E-learning - Key Australian Initiatives

An opportunity for all learners

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What is happening in Australia? Overview

Australia is an internationally recognized provider of high quality education and training, attracting students from all over the world. Australia offers a diverse range of quality education and training courses via its 10,000 schools, 660 vocational training institutions and 39 universities. In addition, many education- related companies are recognized industry trainers in specialist areas, such as Information Technology. A broad network of community colleges also exists, to provide continuing education for adults fuelling the phenomenon of life long learning.

Australia's success in the education sector is built on a strong partnership between both Federal and State Governments and the education industry- its peak, regulatory and professional bodies and individual institutions.

Qualifications systems

Australia's qualifications system[1], underpinning pedagogy and curriculum is also world's best practice. As a result Australian qualifications are widely recognized around the world. Australia boasts a unified system of 12 national qualifications, linking school, work-based and university qualifications. This single unifying system, enables learners to advance from each level of study to the next and also to move between educational sectors, eg. from vocational to university placements.

Australia is an active member of the international education and training community, with a comprehensive bilateral agenda. Australia participates in many international fora including:

- APEC - Australian Pacific Economic Cooperation
- SEAMEO - South East Asian Ministers of Education Organisation
- UNESCO -United Nations Educational, Scientific and Cultural Organisation
- OECD -Organisation for Economic Cooperation and Development

Australia is an active participant in the World Trade Organisation General Agreement on Trade in Services particularly in the field of education services.

[1] 1. AQF- Australian Qualifications Framework

International students

Australia, as a tolerant, multicultural society is sensitive to diverse cultural and religious needs and in 2000 welcomed approximately 188,000 international students across all sectors. Australia now has the largest proportion of international tertiary students, (per head of university student population), of any countries providing international education services other than Switzerland.

Innovation

Australian education has produced seven Nobel Prize winners, invented the 'black box' flight recorder, the internationally accepted aircraft landing system, polymer banknotes and innovative computer hardware/software. Pioneering techniques in the field of medicine have also made Australia a world leader in cranio-facial surgery, invitro fertilization and the 'bionic ear'. Australia has a strong and internationally recognized capability in the fields of biotechnology and astronomy.

e-Education

Australia's innovation extends to the adoption and development of e-education. Australia is a country equivalent in size to the United States of America, but with a population density of only two people per square kilometre. This geographical reality has necessitated that Australians become adept in working across distances. Consequentially, there is a long tradition of distance education in Australia, with the first distance-based university course being offered in 1911. This expertise has provided the precursor for Australia's capability in e-learning. E-learning in Australia is moving from a web-supplemented model towards a fully on-line interactive model. Twenty-three of Australia's universities now offer approximately 200 fully online courses, mainly in the post-graduate sector.

Available statistics regarding the interface between e-learning and Australia's school sector are impressive. Ninety percent of Australian secondary schools have internet access- which is 3rd in the world after Singapore and Sweden. Likewise, almost eighty percent of primary schools have internet access which is 2nd only to Singapore. Australia also ranks 2nd in the world (after the UK) in terms of average student numbers per computer.

The Australian Government is well aware of the fact that the education sector, plays a vital enabling role to support Australia's transition to the Information Economy. It is the school system that provides a foundation for Australia's future intellectual, social, moral, spiritual and aesthetic contributions in an increasingly complex and integrated world order. Competence in information technology is key to this development.

National Goals

Australia's Federal, State and Territory Governments and non-government education providers developed the 'National Goals for Schooling' in 1999. One aim of the National Goals is to produce students who are,'. confident, creative and productive users of ....information and communication technologies, and understand the impact of this technology on society.' To this end a national Action Plan was developed –*'Learning for the knowledge Society:* An *Education and Training Action Plan for the information economy.'* This Action Plan outlines 5 areas to integrate Information Technology into the existing Australian school system in a systematic and measured way. Briefly, the key action areas include:

- People **-** professional development of teachers in the digital medium and the up-skilling of students to competently integrate Information and Communications Technology (ICT) skills into school life.

- Infrastructure **-** affordable access to advanced ICT infrastructure- and the development of the 'Computers for Schools Project'.

- Online content, applications and services - The development of online content in the school sector is a priority for Australia. This initiative is now known as *The Le@rning Federation*. It is linked to a key national policy document, '*Backing Australia's Ability: Innovation Action Plan*' which commits substantial government education funding for science, research and innovation.

Backing Australia's Ability: Innovation Action Plan, announced by the Australian Prime Minister, The Hon. John Howard MP (January 2001), AUD$34.1 million was committed to the Schools Online Curriculum Content Initiative over 5 years. In July 2001, Australia's States and Territories matched this Federal funding, so a pool of AUD$70 million is available to develop high quality digital educational content ('learning objects') linked to the national curriculum.

The Le@rning Federation is a joint venture between two organizations - ***education.au*** – *a* national Australian ICT agency - owned by the Federal Minister for Education, The Hon. Dr. Nelson and the State Education and Training Ministers and *Curriculum Corporation* owned by Education Ministers. No other Government in the world has yet attempted to develop a critical mass of high quality curriculum content, within a robust specifications-based framework, that facilitates the re-packaging of content to improve the learning environment for Australian students and teachers.

education.au manages aspects of the The Le@rning Federation and EdNA Online. The EdNA Online web based service essentially represents Australia's Gateway to resources and services for education and training. EdNA Online aims to promote collaboration and facilitate the growth of Australia's education and training networks. It contains a directory about education and training in Australia, a database of web-based resources useful for teaching and learning and a suite of information and communication services for education and training.

- Policy and organization **-** Ministerial policy support recognises the key enabling role of the education and training authority. MCEETYA - Ministerial Council on Education, Employment, Training and Youth Affairs considers and formulates national education policy and broad initiatives, including e-learning.

- Regulatory Framework **-** development of a framework to support the education and training sector and its enabling role in the information economy, including issues such as digital rights management.

Synopsis of paper

This paper highlights innovative, collaborative ventures of the Australian Commonwealth and State/Territories Education Governments, initiated in the mid '90s. The initiatives were responses to the emerging need of the education and training communities for coordinated approaches in optimising the potential of ICT in teaching and learning at all levels – early childhood, schools, adult and vocational education and training, and higher education.

Most of the projects outlined in this paper are managed by ***education.au***.. owned by the MCEETYA[2]. ***education.au's*** core aim is for the collaborative development of major online national projects on behalf of the Australian education and training community and the formation of international alliances to enhance Australia's digital assets.

