www.thelearningfederation.edu.au>*

# business layer

Formal business and project planning processes with sound management practices underpin the success of school education digital curriculum content development projects. Good content requires cogent leadership, the creative and professional expertise of a team working together throughout the project and agreed quality assurance processes. Teachers and curriculum

experts, content experts, instructional designers, graphic designers, video producers, copyright and licensing experts, programmers and project managers have varying roles in each stage of the project. The creative interaction of team members working within an appropriately planned and managed environment is critical to achieving desired educational outcomes.

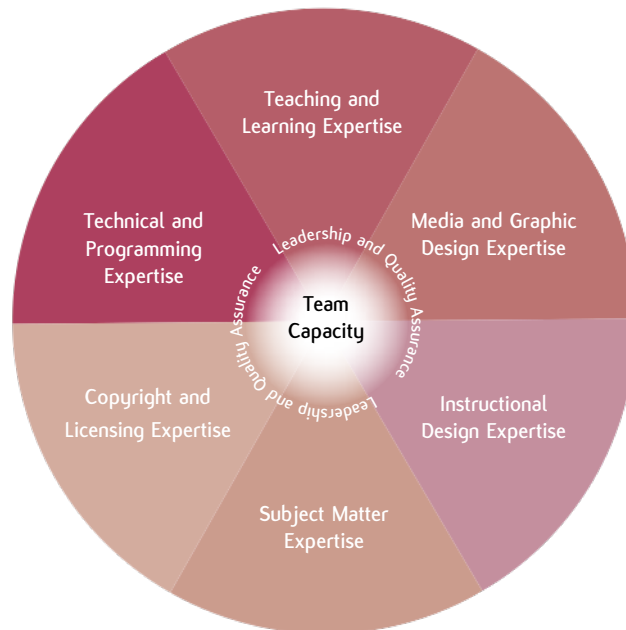


Figure 3: Team Capacity

The minimum required to sustain a reliable cost effective supply of online curriculum content is collaboration on the market framework- namely standards and interoperability.

*Sustainable Provision of Online Curriculum Content Beyond 2005*

*The Le@rning Federation Steering Group November 2004 <http://www.thelearningfederation.edu.au>*

# business layer

The centerpiece of a well planned project is the product specification. It brings together learner needs, the overarching considerations of educational quality, useability, design and re-use, ownership, professional learning and product lifecycle and balances these parameters against the realities of budget and resource constraints.

Once agreed, product specification becomes the blueprint for the production phase. It is the basis of the project plan, underpins the creative input of the team during production and guides the project from educational, business, technical, administrative and quality assurance perspectives.

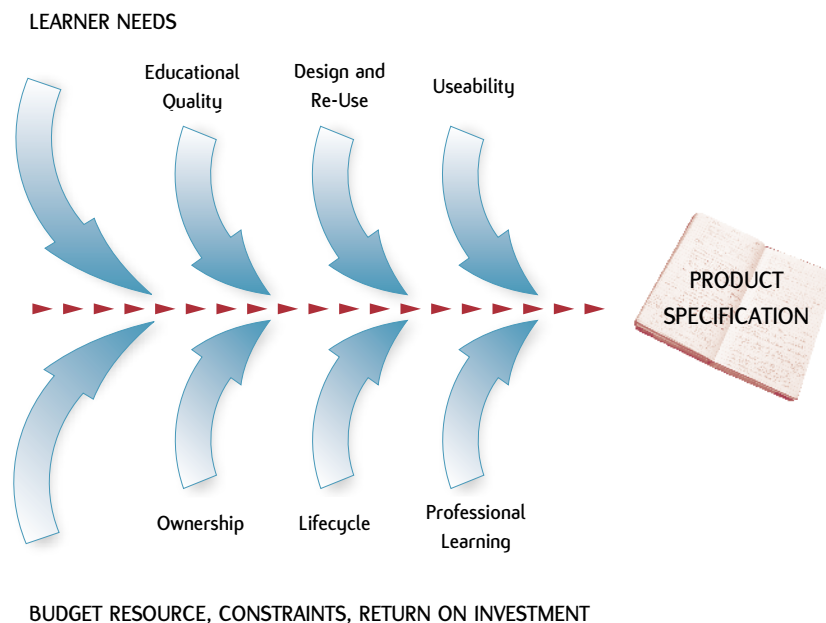


Figure 4: Product Specification

Typical stages in the management of content creation and procurement projects, their broad scope and possible activities are represented in Figure 5. A critical decision point follows completion of the business plan when an informed decision about the viability or otherwise of the project can be made.

