

EdNA, HIGHER EDUCATION AND METADATA IMPLEMENTATION

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ABSTRACT

Education Network Australia (EdNA) is an initiative of the Commonwealth, State and Territory governments together with key stakeholders from the Education and Training sector within Australia. It was formally launched in 1997 as a Directory Service (and website). 'What you see is what you get' may be the experience of most end-users but behind the scenes the process involved in reaching this stage has demonstrated an ongoing commitment to collaboration and cooperation. Originally conceived as a physical network aimed at providing infrastructure development and connectivity, particularly for the schools and Vocational Education and Training (VET) communities, (AARNet already being well-established) EdNA demonstrates that its sustained and successful response to rapid technological development has been twofold: one, in facilitating collaboration (and the development of professional networks and communities of users) and, two, in specifying technology standards (such as metadata). In achieving this there has been an explicit and shared goal between all sectors of the Australian education and training community of maximizing the benefits of Communication and Information Technologies (CITs) in education. A key outcome of this endeavour, to date, has been the development of a value-added Directory Service which has been structured to provide well-catalogued information and opportunities for effective resource discovery. In comparative terms, with large-scale education initiatives throughout the world, the EdNA Directory Service has been an 'early adopter' of metadata (customised from the Dublin Core) as a means for ensuring that resource discovery is effective and relevant. As with the Dublin Core, it continues to evolve and has undergone a number of iterations already.

Of course, EdNA is not the first such initiative geared toward effective and value-added resource discovery in Australia. There are a number of other initiatives, particularly from within the Higher Education sector – the UniServe clearinghouses supported initially by CAUT (and later CUTSD) and AgriGate are examples of subject gateways or clearinghouses. There are a number of others, mentioned briefly in this paper, but in terms of scale and scope, EdNA is distinctive.

After establishing the background and context of EdNA this paper is focused on the metadata implementation in EdNA with reference to the issues and problems as they relate to Higher Education. Recent initiatives from overseas, such as the IMS Project sponsored by Educom, are also discussed and provide a rough 'benchmark' for the EdNA metadata implementation.

KEY WORDS

EdNA, metadata, collaboration, standards, information retrieval, resource discovery.

1. EdNA - OVERVIEW AND CONTEXT

Education Network Australia (EdNA) is an initiative of the Commonwealth, State and Territory governments together with key stakeholders from the Education and Training sector within Australia. Since its original conception, in 1995, EdNA has undergone a number of significant changes. Originally, EdNA was conceived as a physical network with emphasis being placed on infrastructure development and connectivity, particularly for the schools and Vocational Education and Training (VET) communities (AARNet, the Australian Academic and Research Network already being well-established for universities).

In line with the worldwide trend of increasing online data communications, Internet usage in Australia has increased over the last few years, particularly in the education sector. Worldwide, by mid-1996 there were over 2000 courses already offered on the World Wide Web (Tapscott, 1996). That number has been growing steadily as strategic plans of universities and educational governance bodies worldwide have been pushing for alternative solutions to dwindling education budgets. The Gartner Group has predicted that "By 2001, more than 75% of traditional US colleges and universities will use distance-learning technologies and techniques in one or more 'traditional' academic programs" and cite a 0.9 probability of this taking place (Zastrocky, 1997).

The EdNA initiative can be seen as a 'visionary' response to this worldwide trend. In moving beyond being a connectivity solution, particularly for schools, EdNA has developed into a national framework for collaboration between all sectors of the Australian education and training community, with a view to maximizing the benefits of communications and information technologies (CITs) in education. As such, it has now established itself as a benchmark for a number of other related projects and has been shortlisted for an international award by the Bertelsmann Foundation as world's best practice in bringing together media and education.

