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Australian Subject Gateways, the successes and the challenges

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ABSTRACT
The paper provides an overview of subject gateway development in Australia and takes a closer look at three subject gateways coordinated by the University of Queensland: AustLit: Australian Literature Gateway; AVEL Sustainability Knowledge Network, an engineering and sustainable development gateway; and WebLaw, a gateway for legal professionals. The challenges facing subject gateways are examined, including interoperability, coordination and most significantly, sustainability. The paper concludes with the overarching questions being considered by gateway coordinators such as the place of subject gateways and their future given trends in the evolution of the web.

1.0   Introduction

Australian subject gateways provide a significant contribution to teaching, learning and research. In the online world, where overabundance of information makes access to relevant knowledge increasingly difficult, they support systematic resource discovery by the consistent application of quality measures such as high levels of resource description, usability and accessibility that comply with international standards and have been described in the literature as

> *A web-based mechanism for accessing a collection of high quality, evaluated resources identified to support research in a particular subject discipline*[1]

and further extended to define quality-controlled subject gateways as

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[1] Debbie Campbell, "Australian subject gateways: political and strategic issues," *Online Information Review* 24, no. 1 (2000).

> *…Internet Services which apply a rich set of quality measures to support systematic resource discovery…this service is based on resource description.[2]*

However, subject gateways face many challenges such as interoperability, coordination and most significantly, sustainability.

Some of the earlier gateways established in Australia in the mid-1990s, such as EdNA, have proven their longevity and remain viable today. Others have assessed their 'fit' in the global information landscape and have re-positioned themselves to meet the needs of a broader research community. The AVEL Sustainability Knowledge Network in an example of this. Others, unfortunately, have simply not been sustainable either in developing cost-effective management structures or in their ability to continue to attract researchers to their site.

In focussing on the three subject gateways coordinated by the University of Queensland – AustLit: Australian Literature Gateway; AVEL Sustainability Knowledge Network, an engineering and sustainable development gateway; and WebLaw, a gateway for legal professionals – key milestones in their development will be highlighted and the drivers for sustainability over the next five years identified.

2.0 Overview of Subject Gateways in Australia

The number of subject gateways in Australia continues to steadily grow. The Australian Subject Gateways Forum (ASGF) provides a 'meeting place' for members to discuss and develop a common approach to deploying technologies, specifications and standards.

> *The motivation for doing so is to achieve a persistent, sustainable and interoperable infrastructure[3]*

The ASGF site tracks gateway development in Australia and lists each gateway's approach to: software, metadata, interoperability, thesauri, quality assurance, usage statistics, partners, milestones and contact details.

AGRIGATE *Partners:* **University of Melbourne**; University of Adelaide; University of Queensland; CSIRO *Established:* 1998 *Contact:* Tony Arthur, University of Melbourne aja@unimelb.edu.au	**Agrigate** is an Australian information gateway for researchers of agriculture. *Metadata:* Combination of Dublin Core, AGLS, EdNA and A-Core metadata elements with agricultural metadata extensions. *Thesauri:* CABInternational Agriculture Thesaurus (UK), and the Australian extension of CABI Agterms (Kondinin Group) *Interoperability*: OAI under consideration *Usability*: Agrigate Site Evaluation and Survey
AusStage *Partners:* **Flinders University**; University of Queensland; University of NSW; University of Newcastle; University of New England; La Trobe University; University of W.A.;	**AusStage** provides an index to performing arts events in Australia since the beginning of 2001. Its indexing is limited to live performances of events with a dramatic content, such as plays, music theatre and dance. *Metadata:* Dublin Core *Thesauri:* Custom Thesauri

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[2] Traugott Koch, "Quality-controlled subject gateways: definitions, typologies, empirical overview," *Online Information Review* 24, no. 1 (2000).

[3] National Library of Australia, *Technical Considerations of the ASGF: Technologies, Specifications & Standards* (2003 [Accessed 13 July]); available from http://www.nla.gov.au/initiatives/sg/standards.html.