People development - students and teachers

Australian e-learning endeavours to incorporate the notion of 'interactivity' from a course-design perspective, rather than just adding communication features into the online infrastructure eg: discussion forums. Learner autonomy is balanced by teacher guidance, stimulating critical and creative thinking – problem based learning features predominantly in Australia curricula. As the Department of Education, Science and Training paper, *No Place for Egos and Islands* (2002) points out..' The focus of discussions about e-learning needs to remain firmly fixed on 'learning' not on the 'e'.

According to Sue Kirkpatrick, CEO of the Centre for Research and Learning in Regional Australia, co-author of the Study, *Online learning in regional Australia: benefits and barriers,* (2003) students studying via the online mode need:

> ..comprehensive induction programs which include study skills, awareness of their learning styles, how to use technology interactively, conventions for communicating electronically and what is expected of them as students and assessment requirements.

This study cites that students in more remote areas experienced greater frustration than their metropolitan counterparts regarding , '..technical difficulties, lack of adequate induction, poor computer literacy skills, time delays associated with asynchronous communication…' Also noted in the study is the fact that students in regional areas experienced the greatest difficulties in gaining continued access to and support from teacher.

This study highlights the need for the design of online learning to:

- Incorporate collaborative learning and peer interaction;
- Note and work with the limitations of electronic communication;
- Stimulate student motivation, learning styles and skills; and
- Include assessment issues.

[2] MCEETYA is the Australian Ministerial Council of Education, Employment, Training and Youth Affairs.

Essentially, teachers must develop and utilise a range of pedagogical strategies apt for the online environment. This Study highlights that

> ..face-to-face contact with peers and teachers needs to be designed in early in the learning experience. If this is not possible then 'tele-tutorials' are an alternative (2003).

Allied to this Study, according to the report '*All that Glitters in not gold: online delivery of education and training'* (Brennan, 2002) by the NCVER[3], is the reality that:

> Technology does not cause learning…What improves learning is well-designed instruction. The value of any technology for education is proportional to the need for that technology to realise educational objectives. We are constantly reminded that learning must be developed around learning needs, meeting educational objectives and producing viable graduates.

The role of the teacher in the e-learning environment encompasses that of instructional designer, moderator, mentor and facilitator. To become comfortable in these roles teachers themselves need to experience online learning as part of their ongoing professional development.

The study *Global gateways: A guide to online knowledge networks* (2002) analyses the types of users engaged with the internet. From usage patterns the study categorises users, in this case students, into four groups:

- the searcher
- the explorer
- the self improver
- participators

Understanding how students use the internet is important for teachers in designing instructional activities. The report is available at:
http://www.educationau.edu.au/research/globalgateways.pdf

Learning opportunities for teachers and students

The use if ICT in education provides a number of opportunities for educators, who themselves, need to be highly skilled users.

The use of technology facilitates storage and manipulation of data and information. Teachers and lecturers use data and information as basic building blocks to assist learners to develop conceptual knowledge. As a result, engaging with technology can enable teachers and lecturers to store, view, manipulate and present information in many new ways.

The advent of the internet, in 1995, extended existing networking to a global system. This allowed users to communicate over large distances and to share information quickly and in reusable formats.

[3] NCVER is the National Centre for Vocational Education Research

When users then combine the potential for informational processes with that of communication, the internet and networks become very powerful tools for education.

Some opportunities for educators are considered briefly below, all of which can be found at: http://ww.edna.edu.au which is the Australian national online service for education.

The internet can enable educators and learners to:

- research up-to-date and expert information globally e.g. by using an online atlas of countries around the world at: http://www.atlapedia.com/online/country_index.htm . Researching online information requires users to have skills of analysis, the ability to decide authenticity of the information and an ability to scope each request for information.

- access world-class information stores such as reference libraries e.g. Wikipedia the online free encyclopedia at: http://www.wikipedia.org/wiki/Internet_troll Information stores are usually quite large and users require the ability to navigate such services quickly and easily.

- access expertise through web based services e.g. AskNow! which is a library service in Australia that provides expert answers for online users at: http://www.asknow.gov.au/public/ Expert services require users to be able to formulate their requests succinctly and simply so that relevant and useful information can be retrieved avoiding an overload of non-relevant information.

- develop communities of learners based around their interests or needs e.g. Aussie SchoolHouse is an online group of teachers and students in Australia at: http://www.ash.org.au/ Many online communities use different types of online services such as listservs, discussion groups, chat groups and forums. The different variety of services can be seen at www.edna.edu.au under the menu item 'Communicate'.

- learn almost anything, at almost any location and at any time, 24 hours a day. Using the internet depends on the user's access to the web and the cost of that access. Schools and universities can place their courses online which for secondary students in remote locations provide access to courses previously not available. A good example of courses online used by post-compulsory students in Australia is the TAFE Virtual campus in Victoria, Australia at: http://www.tafevc.com.au/ This service enables learners to enrol and undertake courses online anywhere and at any location in Australia. A similar excellent service in the university sector, operated by the University of Southern Queensland can be viewed at: http://www.usqonline.com.au/

- make decisions about a wider range of courses than previously available. Wider student choice of courses can enable learners, especially in remote and rural locations, the same choices as their city counterparts. Australian education systems have made every effort to connect remote and rural schools. In the Northern Territory of Australia, the Department of Education has enabled schools to access the web using satellite services. Their system can be viewed at: http://www.education.nt.gov.au

- access news services. EdNA provides a number of news services to educators in Australia. The weekly Communicator service from EdNA is an example of a news service which provides information about education nationally and internationally. The Communicator can be viewed at: http://www.edna.edu.au/communicator/ The net also enables users to combine several news services from different sources and to customise delivery. Users can select a number of topics, two of which may be 'education' and 'technology' and then have news from several different services delivered to the desktops. This type of online service enables teachers, lecturers and students to remain up-to-date, on a specific topic, on a daily or weekly or monthly basis.

- provide online mentoring services where an agreed person, such as a tutor assists a student. The online mentor could be a parent, a friend, a nominated expert or a previous learner of a specific course. This type of arrangement requires access permission to a third person who may view the learner's work and make suggestions or provide guidance to the learner. There is clear potential for school communities to involve parents in student work e.g. homework provided student work is submitted online. Such online learning systems can also enable teachers to supervise their students' work as well as monitor and assess their engagement in the task measured by student time online. Currently, there are several commercial learning management system packages available, although it could be argued that these commercial packages are in their infancy as online systems and have limited use in schools and universities at present.