# business layer

## Project Initiation and Needs Analysis

- Identify curriculum need
- Research options
- Investigate existing solutions
- Identify stakeholders
- Collect data
- Analyse and interpret data
- Document and report
- Agree decision-making criteria

## Conceptual Design

- Translate learner needs into design options
- Decide on option to proceed to full scale development
- Investigate existing solutions
- Analyse learner needs and learning environment
- Determine assessment and reporting requirements
- Analyse potential costs and resource constraints

## Business Plan

- Justify proceeding with the project and decisions about further investment
- Estimate timeframes
- Develop costings
- Calculate return on investment
- Identify required skills, team members and resources
- Assess risks
- Document lifecycle

## Product Specification

- Detail precise, measurable key product requirements and constraints
- Derive requirements from analysis of conceptual design in relation to learner needs, specifications and standards, available resources and overarching considerations

## Production and Implementation

- Develop project plan
- Identify governance and decision points
- Manage the project from inception to completion
- Co-ordinate the major project phases and key activities in each phase
- Develop and implement quality assurance processes
- Allocate resources and monitor progress
- Monitor and report outputs from each phase
- Identify and resolve operational problems
- Communicate with stakeholders
- Publish and deploy

## Evaluation and Maintenance

- Evaluate processes and outcomes for continuous improvement
- Maintain product
- Identify evaluation purposes in relation to learning goals, overarching considerations and outcomes
- Select evaluation processes
- Collect, analyse and share findings
- Develop action plans for maintenance, unpublishing and archiving

Figure 5: Content Creation

# business layer

The education sector expends significant funds creating digital curriculum content. It has a responsibility to ensure the use and re-use of this content is not restricted by policies that fail to engage jurisdictions, schools and teachers with the longer term responsibility of contributing to accessible, educational capital - in this context the data and knowledge produced with public funds and captured as digital curriculum content. This responsibility is addressed by:

- collaborating on content development and procurement to achieve consistency in policies and alignment of specifications
- harmonising School Education and Vocational Training and Education (VTE) specifications to appropriate international standards
- considering whole-of-government interoperability initiatives
- supporting teachers to develop, adapt and share digital content
- maintaining the currency of digital content, increasing availability across learning areas and year levels
- managing sustainability.



Jurisdictions are designing portals to provide teachers, students and parents, with access to digital curriculum content.

Portals also provide a place for teachers, student and parents to exchange ideas and information and for teachers to co-create resources.

Education portals are at the intersection of all issues concerned with content development, discovery and access. They expose resources developed by jurisdictions, schools, teachers, students and commercial developers to formal and informal testing. They can be used to collect data on the use of specific resources and teacher practice in resource re-use and adaptation.

Portal effectiveness is dependent on appropriate design and adherence by all content contributors to policies on the use of specifications and standards.

Figure 6: Education Portals



# educational community layer

The ease and speed with which communication, distribution, adaptation and publishing is occurring through the Internet has led to the rapid growth of communities of interest, free from previous barriers of geography and time. This growth has been particularly strong within the education sector, leading to new and more effective ways of accessing, sharing, adapting and collaborating on content.

Technologies have stimulated innovative approaches to learning within these communities. They support the multiple roles that content has as it interacts and integrates with communication and other collaborative activities.

Working with digital curriculum content within an educational community subjects it to formal and informal assessment against community expectations and standards. The six overarching considerations provide a guide for designing content that contributes educational capital to the community.

## Educational Quality

Learner focus and resource integrity are central considerations in content development. To assure educational quality, digital curriculum content needs to:

- respond to an analysis of the intended learners, their learning needs and learning environments
- facilitate and support student centred, active and interactive learning
- incorporate, in relevant areas, input by external subject matter experts
- present issues with balance and fairness, and in accordance with mandated curriculum policies where these apply
- accurately conceptualise the content domain
- Incorporate relevant legislative and policy requirements.

Digital content created by teachers and schools is a valuable resource that can be made available for other teachers to use, adapt, share and re-use. This requires teachers and schools to consider the issues addressed through this framework, and to adopt common approaches that enable school, jurisdiction and national knowledge sharing systems to be linked.

Consensus about requirements, specifications and standards maximises the portability of content, accelerates product development and contributes directly to the development of online educational communities.

# educational community layer

## Useability

Useability describes the efficiency and effectiveness of learner engagement with content. It influences user satisfaction with the learning experience, independent of the content itself. Accessibility complements useability through consideration of:

- the special needs of learners with a physical, sensory or cognitive disability
- learners from rural and remote communities
- learners requiring support in the acquisition of standard Australian or New Zealand languages.