1.1 ORGANISATIONAL FRAMEWORK

Representatives from the School, VET and Higher Education sectors along with Ministerial nominees, both State and Commonwealth, come together as the EdNA Reference Committee (ERC), the peak EdNA advisory forum which considers issues relating to the use of information technology in education and provides advice to the Ministers. The Reference Committee is currently chaired by the Commonwealth representative and one of the initial 'architects' of EdNA. Each sector also has established an advisory group which concentrates on issues related to their sector and a representative of each advisory group also attends the ERC forums. The advisory groups are supported by full-time project officers who engage in ongoing consultation on specific projects such as determining strategic directions and enhancements to the EdNA Directory Service. Membership of the advisory groups is drawn widely from within each sector, and in the case of the higher education sector expertise comes largely from the information technology, multimedia, and library communities. Overall coordination and management of the process is effected by a small non-profit company, Education. Au Limited, based in Adelaide and jointly owned by the Ministers of Education and Training. Its Board meets regularly and makes policy recommendations to the Ministers. The sectoral advisory groups feed advice into a number of other forums, such as the EdNA Development Forum, a consultative group set up specifically to investigate and recommend enhancements to the EdNA Directory Service. Given the range of stakeholders and scope of the consultation process, EdNA can thus be viewed as a 'meta-network' in the sense that preexisting networks come together in a networking exercise for mutual benefit (Mason and Dellit, 1998). A key visible outcome of the collaborative effort has been the establishment of a value-added online Directory Service.

1.2 THE EdNA DIRECTORY SERVICE

The EdNA Directory Service was officially launched by the Commonwealth of Australia on November 28, 1997, as an online 'first entry-point' for a wide range of information and resources relevant to education and training in Australia. Development of the Directory Service began in 1995 and has been guided by principles of *quality information retrieval* and *resource discovery*

together with the provision of *networking opportunities* to its stakeholders. Both high quality catalogued online information resources are made easily accessible as are a wide range of electronic discussion groups hosted.

Users can access information stored on the EdNA Directory through *browsing* the extensive category tree of core items or through using the *search* function. Items are indexed and attached to specific categories, with core items having some minimal descriptive metadata attached to enable the process of resource discovery. The Higher Education component of the Directory currently consists of 1885 'core' indexed items (URL's, or 'uniform resource locators') which averages out at close to 50 for each Australian university. All core items indexed on the Directory are available through the *browse* function and any one of these links will take a user of the EdNA Directory directly to the referenced page, thus acting as a 'gateway' to the university. Alternatively, a user may wish to just check the description via the 'i' icon, which is information derived from the URL itself. All information currently provided has been summarised from information publicly available from university websites. For quality assurance reasons during the initial development stage of building the Directory this information has been manually attached by the EdNA Higher Education Project Officers. However, with the implementation of EdNA metadata this process can be automated sometime in the near future. Responsibility for the accuracy and currency of information varies according to sector. Both the Schools and VET sectors have developed quality assurance guidelines while for higher education each university assumes responsibility and ensures that the information published on the World Wide Web is accurate, up-to-date, and complies with relevant regulations such as the Trade Practices Act and copyright legislation.

The EdNA database also stores harvested (robotically-collected and publicly-available) 'non-core' items which are indexed from specified levels referenced from the core items. For the time being, only the Search function allows for retrieval of these resources. Currently, each university homepage – as well as most core URL's – is indexed to a default value of two levels. It has been difficult to apply a general indexing depth greater than this because each university indexes information in differing, if not divergent, ways. Nonetheless, participation in the EdNA process from the higher education sector has strengthened during 1998 and there is now more involvement from universities in assisting in the process, such as specifying to what depth and breadth their websites should be indexed.

The EdNA Directory Service utilises metadata customised from the Dublin Core (DC) as a means for ensuring that resource discovery is effective, thereby maintaining quality of content. However, in its early implementation the effort of evaluating suitable resources and attaching descriptive information to them was not seen as part of the metadata initiative. During 1997 and much of 1998 the implementation of metadata was seen more as a means for providing the essential prerequisite for the 'automatic' or robotic harvesting of resources from 'accredited' locations (such as universities). Version 1.0 of the EdNA metadata standard was released in August, 1998.