Australia Council of the Arts; Playbox Theatre Co.; Performing Arts Special Interest Group; Museum Australia *Established:* 1998 *Contact:* Tony Arthur, University of Melbourne aja@unimelb.edu.au	
 Partners: **University of NSW @ ADFA**; University of Queensland; Monash University; Flinders University; University of W.A.; Deakin University; University of Sydney; University of Canberra, National Library of Australia *Established:* 2001 *Contact:* Kerry Kilner, University of Queensland, k.kilner@mailbox.uq.edu.au	**AustLit** provides access to bibliographical records on almost 400,000 Australian creative and critical works in both print and electronic formats, and to biographical and organisational information on more than 67,000 Australian authors and literary organisations. *Metadata:* FRBR structure with mappings to XML, plain text, tagged text which can be mapped to MARC and DC. *Thesauri:* Custom thesaurus of 5000 terms *Interoperability*: Can interoperate through the XML data. *Usability*: Small usability studies
 Partners: **University of Melbourne**; Australian National university; University of Wollongong; Monash University; Australian Science and Heritage Centre *Established:* 2002 *Contact:* Jane Ellen, University of Melbourne Archives, janee@unimelb.edu.au	**Australian Trade Union Archives** is a gateway for researchers and scholars of labour history, designed to link together historical detail, archival resources, published material and current information about Australian industrial organisations. *Metadata:* ISAD(G) - for the archival/resource descriptions; ISAAR(CPF) - for the biographical/corporate body descriptions; DC used to capture online published resources *Thesauri:* Under development
 Partners: **University of Queensland**; Queensland University of Technology; University of NSW; University of Melbourne; Monash University; Institution of Engineers, Australia; Distributed Systems Technology Centre; Cooperative Research Centre for Mining Technology and Equipment *Established:* 1999 – AVEL Australasian Virtual Engineering Library; 2002 redesigned as AVEL Sustainability Knowledge Network *Contact:* Nicole Clark, University of Queensland, n.clark@library.uq.edu.au	**AVEL Sustainability Knowledge Network** is a portal and brokerage service for engineers, other professionals and researchers concerned with sustainable systems. It is also a resource for students in senior secondary and tertiary education. *Metadata:* Dublin Core and A-Core, supplemented by some AGLS and EdNA elements *Thesauri:* Amalgamation of the EI thesaurus for engineering and the ACM thesaurus for computer science and IT *Interoperability*: *Z39.50:* search target for the Resource Discovery Pilot *Usability*: User-Centred Evaluation and Design: a Subject Gateway Perspective; AVEL: Australasian Virtual Engineering Library - Dynamic Webspace for Engineering and IT Professionals; AVEL Online Customer Survey Results; AVEL Scenario-based Survey

 Partners: EdNA Online has alliances with other education and training organisations. More information at: http://www.edna.edu.au/alliances/alliances.html. *Established:* 1996 *Contact:* Jane Ellen, University of Melbourne Archives, janee@unimelb.edu.au	**EdNA Online** is a network of and for the Australian education and training community (government and non-government schooling systems, vocational education and training, adult community education and higher education). *Metadata:* EdNA Metadata Standard V1.1. This is based on Dublin Core and is interoperable with AGLS. *Thesauri:* Multiple Thesauri – SCIS, ScOT, VOCED, ATED, TAGS and AGIFT *Interoperability*: *OAI:* have trialled exchange using OAI version 1 and hope to do the same with version 2 in 2003. *Usability*: Usability testing to be undertaken as part of the testing plan for the new prototype
 Partners: NSW Attorney General's Dept.; NSW Legal Aid Commission; Law Society of NSW; and others listed on website. *Established:* 2002 *Contact:* Jane Pritchard, jane_Pritchard@agd.nsw.au	**LawAccess NSW** enables the general public to easily access quality plain language legal resources and services that provide legal assistance. *Metadata:* AGLS with legal sector specific schemes *Thesauri:* LIAC subject headings
 Partners: 21 partners including The **University of Queensland;** for other see website http://seblaw.edu.au/weblaw/info_weblaw.phtml# Subjects *Established:* 2002 *Contact:* Barbara Thorsen, University of Queensland, b.thorsen@library.uq.edu.au	**WebLaw** is a co-operative subject index to internet resources for Australian legal researchers including lawyers, students, researchers and lay professionals. Participating organisations take responsibility for a subject area/s, and provide annotated links to quality assessed resources in this area. *Metadata:* Dublin Core with some WebLaw-specific elements *Thesauri:* WebLaw Thesaurus *Interoperability*: Dublin Core with some WebLaw-specific elements *Usability*: Formal usability studies planned