It is important that content is accessible and appropriate for individuals with different backgrounds, learning styles, abilities and disabilities in varying learning contexts. It is not always possible to create a single piece of content that meets a particular educational objective and that is also universally accessible to all students. In these cases equivalent or alternative profile specific content may be required. In some circumstances it may not be possible to support a given accessibility profile for the given educational objective in the chosen digital format. Alternative options need to be investigated.

To assure useability, digital curriculum content needs to:

- address and make explicit the purpose and intended outcomes of the learning
- assist the learner to know what to do and how to do it
- comply with legal obligations and agreed jurisdiction, national or international specifications for accessibility
- use approaches appealing to and inclusive of students of all genders, socio-economic groups, races, cultures and ages.

## Design And Re-Use

Sound educational design of content extends beyond embedded content and associated instructional strategy. The learner may or may not have the support of a teacher or learning facilitator. Learner engagement with content may be structured or relatively unstructured. It may be complemented by extensive communication and collaborative activities or be relatively independent.

The design strategy needs to take into account the potential for use and re-use of the content through a variety of learning pathways and in a variety of learning environments. This strategy maximises the educational value and the overall return on investment in content development.

# educational community layer

Designs taking advantage of this educational and investment approach consider product components as distinct entities. Describing separately how the components are to appear and how they are to come together to achieve a particular educational task enables programmers to cost effectively:

- re-purpose components for different users and different educational tasks
- transform components into different renderings for different devices
- adapt the product to operate with new and emerging technologies and to meet evolving user expectations.

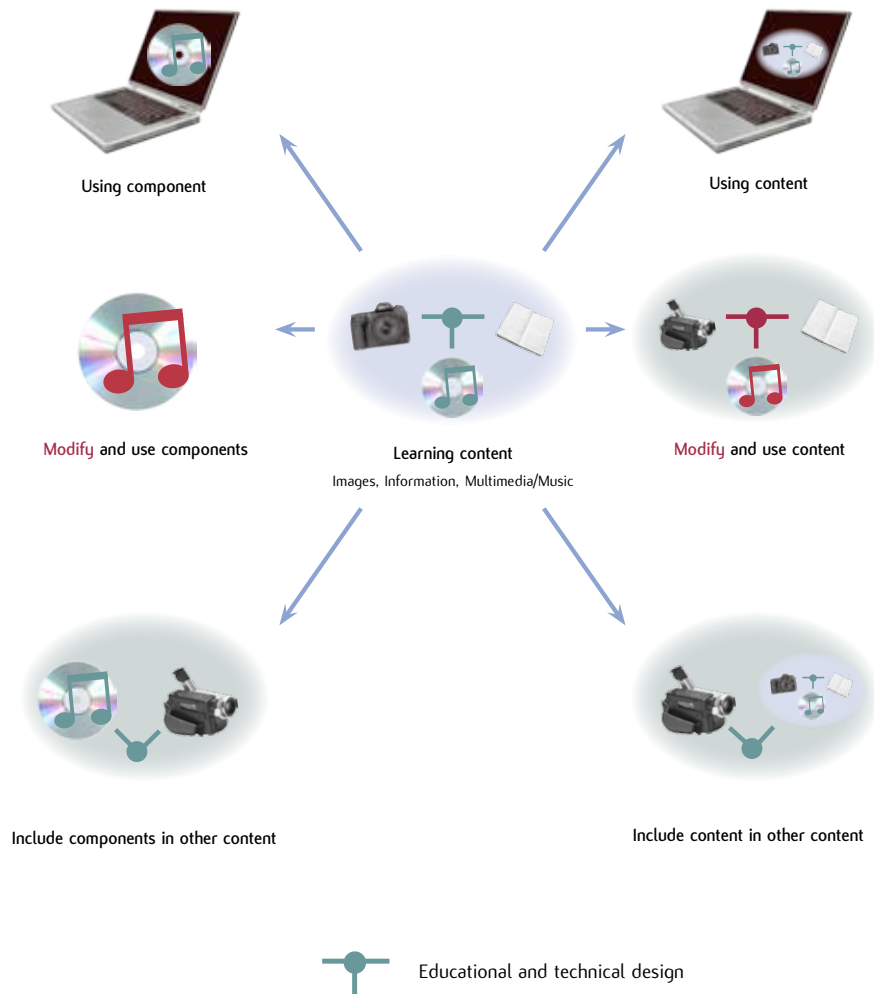


Figure 7: Multimedia Content Re-Use Scenarios

# educational community layer

Key questions related to use and re-use include:

- will the content to be used on and shared between a wide range of software and hardware platforms
- is it desirable for educators, developers and learners to modify or adapt the content or components
- is it possible or desirable for the digital design to separate the elements of content, pedagogy and presentation
- how separable or granular can the content elements be
- how easily will the components of the resource be found, extracted and re-used?