- experience different educational pedagogies such as didactic, constructivist/experiential, online and blended teaching methodologies. There is a range of different online educational services available from which to choose, each of which is underpinned by a specific methodology. Two examples will suffice here are:

    - EdNA [www.edna.edu.au] which focusses on 'discovery' of quality online resources enabling teachers to develop experiential type activities for students.

    - A didactic example where schools are engaged in a Web Quest can be seen at: http://ozprojects.edna.edu.au/challenge/

- track internet usage, lesson engagement, measured success, lesson attendance and indeed students' progress and assessments of online activities.

Indigenous Learners/Learners in Remote/Regional Areas

It is important to highlight that Australia's national policy on Indigenous education, the *National Aboriginal and Torres Strait Islander Education Policy (AEP)* articulates 21 national goals for which there is support from all Australian governments. The primary objective is to bring about equity in education for Indigenous Australians. Today equity involves access to and use of ICT in learning.

As noted by the Australian Department of Education, Science Training (DEST), in order 'to avoid the consequences of the digital divide, Indigenous students and communities also need skills in the "new literacy" – the literacy of computers of digital communication. Indigenous students and communities throughout Australia,

but particularly in rural and remote Australia, are beginning to benefit from the use of ICT. Individuals and communities can now be linked to each other and to the world by phones, satellites and computers.'

Some key examples of innovative initiatives are:

(a) School of the Air

Australia's Schools of the Air have operated for over 50 years, providing education for isolated students. *New Technology for the School of the Air* (http://www.abc.net.au/central/stories/s768496.htm), showcases an interesting e-learning imitative with relevance to both indigenous students and those in more remote areas.

Eight million dollars from the National Communications Fund (Australian Federal Government) and nine million from a consortium comprising Optus, the New South Wales Department of Education and Training and the Northern Territory Department of Employment, Education and Training will deliver the *'NT and NSW Interactive eLearning Initiative project.'*

The project will establish a shared broadband Interactive Distance Learning (IDL) communications infrastructure for small rural communities and isolated homesteads in the Clarence, Murray-Darling and Dubbo areas of New South Wales and the majority of the Northern Territory.

This infrastructure will deliver education services to 'School of the Air' students, isolated Indigenous communities, TAFE outreach students and adults seeking vocational education. Services will be delivered to about 3,700 users in 547 sites including 239 small, isolated schools .

The technology will deliver real-time streaming video, high-resolution graphics, full duplex audio, two-way data interaction and application sharing capabilities.

Essentially, this means that students will be able to see their teachers on their screens and talk with them. Also, they will be able to share the learning experience with other learners 'cyber classmates' & participate meaningfully in group discussions/learning projects.

(b) I-School North Queensland

e-School students (including indigenous students) ion Northern Queensland can now access a new range of subjects being offered online through distance education. I-School is the Queensland Government's latest addition to its virtual schooling service and increases the subject choices for students in remote areas, including Japanese and German. Queensland Education Minister Anna Bligh noted that:

> …the mix of information communication technologies used by Ischool allows student learning to take place in real time and offline.

(c) Teacher Training and Support using the Internet -The Yalata and Oak Valley Experience (South Australia)

Yalata and Oak valley are remote indigenous communities in South Australia. The teachers at Yalata (1,000 km from Adelaide, South Australia's capital) and Oak Valley Schools (1,400 kms from Adelaide) use interactive computer technology for their ongoing training.

Both schools have the following issues as Common problems:

- Pitjantjatjara (Aboriginal Dialect) is the students' first language: the language of instruction is mostly English, with the aid of a teacher and a Pitjantjatjara speaking Aboriginal Education Worker

- many teachers are new graduates, and very few teachers have had experience in remote schools before they arrive at these school sites

- teachers need to have consistent and ongoing support if they are to effectively help the students to become readers, writers and speakers of English; and

- it is very expensive and time consuming to have face-to-face meetings as the only form of teaching training.

The Solution

Starting in 2002, staffs at both schools were trained using "Centra" software which has been developed by Open Access College, South Australia. Centra has a complete set of capabilities for live, collaborative learning in a virtual classroom setting, including full-duplex audio, multi-point video, advanced application sharing, breakout rooms, real-time feedback, online surveys and evaluations, web mustering, text chat and support for the delivery of rich multimedia content.

Using this software, Indigenous learners have the chance to benefit from effective literacy teaching, even in remote sites. It has also enabled teachers to learn at their own pace, with effective, specific and flexible delivery. Open Access College delivers its Centra services through a service agreement where the school, organization or agency need not purchase, install or support expensive hardware and server software.

The school buys named-user licences to participate, a hosting fee and a package of services. Instead of installing the software on their site, the software, updates and infrastructure are all maintained by the Open Access College. This also means rapid deployment of the solution to the client and can save on user travelling costs. The site licences are flexible and transferable, and teachers can access Centra from any computer- rather than being restricted to one.

Online content, applications and services

Key features of online content, applications and services include:

- EdNA Online
- Global Summit of Online Knowledge Networks - directions of online knowledge networks
- The Le@rning Federation – a schools online curriculum content initiative - a joint venture with Curriculum Corporation (another ministerial government agency).
- Synergies: management of knowledge networks- development of alliances

EdNA Online (Education Network Australia)

As highlighted previously, EdNA (Education Network Australia- http://www.edna.edu.au) is a highly regarded national collaborative model of networking for the Australian education and training community.

EdNA Online is the virtual network of learning environments and a gateway to educational and training resources and services. This online service, built on the principles of collaboration and distributed contribution and management of resources, is the vehicle and mechanism through which the EdNA national collaborative model operates.

Today, EdNA Online is a trusted, well-resourced information and knowledge base for educators and learners alike. Organised around Australian curriculum and competencies, it is gateway to freely available, web-based teaching and learning materials and communication tools. A key asset of EdNA Online is the national database of quality assured freely accessible education and training resources catalogued according to the EdNA Metadata Standard:

EdNA Online has over 165,000 quality evaluated resources and 323,000 and linked resources.

The unique role of EdNA Online in today's education and training information space was identified in a recent report as '… the only site (…) that has all the following features:

- targeted at users in all sectors of education and training
- publicly owned and provides its online resources free of charge
- provides a national knowledge node in an increasingly complex system of knowledge networks within a federated system
- provides both information **about** education and training (a directory function) and resources to support curriculum
- provides specific resources and tools to support and utilise the Internet in teaching and learning, while also providing resources for all subject/discipline/industry areas

- promotes collaboration and networking through its communication tools
- offers access to specialist collections and online activities through its 'related sites'
- has technical mechanisms in place for 2-way data transfer, harvesting resources from remote sites (…) and providing (…) resources to remote sites
- provides a range of tools to assist in the management and discovery of information and resources.'