The two methods of information retrieval and resource discovery (search and browse) have also been somewhat separate or disjunct methods on the EdNA Directory Service. It is only been through achieving a critical mass of quality information on the database that discussion about how to seamlessly integrate these functions has taken place. It is likely that within the next 12 months these functions on the Directory Service will be integrated more elegantly than at present, as part of a redesigned user interface. Given the extent of the consultative process involved and consequent diversity of opinion on some matters, however, this is not necessarily a foregone conclusion.

Navigation cues on the EdNA Directory homepage also provide users with a variety of other options including *About EdNA*, *Institutions*, *Noticeboards*, a 'What's New' list, a *Help* system, and an entry point into *Discussion Groups*. These other services are aimed at promoting interactivity and networking opportunities to users.

1.3 THE DIRECTORY CATEGORY STRUCTURE

The overall top level of the EdNA category structure is as follows:

- General References
- Educational Organisations
- Adult Community Education (ACE)
- Higher Education
- Schools
- Vocational Education & Training (VET or TAFE)

During the latter part of 1997 the higher education project officers worked to develop the current higher education component of the directory. The top level covers:

- Australian Higher Education Sector
- Academic Divisions
- Community Information
- Courses, Degrees and Scholarships
- International Students and Programs
- News and Events
- Research and Postgraduate Study
- Staff Information
- Student Support
- Teaching and Learning

Careful observation of the category tree reveals that alphabetical indexing is not universal. While it has been achieved for higher education it was considered to be not so important by the other sectors. However, this issue is one of several longstanding debates.

The category tree branches several levels deep and there are now over 1000 discrete categories on the Directory Service, although many of these do not have unique names (particularly where location is represented according to State or National coverage). With the category tree now well established and in consideration of its current size, discussions are now proceeding among stakeholders aimed at developing a more efficient architecture. This is because basic browse operations on the level of the category tree itself are still subject to database queries and therefore draw on system resources which could be used more efficiently. Such an architecture was important in the beginning process of building and revising the category structure but it no longer makes a lot of sense. With the indexing capabilities of commercial-off-the-shelf products such as Netscape Compass Server there could be a ready solution at hand. However, due to the complex cross-linking within the current database migration to a more elegant configuration may prove challenging.

Linked to the directory categories are currently around 7,500 core, or 'approved', items and a further 45,000 linked (harvested) items. Of the approved items, 63% represent Australian content. The category tree has so far provided a good basis for cataloguing resources useful to Higher Education.

1.4 EdNA IN GLOBAL CONTEXT

During 1997-98 there has been an increasing number of other developments around the globe which are similar to EdNA. In the UK, the Department of Education and Employment launched in 1997 a discussion paper, 'Connecting the Learning Society: National Grid for Learning' as part of a consultation process concluded at the end of 1997. Implementation of the grid began in early 1998. In Europe, the European Schoolnet Project (EUN) is established for the purposes of providing value-added services to the European K-12 community. Its espoused goals are very much framed in language that expresses collaboration and cooperation between key stakeholders. In Hong Kong an initiative explicitly modelled on EdNA, called HKeduNet, was proposed in late 1997 but has so far failed to attract seed funding.

On April 29, 1998, Educom (USA) released its Instructional Management Systems (IMS) Specifications document in draft version 0.5 as a far-reaching specification for online education aimed at establishing standards for the education community. There are key features in this project which bear some resemblance to the EdNA project. For example, the overall stated goal of the IMS project is to “Enable an Open Architecture for Learning”. IMS stakeholders are identified as: learners, teachers, coordinators and providers. Key design considerations for online learning are identified as:

- Granular content
- Scalable systems
- Interoperability
- Customisability and extensibility
- Facilitation of and support for collaboration

A 33-element metadata specification comprises part of the documentation published in all IMS drafts by 1998 (IMS, 1998). This metadata specification is more extensive than EdNA's although both are based on the Dublin Core standard and aimed at developing quality online resources useful to education communities. Importantly, with the Dublin Core adopted as a baseline various communities can add further value by defining and adopting extra elements. For EdNA, IMS, and other gateways and repositories of online educational resources such as GEM, a critical issue will become interoperability between metadata-enriched collections. Clearly, the various gateways will need to recognise and accommodate the major metadata element sets (GEM, 1998).