3.0 Management of Subject Gateways – University of Queensland Library's Experiences

3.1 AustLit: Australian Literature Gateway (http://austlit.edu.au)

AustLit is the premiere resource discovery service for Australian literature. It provides access to biographical, bibliographical, textual and manuscript information to support research and learning in Australian literature. This unique information infrastructure was built, and is maintained, through the collaboration of eight universities and the National Library of Australia. At the inception of this project, one of the gateway's key initiatives was the development of a management architecture that would formalise collaboration; define institutional areas of responsibility for content; establish quality

standards; aim for excellence and innovation in the constituent areas of endeavour and in efficient use of shared resources; and to act as a best practice model for similar subject-based gateways for Australian content.

Achievements include:
- An innovative data model and design based on the FRBR data model and strongly influenced by the work of the ABC Harmony, INDECS and Topic Map groups. AustLit's implementation of the International Federation of Library Associations' *Functional Requirements for Bibliographic Records (FRBR)* model[4].
- The merging, standardisation and enhancement of 12 specialist research databases to provide a single point of access to more than 370,000 works of creative and critical literature.
- The ability to search information across the whole gateway or limit to specialist datasets, including drama, multicultural writers, children's literature, indigenous and regional writers, and literary responses to "Asia".
- Interoperability with a range of important information sources, including monograph and serials holdings information from the National Bibliographic Database (Kinetica), archival collection holdings and content from the Register of Australian Archives and Manuscripts and the Guide to Australian Literary Manuscripts, and pictorial images from Picture Australia.
- A cross-institutional editorial board that guides future development and research.

To sustain growth over the next five years, AustLit's management structure and business model will need to be refined. It is anticipated that the sources of funding will change. AustLit is a not-for-profit resource discovery product that receives substantial cash and in-kind contributions from partner institutions. It is reliant upon subscription income to maintain currency. To achieve the aim of providing comprehensive coverage of Australian literature from 1780 onwards, the gateway needs both an ongoing commitment from partner institutions and a strong subscription base. Further funds are required for the completion of retrospective entries. Cultural heritage issues are involved and all sectors, including public and school libraries, university libraries, state libraries and the National Library must recognise the imperative of continued support.

3.2 AVEL Sustainability Knowledge Network (http://avel.edu.au)
The Australasian Virtual Engineering Library (AVEL) was established in 1999. It reflects developments with EEVL[5] and was one of the first subject gateways established in Australia. It has contributed significantly to the development of best practice standards for Australian Subject Gateways. Initially created to support the information needs of engineering and information technology students and researchers and like many Australian gateways funded from a government gran, Research Infrastructure Equipment and Facilities (RIEF) grant from the Department of Education, Training and Youth Affairs, it has continued with support from the partner institutions..

In August 2002, AVEL re-focussed its content, redesigned the user interface and strategically re-aligned itself to move towards incorporating sustainability principles into mainstream engineering practice. This was a logical step as the engineering profession is increasingly recognising that sustainable development and sustainability issues are central to professional practice. The new site is known as the AVEL Sustainability Knowledge Network (AVEL SKN).

One of the key success factors for AVEL has been the ability to identify, adapt to, and fulfil the information needs of the user community. Gateways that fail to respond to changing customer expectations have been described as "mortal portals" because of their curtailed life expectancy.

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[4] Marie-Louise Ayres, Kerry Kilner, Kent Fitch, Annette Scarvell, "Report on the successful AustLit: Australian Literature Gateway implementation of the FRBR and INDECS event models, and implications for other FRBR implementations" (paper presented at the 68th IFLA General Conference and Council. Libraries for Life: Democracy, Diversity, Delivery, Glasgow, Scotland, August 18th - 24th 2002).
[5] *EEVL: The Internet Guide to Engineering, Mathematics, and Computing* (2003 [Accessed 12 July]); available from http://www.eevl.ac.uk.