McKenny, Carol 2002. EdNA Online: strategic directions for customer focused resource discovery

The History

The period of conceiving the idea for a national network of cooperation and collaboration between all education and training sectors in Australia coincided with the release of some important documents and reports. Some significant publications include the 'Creative Nation' statement, announced in 1994 by the then Prime Minister, The Hon. Paul Keating, and 'The Networked Nation', published in 1994 by the Australian Science and Technology Council.

Alongside Commonwealth Government initiatives, State-based education and training systems also made efforts to capture the new opportunities. Education and training authorities provided funding for Internet connectivity, teachers were offered professional development opportunities, and projects on exchanging and sharing of teaching and learning resources online were planned.

The Federal and State/Territories Education Departments realised that these individual initiatives and projects could be streamlined by a national collaborative network, in which stakeholders would share knowledge of common issues while pursuing solutions, avoiding duplication in effort, and thus minimising costs.

The foundations of the physical network, EdNA, were set up in 1995, by a number of national working and reference groups – the EdNA Network Business Requirements Reference Group, followed by the EdNA Reference Committee (now Australian Information and Communications Technology in Education Committee) with representatives from each education and training sector. The EdNA Task Force, established by the then Department of Education, Employment, Training and Youth Affairs (DEETYA), was responsible for managing the initiative.

Early technical architecture

EdNA Online was the first database-driven educational website in Australia, build around the concept of a browsable and searchable directory of online resources.

Details of the technical components can be found in Appendix 1.3

The challenges and the lessons

The EdNA story is a success story – not only because of the innovative ideas behind the initiative, for effectively engaging autonomous and diverse education and training systems and sectors – but also because of the dedication of all participating parties. EdNA is a success story also because of the ability of its leaders and the team members to commit themselves to the challenge facing such an ambitious initiative, to be inspired by its achievements and analyse and draw on its setbacks gained through feedback and use of the service.

The EdNA model has become synonymous with successful collaboration - both between the Australian education authorities (Commonwealth, States & Territories), and between all education sectors. It demonstrated that:

> We can achieve better online learning outcomes by working collaboratively than by working in isolation (White, G. 2002)

However, not all has been smooth sailing - some of the lessons learnt in this the process of building and maintaining EdNA Online include:

- engaging traditional education and training professionals can be challenging, as some of them argue that national collaborative initiatives compete with existing activities – there is a need for ongoing promotion and marketing of the mutual benefits and celebrating the shared achievements.

- an assumption that was made in the early days that a good service will 'sell' itself – later on, it was recognised that online communities of practice played a critical role in spreading the word about the learning and professional development advantages offered by EdNA Online's services, tools and resources.

- the quality of content input and subsequent maintenance of data which needs to be facilitated by ongoing communication with contributors and distributed administrators, to raise and sustain awareness of commonly agreed content and metadata standards.

- the maintenance of a collaborative venture of such large proportions, an agreement on technical interoperability standards must be achieved early in the process – a lesson learnt in the early stages in implementing the harvesting model for aggregating resources from stakeholders' collections.

- defining the EdNA Online audience which has been one of the most challenging aspects over the years – it is a dilemma between meeting stakeholders' obligations and responding to end-users needs, as both requirements do not always overlap. A solution to this issue can be the customisation of EdNA Online – a project currently underway.

- staying tuned to worldwide trends and developments are paramount in today's global learning environment. EdNA Online cannot afford to test creative ideas in

isolation – alliances with key bodies will ensure that we gain the position of a resourceful player in the e-learning information space and take advantage of technological innovation and knowledge creation.

The Present

The EdNA collaboration model plays a leading role in Australia's education and training as a 'think-tank' in the area of implementing ICT in education. One of the key forums for exchanging ideas and discussing trends in education and training is the annual EdNA Development Forum (EDW). This cross-sectoral forum, engaging representatives from all education and training systems in Australia, has become the driving force for investigating viable opportunities for EdNA Online. As a result of the 2002 EDW the project was brought to new heights, with the introduction of significant new features on the website and a shift from a 'retail' to a 'wholesale' operating model. Some major developments that resulted from recommendations made at the forum, included:

- facilitation and coordination of collaboration and alliances
- development of standards (information management and learning management systems)
- provision of information brokerage, of quality assured current resources/events and people contacts, to assist independent learners, workplace learners find the qualifications, course, information they need
- furtherance of the work of engaging and building online communities
- channelling the process of sharing information between States and education and training institutions.

Current technical architecture

EdNA Online is a high-end information suite of services which includes a portal/gateway for the education community. It consists of the following functional components:

- Metadata repository and information category structure
- Resource discovery (search, browse)
- Collaboration tools (feedback, forums, discussions, messaging, chat, noticeboards).
- Distributed administration, content management and publishing.
- Metadata Harvesting
- Web User Interface.

Further details regarding technical aspects of this initiative can be found in Appendix 2.

Growth and major achievements

EdNA Online has a highly praised reputation as a source of quality relevant educational resources and services. Some aspects of the growth of EdNA Online are illustrated in the following:

- 1999 - 8,000+ evaluated items (Mason, 1999)
  2003 - nearly 16,000 evaluated items – **100% growth in 4 years**
- 1999 - 235,000 linked items (Mason, 1999)
  320,000+ linked items – **36% growth in 4 years**
- 1998 - 82 discussion lists (Mason & Dellit, 1998)
  2003 – more than 500 discussion lists – **509% growth in 5 years**
- 2000 – 1.8 million hits per month
  2003 – nearly 3 million hits per month – **66% growth in 3 years.**

In addition to providing free access to an extensive quality assured database of online resources relevant to Australian education and training, the project marked some major milestones, including:

- EdNA Online is positioned as a key service point for Australian digital repositories in education and training for the purpose of sharing metadata through a wholesale model with States and Territories.