There is strong international interest in IMS which is also evident in Australia. As a consequence, Australia, through the Department of Employment, Education, Training and Youth Affairs (DEETYA) has recently subscribed to IMS to enable participation of EdNA in this international education forum focused on developing standards relevant to the delivery of online education programs.

2. METADATA

2.1 AN OVERVIEW

Metadata has been an essential tool of trade for the library community for a long time now. Essentially, it is descriptive data about a document, book, audiovisual artefact, digital object, or the like that enables it to be efficiently catalogued and indexed. In the case of a book this information is commonly located somewhere in the first few pages and can contain information such as publishing details, intellectual property ownership and key details relating to content. In the case of the World Wide Web, HTML-encoded documents have (minimal) provision for metadata through two general ‘meta-tags’: *keywords* and *description*. However, it was recognised a few years ago – particularly by bodies such as the W3C (the World Wide Web Consortium), the peak standards body of the World Wide Web – that this minimalist implementation of metadata was not only inadequate but easily open to abuse. For example, in particularly the commercial race to attract ‘hits’ to websites, individuals and enterprises have sometimes adopted a cowboy or anarchistic approach by embedding metadata which is not regulated or subject to a code of practice and often misrepresents the actual content being provided.

2.2 BRIEF DESCRIPTION OF THE DUBLIN CORE

The Dublin Core metadata consists of a set of 15 elements some of which are ‘qualified’ by ‘schemes’ or qualifiers. The semantic meanings of these 15 elements are well defined and some elements accept values from a ‘controlled vocabulary’. Each element is optional and repeatable. Furthermore, metadata elements may appear in any order, and with no significance being attached to that order. A metadata element’s meaning is unaffected by whether or not the element is embedded in the resource that it describes.

The metadata elements fall into three groups which roughly indicate the class or scope of information stored in them: (1) elements related mainly to the Content of the resource, (2) elements related mainly to the resource when viewed as Intellectual Property, and (3) elements related mainly to the Instantiation of the resource, as shown in Table 1.

TABLE 1
DUBLIN CORE METADATA ELEMENTS

Content	Intellectual Property	Instantiation
Title	Creator	Date
Subject	Publisher	Type
Description	Contributor	Format
Source	Rights	Identifier
Language	Relation	Coverage

2.3 EdNA'S IMPLEMENTATION OF METADATA

EdNA now implements all 15 DC metadata elements indicated in Table 1. In addition to these are nine EdNA elements – Table 2 provides a general summary of their meaning.

TABLE 2
EdNA ADDITIONAL METADATA ELEMENTS (Version 1.0)

EdNA Element	Semantic Summary
EDNA.Entered	Created automatically by EdNA software to indicate the time the resource is added to EdNA's database.
EDNA.Approver	Person who approves the resource for inclusion into EdNA's database. This is typically an email address.
EDNA.Reassessment	The recommended date on which the reassessment of the resource is due.
EDNA.Userlevel	Typical level of user for which the content would be most appropriate - from 'preschool' to 'university'.
EDNA.Categories	Relates to categories in the EdNA Directory tree to which an item in the database is linked.
EDNA.Conditions a	Some resources are only available conditionally – provides teachers with mechanism for excluding certain resources from student searches.
EDNA.Indexing	The EdNA software indexer, as well as performing full text indexing of pages identified in the EdNA directory, can optionally follow links in these pages and create indexes of these additional pages. These additional pages are not currently displayed through Browse and only show in EdNA search results. Values assigned within this element determine the extent (depth) to which links are indexed.
EDNA.Review	A review provided by a third party.
EDNA.Version	The version of the EdNA Metadata standard.