In the *Wild Ride* series of learning objects students investigate physical forces involved in riding a bicycle.

This resource is an excellent example of design and development using a component based methodology. The functionality, navigation, content and scenario configurations are all in separate files. The content itself is held as separate, image (.jpg), audio (.mp3) and text (.xml) files.

This resource has been easily re-purposed to meet the requirements of an additional language, in this case Thai.

Figure 8: Component-Based Methodology

# educational community layer

## Ownership

In the online world, management of ownership issues arising from the creation, use and re-use of digital content is influenced by our vision for education in the 21st century. Education operates as part of the knowledge economy, fostering innovation and creativity. The increasing complexity associated with the use and re-use of digital content is challenging systems originally developed to ensure ethical and cost effective processes for managing intellectual property issues in the print environment. Digital content requires ownership and rights management processes that:

- maintain high levels of openness and freedom
- recognise the value of new and existing intellectual property
- provide appropriate returns for ownership of, or investment in creation of intellectual property used within the education sector.

Within educational communities, processes to manage intellectual property are increasingly based on models where ownership lies with or is delegated to the community. The benefits of the intellectual property are available to all members of the community. These systems take into account that the development of content for education is frequently an iterative and incremental process that builds on existing resources. Enhancements and new developments are contributed back to the community.

This approach:

- maximises use of existing intellectual property
- minimises unnecessary duplication
- reaps professional learning benefits through participation in community activities
- minimises administrative overheads and
- minimises costs associated with negotiating and trading intellectual property rights.

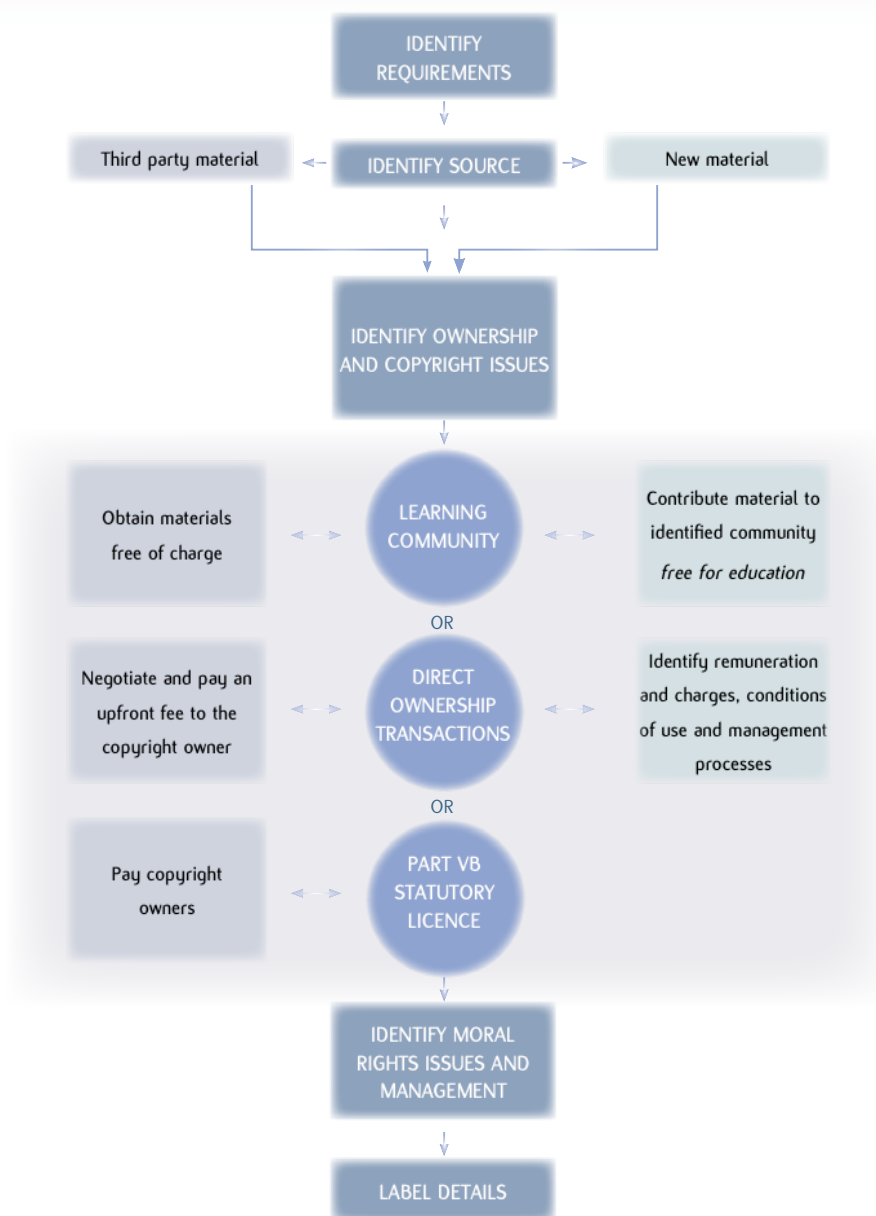
Implementation of this approach is occurring at jurisdiction level in Australia through the introduction of a cross-jurisdictional licence (NEALS), designed to facilitate cost-free sharing of materials produced by schools and jurisdictions. In addition, a number of organisations are adopting a *free for education* approach to manage copyright costs. Standard methods of labelling assist teachers and educators to identify this content.