- A number of specialist collections of resources relating to National Online Initiatives have been delivered:
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  a. Technical online standards at: http://standards.edna.edu.au
  b. OzProjects for Australian school projects at: http://ozprojects.edna.edu.au
  c. ICT research at: http://ictresearch.edna.edu.au
  d. Leading practice case studies at: http://leadingpractice.edna.edu.au
  e. National software evaluation project at: http://nsep.edna.edu.au
  f. International comparison of e-learning policies at: http://ictpolicy.edna.edu.au
  g. Access to Flexible Learning Resources in the VET[4] Sector at: http://flexiblelearning.net.au/resources/index.htm

- A modern technical architecture has been established, to ensure a responsive and reliable national online service to education and training.

- EdNA Online plays a leading role in promoting interoperability standards, by organising a number of 'Metadata and Harvesting' workshops and piloting a standards-based program with the National Libraries of Australia, Australian Museums Online and Victorian Education Channel as proof of concept for resource sharing and discovery.

[4] VET is the vocational education and training sector in Australia

- EdNA Online continues to contribute to the building of national and international education and training networks through the hosting of online events for the World Congress in IT, the Global Summit of Knowledge Networks, e-Schola (collaboration with Europe), and NetDays (collaboration with Europe).

Next generation EdNA Online

The future holds exciting new opportunities, both for the EdNA collaboration and for the EdNA Online service. The focus will be on strengthening its role as Australia's national service for the education and training community, and a leader in promoting collaboration and cooperation throughout the Australian education and training sector.

Details about 'technical' infrastructure to support the next generation EdNA online can be found in Appendix 1.4 See Appendix 1.5 for new technologies re EdNA Online.

Global Summit of Online Knowledge Networks -Directions of Online Knowledge Networks

Major decisions about the future development of knowledge networks have been influenced by an international event organised by ***education.au*** in March 2002. The Global Summit of Online Knowledge Networks provided an opportunity for leaders in online education and training, from Australia and the world, to discuss the future for education and training and to address issues of common concern. Some of the recommendations made at the Summit, with a direct impact on the strategic directions for EdNA Online include:

- establish and extend online knowledge networks, by stimulating the growth of online learning communities through setting up and maintaining hubs, networks and partnerships
- redefine the role of teachers and teaching, initiate and support research, identify examples of best practice and sharing case studies
- leverage resources to enhance online knowledge networks, by identifying of common goals and associated advocacy
- demystify online education and training services, by clearly communicating its value and by fostering an appreciation of its benefits among learners, adults, teachers, trainers, principals and learning managers
- develop ICT skills for education and training personnel across geographical and organisational boundaries
- create greater public awareness of the benefits of online knowledge networks.

It became clear from the Global Summit recommendations that the future directions and development of EdNA Online must be in line with trends in the international online education and training arena, and with the emerging needs of educators and learners, who increasingly rely on online learning resources.

A detailed discussion of the outcomes of this Global Summit can be accessed at: **http://www.educationau.edu.au/research/gs_report.pdf**

The Le@rning Federation

The use of digital materials as learning resources in the school sector has been growing as teachers become more familiar with digital materials and e-learning environments. That growth recently received a boost when in January 2001 the Prime Minister announced $34.1 million over 5 years for the The Le@rning Federation as part of the *Backing Australia's Ability: Innovation Action Plan*. In July the same year all States and Territories agreed to match this amount, creating a total pool of $68.2 million to be spent over the 5 years. It would not be possible for any single Australian school system, however well resourced, to undertake this work on the scale and of the quality envisaged. This has now become possible through States and Territories pooling their resources with the Commonwealth Government.

The Le@rning Federation will create a standards-based pool of content and associated infrastructure that will ultimately provide a more efficient marketplace for the development and delivery of education content. The business models allude to flexible management and distribution of learning objects developed by various providers, including National, State and Territory, and commercial suppliers.

Importantly, there will also be articulated specifications (for pedagogy, operability between systems, information management, discovery and rights management), consistent with specifications in other sectors of Australian education. This initiative is not intended to replace teachers, the school library or student research, but will enhance elements of the learning journey.

The Exchange is a major online system development that will support the entire lifecycle for learning objects; from creation to distribution, to use and to re-use. This will include bringing content into the Exchange, processing the content through a quality assurance cycle, and then publishing the content for access by and distribution to the Education Systems. A major innovation will involve the development of Digital Rights Management systems that will enable the control and tracking of the intellectual property of the digital material through the life-cycle of the content. Through this service The Le@rning Federation will be a leader in the development of online educational materials management.

Content Development

The digital curriculum content will be based on an "learning object" model approach, which has been selected for the development of online curriculum content as it offers greater flexibility and educational opportunities to engage student learning in new ways. A Learning Object must have educational integrity and be able to stand-alone and supports diverse teaching and learning activities, rather than dictating modes of use.

Learning Objects

A Learning Object can be seen as a basic 'unit of learning', and has the purpose of assisting students to achieve specific learning outcomes. Learning Objects will consist of one or more files designed to be stand-alone, or as a component of a learning sequence that may be created during the development process or later constructed by the end user to suit their specific learning and teaching requirements.

The content will be at various levels of granularity and may have complex arrangements of usages and rights holders.The complexity of the content will develop over the life of the project as new technologies are realised. Digital rights management schemes will also be improved as new technologies are developed and implemented.

Creation

Learning Object construction is based on a user-centred approach to design and development, which is essential to meet the needs of diverse learners and learning contexts. Users will be active participants in assisting development teams with determining the treatment of content, based on the published standards and specifications.

It will be possible to develop and deliver educational objects using a variety of media and technologies. The providers of the content will design, develop and integrate these technologies to achieve the best possible educational outcomes. The Technical Specification for Content Development specifies technical requirements for content development.

Objectives

The Le@rning Federation is developing on much of the work that is currently taking place in national and international standardisation initiatives. Such work includes metadata specifications, incorporating knowledge from the IMS Global Learning Consortium (www.imsglobal.org), the Dublin Core Metadata Initiative (http://dublincore.org), and the EdNA Online Metadata Standards (www.edna.edu.au).

The Le@rning Federation are utilising a number of other specification from the IMS Global Learning Consortium, including their content packaging specification. The SCORM specifications from Advanced Distributed Learning (www.adlnet.org) also form part of the content development model. Advanced digital rights management systems will be developed using the Open Digital Rights Language (odrl.net).

The documented objectives for the developed content include educational soundness, accessibility issues, technical requirements, and management of intellectual property. These areas are addressed as follows:

Educational Soundness

Educational Soundness is based on exemplary practice in the planning, design, development and use of online curriculum content. It is the critical measure of the pedagogical quality of the Initiative's online curriculum content. The achievement of educationally sound Learning Objects will be determined through a rigorous quality assurance process. These Educational Soundness specifications are being developed collaboratively with the Initiative stakeholders.