Version 1.0 of the EdNA metadata standard was published on August 31, 1998 after four earlier drafts developed over an 18-month period of consultation with each education sector. Where development of standards is concerned there are many complex issues (such as interoperability and compatibility with evolving international standards initiatives such as Dublin Core). These can be very challenging for all concerned. Moreover, in this case, compromise has played a part and a number of issues remain. Achieving signoff on EdNA. Indexing was an example of this, as was the decision to leave out an EdNA. Type element after much effort had been invested into it. Other elements are under consideration for inclusion in an update of the standard likely to happen some time during 1999. For example, at the time of writing, it was recognised by the EdNA Higher Education Advisory Group that the IMS and GEM metadata element sets were in some ways more comprehensive in scope than EdNA's for describing online educational resources on one critical issue – pedagogy. The element, EdNA. Userlevel, is the closest that the EdNA specification gets in terms of this. Yet, more and more universities in this country are providing courses and single subjects in online mode. If the universities also recognise that adding value in the online domain is a strategic marketing option then pedagogical description of these resources will become more important for both educators and students alike. The higher education sector is likely to play a major (lead) role in moving forward on this issue within the EdNA process during the next 12 months.

For both the higher education and VET sectors the disciplined adoption of metadata standards will also be the key to ensuring that effective automatic harvesting of quality resources can take place. Peak bodies such as the Australian Vice-Chancellors' Committee have supported this approach recently through related initiatives such as the MetaWeb project (MetaWeb, 1998). This project which involved collaboration between the National Library and three universities and was aimed at developing improved library information infrastructure, delivered a powerful set of tools for generating and handling metadata. It has now been picked up by EdNA for further development.

The EdNA Directory Service, as mentioned earlier, continues to be developed with enhancements and a range of projects are underway which depend on the successful implementation of metadata (EdNA, 1998). A metadata wizard which provides individuals with an easy and precise method for producing metadata was in prototype on the EdNA website for 10 months and has recently been revised to be consistent with the version 1.0 standard. With the launch of the version 1.0 EdNA metadata standard the wizard is used to promote the process of enriching the collection of online resources with descriptive data. Complementing this approach is a number of excellent metadata tools produced by the Distributed Systems Technology Centre, a Cooperative Research Centre based at the University of Queensland and involving over 30 participating organisations – in particular, is Reggie, a generic metadata tool which assists users to create metadata in various standards, formats and languages (DSTC, 1998; Reggie, 1998).

2.4 AGLS

Locally, the Australian Government Locator Service (AGLS) metadata standard is also based on the DC specification. It was developed in 1997 by a Commonwealth Agencies' Working Group led by the Australian Archives and the Commonwealth Government's Office of Government Information Technology (OGIT). An implementation plan which involves all Commonwealth agencies was initiated in early 1998. The standard uses the 15 DC elements plus two more: Function (specifies business function of agency using the metadata) and Availability. With Government agencies adopting this standard there is a potential flow-on benefit to EdNA which will streamline the collection of government-held online resources. The EdNA database now has provision for storing AGLS-compliant metadata.

3. CONCLUSION

EdNA is not the first such initiative geared toward effective and value-added resource discovery in Australia. There are a number of other initiatives, particularly from within the Higher Education sector – the *UniServe* clearinghouses supported initially by CAUT (and later CUTSD) and *AgriGate* are examples of subject gateways or clearinghouses. However, as mentioned briefly in this paper, in terms of scale and scope, EdNA is distinctive. The collaborative approach of EdNA is intrinsically broadening and, as such, mirrors the communications architecture of the World Wide Web itself.

The EdNA Directory Service is now moving towards maturing its harvesting of resources from accredited sites with the aid of metadata. There are a number of dependencies in this process and it will be critical for the resource producer, or publisher, to use valid metadata in order for EdNA's software agent (or robot) to automatically collect the resource and enable user to search for these resources. The EdNA metadata wizard and tools produced by the MetaWeb project are now available to assist this process. By December 1998, at ASCILITE 98, we expect to be in a position to provide a report on the effectiveness or otherwise of EdNA's automatic harvesting effort.

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