In planning content creation and procurement projects educators need to consider:

- the longer term returns from investment in the learning community
- the savings this approach will bring to school education in Australia and New Zealand
- the costs associated with short term returns from the sale or licensing of the intellectual property – particularly in cases where the market consists largely of other members of the community.

# educational community layer

In all digital content and procurement projects, however small, it is necessary to treat copyright management as a significant phase of the project. It requires a budget allocation and appropriate expertise to research, consult, analyse and make recommendations on the most appropriate action.



Whichever type of licence is chosen it is important to clearly label the content item to identify the type (and details) of the licence it has been acquired under. Failure to do this means that payments will be made for *free for education* materials and additional payments made when a direct licence has already been negotiated and paid.

Figure 9: Managing Ownership and Copyright

# educational community layer

The National Education Access Licence for Schools (NEALS) is a cross jurisdictional licence being developed to facilitate cost free sharing of materials between the parties to the agreement. The licence supports the use and sharing of materials produced by schools for schools, reducing the possibility of jurisdictions paying to copy their own material. It encourages exploration and sharing of resources available in an expanded educational community within a managed legal framework. It preserves the right of jurisdictions to commercialise their material to parties outside the scheme. The parties to NEALS are the Australian Government and the Departments responsible for Education in each state and territory. NEALS is due to be finalised in 2006.



Figure 10: NEALS Licence

While the most desirable and cost-effective way for educators to access third party content is to take advantage of material available free of charge this will not always be possible. When this is the case, an alternative, cost-effective mechanism is to negotiate and pay an upfront fee for the use of material direct to the copyright owner.

The statutory licence in part VB of the *Copyright Act 1968* may be used by jurisdictions and schools developing content when using *free for education* materials or paying a direct licence is not an option. Under this licence, schools and TAFE are permitted to copy and communicate specified amounts of copyright material found in print and electronic form.

Materials need to be clearly tagged as copied under Part VB of the statutory licence. Jurisdictions then pay fees to copyright owners through companies that collect and manage payments.

Moral rights are an important intellectual property consideration covering an author's right to:

- be identified as the author of the work or film when it is presented to the public
- not have their work attributed falsely to someone else and not to have an altered work being attributed as unaltered
- have the integrity of their work respected and not subjected to derogatory treatment.

Moral rights are granted to authors of literary, dramatic, musical and artistic works and films. Content developers must establish and implement policies for attribution and use of content that address moral rights.

# educational community layer

Technologies provide new opportunities for students to interact with local, national and international experts through online chat. This provides a resource that can be contributed to the community for re-use in classes and schools across states and territories.



Illustrative copyright actions required for the classroom activity to be reproduced in electronic form and re-used are outlined in Figure 11.