Technical Specifications for Content Development:

This specification outlines the parameters regarding physical/technical attributes and includes information regarding the size/format of Learning Objects that can be distributed to schools. It assumes that content must be delivered to schools within a reasonable response time. This specification is cognisant of the existence of caching software in school environments. The Technical Specifications further specify software development tools and standards, content packaging, client devices, network protocols and services.

Accessibility:

This specification will guide the creation, delivery, and usage of accessible learning content for The Le@rning Federation. The specification encompasses telecommunications, online content and authoring tools, which are all defined by different statutory requirements and guidelines. In particular, the Accessibility Specification will apply to templates and content compilation software.

Within The Le@rning Federation, the creation of an alternate learning object will be required when an educational concept is unable to be represented adequately in all media modes within the same learning object, due to incompatibility with the educational goal. Alternate object manifestation will range from interactive to directive depending on the initial educational goal and the complexity of the originating concept.

Rights Management

The management of intellectual property of the digital resources over the entire lifecycle of the content will be one of the major innovations of the work undertaken by The Le@rning Federation. The Open Digital Rights Language (ODRL, http://odrl.net) has been selected as the preferred method of recording and managing the intellectual property rights of the content. The Le@rning Federation will build components to support the implementation of this language as a useful method of managing the digital rights of the objects it produces, as well as the rights of other content that may be introduced.

The Le@rning Federation is committed to flexible intellectual property licensing arrangements in order to stimulate the education multimedia development market and benefit the shareholders. The Le@rning Federation encourages the submission of innovative licensing proposals from developers that contribute to content viability and sustainability.

Delivery infrastructure

The final architectural models for the infrastructure required to deliver content to schools, teachers and students are under discussion between The Le@rning Federation Joint Venture, States and Territories, Commonwealth and non-government sectors. For the purpose of this paper the following model is used to identify software requirements.

- Learning Exchange – a repository that stores the content for distribution and management.
- Interface between the Learning Exchange and State and Territory systems to ensure the systems are compatible and content and data is exchanged.
- State and Territory infrastructure for the storage and management of content.
- School infrastructure to manage users and local storage of content.
- Computer software and set-up such as operating system, Internet browsers and plug-ins.

The Exchange is a key deliverable for The Le@rning Federation that will provide the infrastructure to procure, manage, and distribute the quality-assured content. The Exchange will not be an open public portal, but rather a repository of e-learning content that the Education Systems will be able to use. The Education Systems are responsible for providing the infrastructure to deliver content to schools, teachers, and students. The Le@rning Federation will continue to work closely with the

Education Systems to successfully implement all aspects of content delivery and use.

For The Le@rning Federation, the initial focus will be at a macro-trading level between Education Systems. There is, however, a requirement to subsequently accommodate a transaction-based trade model. This will enable the inclusion of other third party content to be traded with the Education Systems in the future. The Le@rning Federation will support a staged approach to developing and sustaining various trading business models.

The Le@rning Federation aims to streamline the negotiation and clearance of digital copyright licensing for contracted project content. A further ambition is that the digital rights management model encompasses management of other educational copyright material throughout the schools sector. The outcome will be a comprehensive and accurate recording of all licenses for content usage. Such information will enable the Le@rning Federation to be a trusted source of copyright information for the purpose of reporting and accountability.

The Exchange technology will include the capacity to support rights management throughout the distribution chain from the national pool through to systems and to schools level. All players in the chain will therefore have the "facility" to manage and track the attendant content rights. As content is passed "downstream" to other systems the IP rights will need to be honoured, managed, and tracked back to the Learning Exchange. The development of the rights management models is expected to be staged throughout the life of the project along with the various trading models.

The Le@rning Federation initiative, and its underlying component architecture, aims to both optimise production, deployment and usage of e-learning content and meet copyright and publishing responsibilities. It is envisaged that the creation of a standards-based pool of content and associated infrastructure will ultimately provide a more efficient marketplace for the development and delivery of education content to Australian schools. Further information on The Le@rning Federation can be found at www.thelearningfederation.edu.au. Suppliers wishing to participate in The Le@rning Federation projects can register on the website and receive regular updates.

SYNERGIES: Management of Knowledge networks- the development of alliances

education.au has a primary role in identifying opportunities for establishing alliances and agreements between ***education.au*** and other key organisations utilising EdNA Online's collections, experience and expertise. In addition, ***education.au*** has the responsibility of engaging stakeholders, industry, national and international agencies in collaborative activities, to derive strategic advantage by working together. Some of the alliances which ***education.au*** is managing today include: British Council, Australian Museums Online, Culture and Recreation Portal, Australian Council for Educational Research, myInternet, AEShareNet, ABC[5], TKI (NZ)[6], MERLOT (USA)[7], GEM (USA)[8], European Schoolnet and others.

[5] Australian Broadcasting Corporation
6 The Online Learning Centre, NZ
7 Multimedia Educational Resource for Learning and Online Teaching
8 The Gateway to Educational Materials

A major achievement in 2002 for ***education.au*** has been the initiation and establishment of a Global Exchange Network of ICT in Education (GENIE), involving SchoolNet Africa, Educar Argentina, ***education.au*** Australia, Nacional Red Enlaces Chile, European Schoolnet and USA Consortium for School Networking. This network will present further opportunities for ***education.au*** involvement in sharing digital resource and information about interoperability standards.

The synergies between ***education.au*** projects further enhance its role in facilitating shared use of educational materials. Synergies between web based services include:

- The Government Education Portal at: http://www.education.gov.au powered by EdNA, uses a subset of the EdNA Online collection,
- Myfuture at: http://www.myfuture.edu.au, the Australian Career Information System was based on the EdNA collaborative model and incorporates elements of the EdNA Metadata Standard
- The Le@rning Federation initiative at: http://www.tlf.edu.au, a joint venture of ***education.au*** and Curriculum Corporation, also incorporates EdNA Metadata elements for describing learning objects for the Australian digital content market.

A practical example of the synergies between the projects is the establishment of a 'technical cell' at ***education.au*** , comprising IT professionals from each team, who look at common problems and design appropriate solutions based on their shared experiences.

In all of its future endeavours, ***education.au*** will strive to meet the growing expectations of stakeholders and users alike by offering rich learning experiences and introducing innovative web based online learning tools.

Also on the agenda is further proliferation of national and international knowledge networks, aggregation and sharing of quality assured education and training resources, developing new resource discovery mechanisms and interoperability standards, and promoting research and best practice in implementing ICT in education and training.