Other achievements include:

- Encouragement for users to provide input and define the evolution of AVEL, with decisions concerning the choice of thesaurus, metadata schema, interface, keyword searching and the resource selection policy being made through input from both engineers and librarians.
- Crucial support from the Institution of Engineers, Australia (IEAust) and the Australian Council of Engineering Deans (ACED
- Extensive usability testing involving focus groups, surveys, heuristic analysis and scenario-based testing.
- Major redesigns of the web interface to meet client needs, with significant enhancements made to search and browse functionality. An iterative approach has also been taken to service delivery.

AVEL will continue to develop and redefine itself over the next five years. In the second phase of the website, realignment metadata harvesting will be trialled. The user will be given the option of choosing only human evaluated records or automatically harvested records. Opportunities to partner with interested government and tertiary groups, in order to offer more full-text content, will be explored and consolidated. Some opportunities exist to exchange data with other relevant gateways and these will be investigated. AVEL SKN is also the inaugural member of the proposed Virtual Engineering Library for Sustainable Development (VELSD) Network. This is a joint project between the World Federation of Engineering Organisations (WFEO) and the United Nations Educational, Scientific and Cultural Organisations (UNESCO). AVEL's role will be to develop and host a prototype site that can be used as a template by other network partners.

Financial sustainability remains an issue for AVEL, as it does for most Australian gateways. The AVEL Business Plan for 2003 – 2005 identifies several strategies for securing adequate operating funds. These include: applying for small and medium federal funding, raising revenue via a tiered membership scheme and the generation and capture of new content from partners as in-kind contributions.

3.3 WebLaw: a gateway for legal professionals (http://weblaw.edu.au/)

WebLaw is a cooperative gateway to quality-assessed legal resources freely available on the Internet. The aim of WebLaw is to provide efficient access to these resources for legal researchers, students, legal practitioners and anyone with an interest in a particular area of the law. It is a unique national collaborative project currently involving 21 institutions, including academic libraries, the National Library of Australia, Commonwealth Parliamentary Library, the Law and Justice Foundation of New South Wales, National Native Title Tribunal and the Federal Court of Australia.

While 'WebLaw the gateway' is relatively new, having only gone live in September 2002 and formally launched in July 2003, WebLaw began as a cooperative legal resource several years ago. It began as a collection of web subject guides to the law created and maintained by different organisations and hosted on servers around the country. As a ground-up initiative that developed in response to a need, it was very successful. However, it did have its limitations, including lack of searchability across the various subjects. Some of the limitations could be overcome by locating all the resources on a single database.

Once the possibility of a gateway based on a central database model became a reality (thanks to a Research Infrastructure Equipment and Facilities Grant from the Australian Research Council and substantial contributions from the collaborating organisations, both financial and in kind) it was decided to strengthen and base its continued development on lead contribution by individual partners.

Achievements include:

- Contribution of 2,000 records by partner institutions spanning 28 subject guides
- 250,000 requests for information in 2003 from over 70 countries.

- A central database, located at the University of Queensland Library, accessible to all contributors through a remote login. An easy to use web form allows the addition and maintenance of records from computers that can be located anywhere in the world.
- A custom-designed link checker that runs daily alerting contributors to any broken links and facilitating simple updating.
- Peer assessment of listings by an academic/subject expert.
- Browsing by subject area or specific searching using key words or phrases, or through the online thesaurus of set subject terms.

The current model of WebLaw is likely to remain largely unchanged over the next five years. It works particularly well in terms of thorough and up-to-date subject coverage for those subject areas that are included. Each partner is committed to maintaining its subject specialties, and the centralised, collaborative nature of the database results in less effort for each individual institution than the maintenance of a variety of subject areas. Once the gateway is fully established, this model should be self-sustaining. Growth will be achieved either by current partners taking on additional subject responsibilities, or by enlisting more partners. Potential contributors could include any organisation with sufficient infrastructure and expertise to develop a quality subject guide.