Activity	Copyright Related Actions
Organise a chat session between an expert in climate change and a class	<ul style="list-style-type: none"> <li>• Obtain a written release from the expert to allow editing, communication and publishing of the transcript, in perpetuity and for all geographic regions, including permission to make available under NEALS</li> <li>• Obtain similar permissions from all the students involved, including a statement that attribution will be to the school rather than individual students</li> </ul>
Edit and archive the transcript of the chat session for use with next year's class	<ul style="list-style-type: none"> <li>• Comply with moral rights requirement by giving contributors, the school on behalf of students, the opportunity to review the edited transcript</li> <li>• include appropriate attributions in the transcript</li> </ul>
Publish the edited transcript through the school educational portal	<ul style="list-style-type: none"> <li>• Create a permanent digital copyright identifier for the resource giving attribution details, date of production and if appropriate a disclaimer that the views expressed are those of the contributors not their employing organisations or the school</li> </ul>
Respond to requests by a school in another state to use the transcript	<ul style="list-style-type: none"> <li>• Include the NEALS logo prominently on the resource and digital copyright identifier.</li> </ul>

Figure 11: Re-Use of Online Chat Transcripts

# educational community layer

## Product Lifecycle

In an environment of rapid change there are important product lifecycle processes impacting on management and use of digital curriculum content within a community. The project plan needs to address the lifecycle stages that follow development. Maintenance, unpublishing and archiving decisions are influenced by the outcomes of evaluation processes including recording, collation and analysis of user feedback.

Lifecycle Stage	Purpose
Publish	Registers content to meet legal and discovery requirements
Deploy	Provides user access to the product and support in its use
Evaluate	Acquires data for assessing the degree to which goals have been achieved to guide product maintenance and for planning further content creation or procurement projects
Maintain	Ensures that valuable content will continue to be used or re-used and will maximise the return on investment
Unpublish	Withdraws out-of-date content
Archive	Facilitates location of out-of-date content for future reference or for its possible value in future projects.

Figure 12: Product Lifecycle

## Professional Learning

Digital curriculum content supports the work of teachers. Managing interaction and integration within the range of collaboration and communication activities that are part of contemporary teaching and learning requires professionals who:

- understand the role new technologies and content can play in stimulating innovative, creative and engaging approaches to teaching and learning
- recognise how content can provide opportunities for personalised approaches to learning
- use content to build and support learning communities.

Professional learning initiatives designed to develop and enhance these skills are most effective when directly linked to the context of a teacher's own work. Major content development or procurement projects require an associated professional learning strategy that addresses this need.

# educational community layer

Continuous improvement in the development of digital curriculum content to meet agreed educational outcomes is supported by evaluation of learning resources against agreed specifications.



The Frog Pond Habitat learning resource was evaluated by independent experts against agreed educational quality and useability specifications. The evaluators considered the resource to be an example of exemplary instructional design, rating it very highly against agreed criteria.

Criteria		Rating
Integrity of Content	The content of the resource is accurate and reflects the ways knowledge is conceptualised within the domain	strong
	There are clear learning objectives that are made explicit to learners and teachers	perfect
Learner Focus	The target learners are clearly identified (academic level/technical ability/demographics) and addressed	strong
	The technology helps learners to engage effectively with the concept/skill/ideas and structures information content in order to scaffold student learning	perfect
	The resource provides an opportunity for learners to obtain feedback within or outside the learning object	perfect
	Pre-requisite knowledge and skills are identified and make clear connections with prior and future learning	strong
Useability	The resource stands alone and reflects an awareness of the varying educational environments in which learning sequences and objects may be used	perfect
	There are clear instructions for using the resource	perfect
	The resource is easy to use (navigation, user control, visibility of system status)	perfect
	Help and documentation files are provided for students and teachers including contextual assistance	strong
	Design of visual and auditory information enhances learning and mental processes.	perfect

Figure 13: Specifications and Evaluation

# technology layer

## Educational Quality

Teachers and students need to be able to locate, access and adapt quality digital curriculum content, share it across online delivery systems and integrate it into learning activities. This requires teachers, schools, systems and commercial developers to plan for how the digital resources they develop will be discovered, used, adapted, re-used and stored.

Compatibility and standards-based approaches are essential to the technologies that underpin these activities.

International and national organisations develop and document agreed technical specifications and standards based on extensive, ongoing research and consultation. These guide developers towards interoperability in learning systems, learning content and integration of these into enterprise systems.

Specifications and standards continually evolve and require constant attention to ensure the advantages of sharing and re-use are maintained as new technologies are adopted.

## Useability

Content developed with new technologies and involving complex user interactions can be challenging for users. Useability describes how easy is to use the content. It relates to the nature of the user group, the nature of the task and the technical environment in which the task will be undertaken.

Useability is enhanced by flexible technologies that operate across a range of user technical environments, aligning content technical requirements with user environments. It is supported by.

An effective mechanism in planning for and managing useability is to develop a useability specification. This details the characteristics of the learners and their environments, the tasks learners must be able to perform, and verifiable measures to assess useability.