New technologies and educational issues

The future use of technology and the internet in education is assured. Education focusses on developing knowledge and the internet is an excellent tool to engage with e-knowledge. 'Digital representations of content and context become e-knowledge through the dynamics of engagement with them', suggest Norris, Mason and Lefrere (2003) in their seminal work on e-knowledge.

New technologies and issues, related to ICT in education, that have emerged include:

- the ability of education service providers to deliver quality online services to a single screen enabling teachers to utilise online services in the simplest manner possible, in classrooms for students.

- the use of mobile devices such as mobile telephones and handheld devices. The ability to access the internet and process information on these devices is becoming increasingly common and cheap. This may mean that the future use of online services is through these devices for students becomes dominant because they are simple, cheap and easy to handle.

- the ability of internet users to access the internet in different locations seamlessly and easily. Learners can be expected, in the future, to undertake courses from multiple institutions which may be required to provide integrated internet services for learners focussed on their needs as learners.

- providing a suite of web based services. Education entered the internet age by developing directories of information and web based portals. However, today this is not enough and learners require a suite of services which include search facilities, quality online resources.

- discovery mechanisms, communication services, customised web based services such as news feeds, and the like.

- global quality information for education. Already on the internet there are many high quality information services which can be used by all levels of education. Similarly, it is reasonable to expect that there will be a small number of authoritative sources for specific types of information. For example, NASA can be seen as an authoritative source for space travel. In the future, there may emerge a small number of global sources for high quality lessons which based on different pedagogies in areas such as mathematics, science and more.

- collaboration and its attendant skills. In Australia, all States and Territories and the national government have collaborated together to develop national online web based services which have been very successful.

- broadband access to the internet. Online educational content today is being developed as small, digital, modular packages known as learning objects. Learning objects require broadband access to the internet because schools and universities have large numbers of users to use these learning objects.

- pedagogy. The use of different pedagogies is only emerging globally in educational circles today. Until now the focus in education sectors in Australia has been on the provision of computer equipment, local networks, internet access, technical support and security. The discussion has now moved to focus on online pedagogies and the most appropriate use of the internet in education in the development of e-knowledge with learners.

- repurposing content to 3rd party websites, 3G, SMS, digital TV, internet TV, broadband, and multimedia. Media companies seeking to engage in education are examining technological capacities to repurpose content for use in education over multiple devices and services.

- security. As the internet matures, security issues multiply. For example, destructive viruses, unwanted interference [hacking], spamming [unwanted email] and safe storage and retrieval of data are major issues for managers of educational online web based systems. Security is a major cost consideration.

- privacy. In Australia, privacy laws mandate the proper use of personal information gathered and stored on electronic systems. This has both a technological and management cost overhead for educational administrators.

- intellectual property. The question of ownership and royalty payments for online content is a much debated issue. In education the costs for accessing and using printed content have usually been minimal. However, a global regime has not yet resolved content ownership rights to the satisfaction of all players. On the one hand publishers well versed in ownership rights for print based information have moved to providing digital content where rights are less obvious, somewhat more complex and less well accepted universally. A useful discussion on this issue by Lawrence Lessig (2002) argues for an internet 'commons'. Intellectual property is expected to remain a vexed issue for some time which may effect and restrict educational access to high quality online content.

So: Why Australia?

Australia possesses the experience, systems, standards, educators, technology and knowledge of technology and e-learning into the future to effectively implement a comprehensive e-learning agenda. Additionally, e-learning is a sub-sector that has significant Ministerial support in Australia.

Australia's experience has been that the implementation of e-learning involves not only the implementation of innovative hardware and software, but the professional development of teachers in this digital medium and the provision of online access for students. Allied to this is the development, management and utilization of robust online curriculum.

I would like to finish this paper with a thought shared by Mr Lim Kin Chew at the Global Summit of Knowledge Networks, who said:

> 'Ultimately, … for us to reinvent the future we need to connect; we need to learn continuously and we need to collaborate globally'.

A window of opportunity to collaborate openly to benefit education and training is with us now. Our challenge is to use this opportunity to benefit education and training.

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Websites

Access to Flexible Learning Resources in the VET Sector: http://flexiblelearning.net.au/resources/index.htm

AskNow! Online answers Australia -wide http://www.asknow.gov.au/public/

Atlapedia Online http://www.atlapedia.com/online/country_index.htm

Aussie SchoolHouse http://www.ash.org.au/

Australian ICT in Education Committee (AICTEC) http://www.aictec.edu.au/

Department of Education, Science and Training http://www.dest.gov.au/

EdNA Communicator http://www.edna.edu.au/communicator/

EdNA Online http://www.edna.edu.au/

education.au http://www.educationau.edu.au/

ICT research: http://ictresearch.edna.edu.au

International comparison of e-learning policies: http://ictpolicy.edna.edu.au

Leading practice case studies: http://leadingpractice.edna.edu.au

Metadata Standard http://www.edna.edu.au/metadata/

myfuture http://www.myfuture.edu.au

National software evaluation project: http://nsep.edna.edu.au

Northern Territory Department of Education **http://www.education.nt.gov.au**
OzProjects for Australian school projects: http://ozprojects.edna.edu.au
OzProjects Learning Quest Challenge http://ozprojects.edna.edu.au/challenge/
TAFE Virtual Campus http://www.tafevc.com.au/
Technical online standards: http://standards.edna.edu.au
The Le@rning Federation http://www.thelearningfederation.edu.au/tlf/
University of Southern Queensland Online http://www.usqonline.com.au/
Wikipedia: The Free Encyclopedia http://www.wikipedia.org/wiki/Internet_troll

Appendix 1

1.1 EdNA Online- Early Technical Architecture

Some of the key technical components driving the early system were an Oracle database, a combination of the Verity Internet search engine with the Harvest freeware robot, Majordomo mailing lists which were set up to accommodate the networking needs of the EdNA stakeholders, and a Noticeboard facility based on the Network News Transport Protocol (NNTP).

The resources collection was built using manual and automated processes simultaneously, whereby web-based documents were evaluated according to collaboratively developed content criteria. A core pool of linked documents was then automatically harvested and indexed separately - the automated harvesting being one of the first of its kind at the time. The concept of metadata was adopted very early [1995] by EdNA which developed its own set of metadata elements based on the Dublin Core metadata standard. A distributed model of database administration was enabled through a system of security groups, to allow maintenance of the quality of the resources and the mailing lists by information officers who were appointed by each education and training sector.

1.2 Current Technical architecture

The metadata repository is a large collection of education and training resources maintained by human content managers and metadata harvesting. A two-way metadata exchange with external web sites is supported by:

- Harvesting (extracting metadata from external sites into EdNA)
- Reverse Harvesting (extracting metadata from EdNA for loading into external sites)

EdNA functionality is accessible by end users via browsers (retail model) and also by other web sites/portals (wholesale model) via a set of Web (XML) Services or application program interfaces (APIs).

EdNA technology can be re-used to create sibling sites and other portals. In this way it can function as a 'portal building toolbox'. EdNA tools can be used to quickly create dynamic, high-performance portals with 'out-of-the box' high-end functions such as database-driven metadata repositories, resource discovery, collaboration, template-based user interfaces, XML Web service APIs, distributed content management, publishing and metadata management.

EdNA runs on enterprise-class Solaris Servers and is driven by the open source Apache web engine, Oracle database management system, Lyris messaging engine, Verity search engine and the Tomcat Java J2EE application server.

The EdNA servers are hosted at Adelaide University in a high availability computer site with "GOLD+" level 24x7x365 service levels and high speed (100mbps)

Internet feeds via AARNET. The servers are protected by a dedicated firewall (Cisco PIX).

EdNA is a high performance, high volume website averaging more than 3 million hits per month while maintaining average search response times of less than 2 seconds and system availability of more than 99%.

Assets and services – Discover, Communicate, Collaborate

The suite of services available through EdNA Online have been developed with the aim of enhancing users' interaction with digital resources and assisting educators and learners in the delivery of and participation in online learning.

Discover

Search and browse functions

The 'standard' option offers a choice of searching for EdNA evaluated resources, EdNA collections (message archives, noticeboards, newsletters), and a pool of sites linked to the evaluated resources. Alternatively, users can search external databases such as GEM and VOCED. The 'advanced' option enables more precise filtering of resources, by specifying metadata fields to be searched.

A distributed search (Free EdNA Search) is also available for users who prefer to install the search tool (API) on their website and search for EdNA Online resources without leaving their own site –educational communities that have implemented the service include MyInternet, the ABC and a number of schools.

A customised access to the resources is available as a result of a comprehensive browse structure developed in extensive consultations with the education and training systems around Australia. In addition to sector-specific collections and defined by the corresponding browse categories, educators and learners can browse through resources in the area of international education, technical standards, current issues, reference resources and other collections.

A national database of online resources

A key asset of EdNA Online is the national database of quality-assured freely accessible education and training resources catalogued according to the EdNA Metadata Standard:

- nearly 16,000 evaluated resources
- 323, 000+ linked resources.

EdNA Metadata Standard

The Standard is based on the internationally recognised Dublin Core Metadata Element Set and is consistent with the Australian Government Locator Service (AGLS). The purpose of the EdNA Metadata Standard is to support interoperability across all sectors of education and training in Australia in the area of online resource discovery and management. In addition,

EdNA's technical architecture enables the packaging of resources into specialised collections, for example**:**

- ICT Leading Practice site http://leadingpractice.edna.edu.au/
- OzProjects http://ozprojects.edna.edu.au/
- National Software Evaluation Project http://www.edna.edu.au/sibling/nsep/.

The EdNA Online database is also the backbone of the Australian Government Education Portal http://www.education.gov.au – another government initiative managed by ***education.au*** .

Communicate

Discussion lists, online forums, chat

The suite of interactive tools fosters both asynchronous and synchronous interaction by participants, while the chat room provides a real-time virtual environment for sharing views and exchanging documents. Currently, there are over 500 mailing lists and 45 forums and chats, utilised by teachers, principals, professional associations, trainers and educational administrators.

The EdNA Online communication tools were successfully utilised during the World Congress of Information Technology Conference, held in Adelaide early in March'02, when participants had the opportunity not only to gain access to current knowledge and thinking from the experts, but also to 'have their say' and contribute to the creation of focused knowledge.

Online newsletters

The team at EdNA Online strives to keep the education and training community abreast of important developments and projects in the Australian and international education arena. Today, there are more than 12,500 first-line subscribers to the EdNA Online newsletters, some of the most popular being:

- The Networker, offering an insight into recent developments at EdNA Online
- The Communicator, providing an extensive weekly summary of key reports, news, media releases and major national and international events,
- EdNA for Schools newsletter featuring school-related resources and information
- New in Early Childhood for educators,

- VET&ACE eNews targeting readers from the Vocational education and training community, as well as members of the Adult Community Education.

In addition, educators and learners alike benefit from a range of thematic pages, and updates on new sector-specific resources.

Noticeboards

Currently, there are 14 active noticeboards on EdNA Online, featuring conferences and events in Australia and overseas, online conferences, a calendar for Australian schools, library books for schools, museums and galleries news and events, resources on appropriate and safe use of the Internet, and others. While monitoring and ongoing maintenance of the service is provided by the Information Officers, stakeholders and users of the site are welcome to submit notices for the noticeboards.

Collaborate

Webdesk and Feedback

Widely used avenues for communication with users are the Webdesk and Feedback channels. The requests are coming from across all education and training sectors, the wider audience, as well as from overseas users. The services and information sought by users range from reference-type questions, through to research-related assistance, advice on promotion of resources, direction on courses and programs, or seeking employment-related information. On average, more than 50 requests are responded to by the Information Officers per month.

Metadata tool and Harvesting tool

The tools are offered free to the education and training community, to assist in the creation of metadata compatible to the EdNA Metadata Standard and to enable successful uploading of resources from external collections to the EdNA database. Quality assurance assessment and guidance is provided throughout the process of metadata creation and harvesting.

1.4 Technical architecture – MyEdNA

Work is underway to develop a next-generation version of EdNA Online. Its major characteristics will be:

- Open Source (most of the software components will be open source)
- Linux (it will operate on Intel Linux servers)
- Distributed Resource Discovery with thesauri (a single EdNA search will be capable of simultaneously accessing the EdNA metadata repository, harvested repositories and any number of searchable external repositories). Searchers will be able to utilise thesauri to create additional search pathways based on thesaurus concepts such as “broader terms”, “narrower terms”, “related terms” etc.

- Collaboration Workspace (a new more integrated set of collaborative tools)

Customisation and personalisation (a new 'myEdNA' portal user interface that will enable users to customise and personalise their view of EdNA).