Assessment of useability involves:

- measuring how accurately and completely intended outcomes are achieved
- the effort required to achieve outcomes
- ratings of user satisfaction.

Accessibility refers to the ability of a product to be used effectively despite a user's physical, sensory or cognitive disability. It can be seen as a specific subset of useability. New technologies have the capacity to overcome many of the accessibility barriers encountered in traditional media.

Planning for accessibility at the outset of a project ensures that these features can be incorporated in the product through appropriate choice of technology and technical tools.

# technology layer

## Design and Re-Use

With appropriate technical design, digital curriculum content can be duplicated, shared, re-used, reorganised and adapted for different learners and different learning environments.

## Interoperability – Platform Independence

Interoperability and platform independence protect investment, allowing content to be used on and shared between a wide range of software and hardware platforms.

Technical formats range from open source technologies referenced to agreed standards and specifications, through to proprietary and closed formats. The choice of technologies includes consideration of deployment issues, ongoing licensing costs, access to source code and maintenance and support requirements.

## Flexibility – Multiple Use and Re-Use

Multiple use and re-use of content requires the capacity to adapt content or the components of the content for changing learner requirements and different devices.

The most common way of achieving this is through design methodologies based on the organisation and integration of distinctly separate components.

Managing the balance between flexibility and complexity is critical. A widely accepted solution is the use of an information model that addresses a continuum from digital assets through to learning objects and complex aggregated content. Utility of learning objects and other complex digital resources is enhanced by describing and packaging components in ways that reference agreed specifications and standards.

## Resource Discovery

Consistent application of information describing digital content is required for users to find, manage and use digital content.

Text based searches are useful for many purposes. However, reliable access to content by multiple users working in different technical environments is improved through the use of metadata standards, local application profiles and agreed vocabularies.

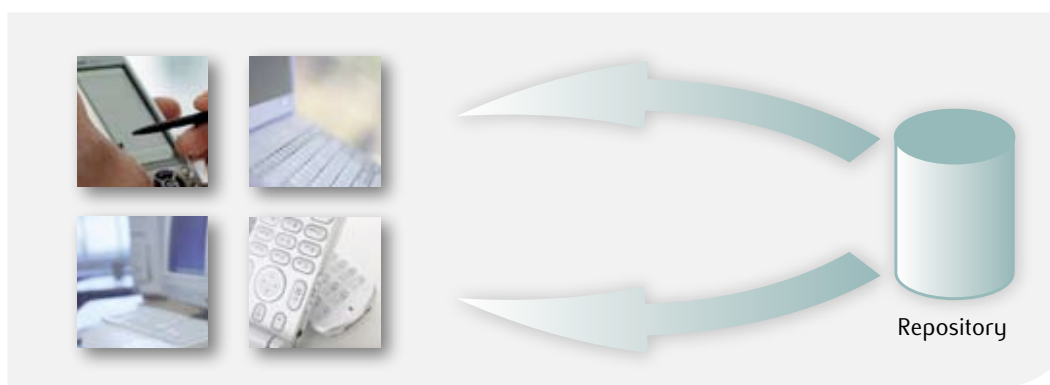


Figure 14: Platform Independence

# technology layer

## Ownership

Management of the rights associated with the use of digital content is complex with the application of traditional systems being neither efficient or effective. Decisions about the use of new digital rights management systems need to balance the level of functionality required against complexity and cost.

## Lifecycle

Digital curriculum content development occurs in an environment of rapid advances in technical developments and user expectations. Products need to be able to be adapted in response to these factors.

The use of component-based design methodologies during initial product development is an ideal basis for cost-effective maintenance.

## Professional Learning

Development of digital curriculum content requires teachers and system leaders who:

- recognise how content can be designed, developed for multiple use and re-use
- understand the potential and limitations of technologies that can be used
- utilise the diverse professional skills needed to produce effective content
- understand and guide the work of other professionals, ensuring intended educational outcomes are met

Identifying action learning opportunities within content development projects provides for context-based professional learning for teachers and system leaders.

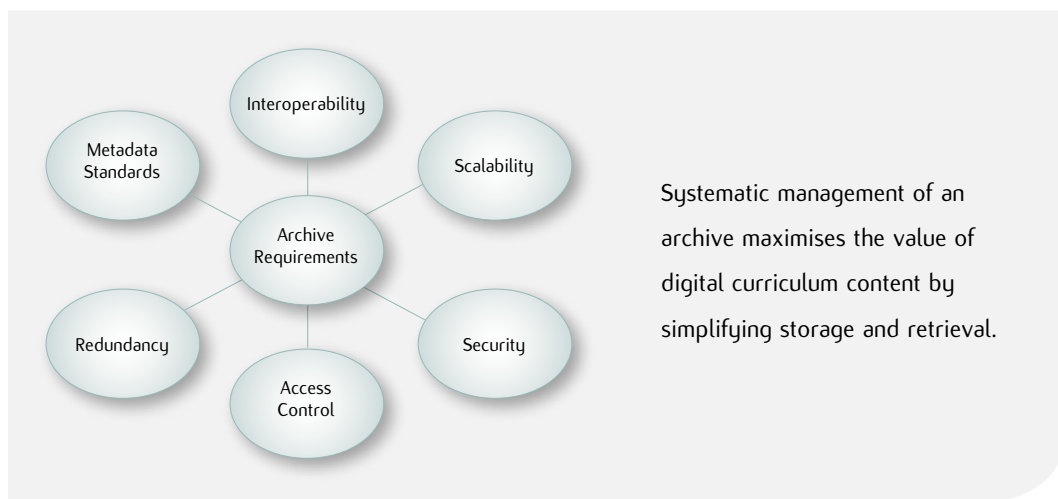


Figure 15: Archive Requirements

# national approach

Recent national and jurisdiction initiatives have provided a research basis and a best practice model for developing and implementing digital curriculum content creation and procurement specifications.

In the current dynamic and creative environment, new educational initiatives and educational technologies provide new national and jurisdiction challenges in efficiently and effectively managing investment in digital curriculum content creation and procurement. Challenges include:

- harmonising specifications with appropriate international standards
- aligning School Education and Vocational Training and Education (VTE) specifications
- developing an interoperable framework and support for the sharing and peer-reviewing of teacher-developed online resources
- reaching agreed interoperability standards for learning management systems
- contributing to international standards supporting the design, implementation and management of integrated online learning experiences
- implementing digital rights management systems that keep the administrative burden to a minimum

Continued collaborative approaches are needed to meet the challenge of achieving the best possible educational outcomes from the investment made by jurisdictions, schools, teachers and students in the development, procurement, distribution and sharing of digital curriculum content.

Ministers of Australia and New Zealand have agreed to work for open, transparent and standard agreements for sharing education content and materials developed with public money, along with associated intellectual property.

*Content strategy - Learning in an online world 2004.*

# search strategies

The online world enables a flexible, expansive learning paradigm characterised by new educational initiatives and new educational technologies. Digital curriculum content developed to agreed specifications and standards maximises interoperability and enables the content to be used and re-used both nationally and internationally.

Specifications and standards are dynamic. Content developers need to research relevant, current websites, documents and resources as a critical element in the digital curriculum content development process. The following table provides key search words to access current information.

Content Specifications Framework	Sites and Key Words
 <p>The diagram illustrates the Content Specifications Framework as three overlapping circles: BUSINESS LAYER (red), TECHNICAL LAYER (teal), and EDUCATIONAL COMMUNITY LAYER (blue). A central white box lists the following specifications: Educational Quality, Design and Re-Use, Useability, Ownership, Life Cycle, and Professional Learning.</p>	<p><b>Australian</b></p> <ul style="list-style-type: none"> <li>• AICTEC</li> <li>• ICT in Schools Taskforce</li> <li>• EdNA</li> <li>• The Learning Federation</li> <li>• Australian Flexible Learning Framework</li> <li>• Australian Government Information Management Office</li> <li>• Australian Government Technical Interoperability Framework</li> <li>• Educational Soundness Specification</li> <li>• National Copyright Guidelines</li> <li>• AEShareNet Free for Education</li> <li>• Creative Commons</li> <li>• CopyrightAware Statutory and Voluntary Licence</li> <li>• Standards Australia</li> </ul> <p><b>International</b></p> <ul style="list-style-type: none"> <li>• British Educational Communications and Technology Agency</li> <li>• IMS Global Learning Consortium</li> <li>• IEEE Learning Technology Standards</li> <li>• ISO /IEC JTC1 SC36 American National Standards Institute</li> <li>• Joint Information Systems Committee</li> <li>• CETIS Learning technology standards</li> <li>• Advance Distributed Learning SCORM</li> <li>• Dublin Core Metadata Initiative</li> <li>• Usability International Standards</li> <li>• W3C Web Accessibility Initiative</li> </ul>

Figure 16: Search Strategies

Further information regarding this publication can be obtained from:

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