4.0   Challenges Ahead

4.1   Interoperability

The issue of interoperability among gateways, with diverse subject areas, data types, metadata standards, technical formats and business strategies, is one of the major challenges in providing a one-stop, coherent service to users, and quite simply, in order to survive in the world where the nearest supplier is only a search engine query away. *Googleisation* has revolutionised resource discovery. Today's users expect seamless access to information and simple information retrieval. In the age of globalisation, government deregulation and the blurring of boundaries, apart from meeting the needs of inter-disciplinary researchers, the gateways will have to consider the demands of researchers who have wide geographical or even linguistic needs. At the same time, it is generally recognised that a complex, multi-level model of collaboration, including a plethora of technical, content and organisational areas in which agreements must be achieved, is required in order for any kind of interoperability to take place.

4.2   XML and Open Archive Initiatives

Extensible Markup Language (XML) refers to a set of simple, very flexible standards derived from SGML (the Standard Generalised Markup Language - ISO 8879). This 1986 ISO standard was itself based on document-structuring technologies developed at IBM in the early 1970s. XML is a mature approach to the problem of structuring documents in ways computers can be made to understand. XML is an open standard developed under the auspices of the World Wide Web Consortium (W3C). The W3C was created in 1994 to develop common protocols that promote the evolution of the web and ensure its interoperability.

XML is not so much a data format or 'language' as a set of universal rules for describing text and documents. It provides a standard syntax for identifying parts of a document known as elements, and then a standard way (known as a schema) for describing the rules for how those elements can be linked together in a document. The elements are separated from each other by start and end tags. Each element can also have attributes associated with it that provide further context to the element's enclosed data. Software applications can be developed to parse (or read) the XML text – identifying and intelligently using the data elements it contains. Many recent browsers, such as the latest versions of Microsoft Internet Explorer and Netscape Navigator, can read and display XML documents.

XML can be used to make text 'self-describing' and facilitate information exchange – particularly between machines. It can also provide the 'container' used to create a language like HTML. In the context of subject gateways and archives, XML can have many uses. Metadata about digital objects

can be stored and exchanged using XML. The Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) uses XML as its information exchange medium. Even the digital objects themselves (using a suitable binary-to-text encoding method) can be stored and exchanged in XML – with metadata attached.   XML provides a non-proprietary, widely accepted and fully documented way of structuring documents that is supported by many different open software applications.

4.3   Coordination and cooperation

At the broadest possible level the successful coordination of Australian subject gateways will achieve a considerable improvement on at least three levels: improved resource discovery, improved resource understanding and improved resource delivery to users. However, while the Australian Subject Gateways Forum provides considerable assistance by publishing and recommending guidelines, specifications and standards in a number of areas, thus minimising duplication of effort and infrastructure, there is no coordinating agency overseeing digital repositories and their efforts at integrating information resources for the improved efficiency of information access in Australia. At the local gateway level, the coordination is generally very effective. Each gateway aims to implement an approach that will aid the development of interoperable infrastructure. The partner institutions have managed to build on the long history of successful collaboration in projects such as the National Bibliographic Database (NBD, in order to achieve in some cases unprecedented levels of cooperation. The NBD in its electronic form has existed since 1981 and records the collections of over 850 Australian libraries.[6] In the light of the current economic climate where institutions, particularly educational institutions, are forced to compete rather than collaborate, it is an accomplishment of a very high order indeed.

4.4   Sustainability

Most Australian gateways were funded as part of short-term research and development projects, generally one-off Australian Research Council grants. Some have received in-cash and in-kind contributions from their partner institutions. The vast majority are mounted on University-based Web systems and rely heavily on the continued support of the hosting institutions. However, most gateways do not receive ongoing funding and must consider long-term sustainability. Apart from securing adequate funding, of particular concern are the issues of enduring support of partner institutions, a strong user or subscriber base, efficient management of the gateways and effective business planning.

5.0   Conclusion

Much has been achieved in subject gateway development in Australia since the mid-1990s. While some gateways have remained viable for several years, others have not been as successful in developing cost-effective management structures, maintaining currency, or in their ability to continue to attract researchers to their site.

The owners and providers of the Australian gateways have proven themselves a knowledgeable and vigorous group who are extremely willing to cooperate and collaborate at the national and international levels. That, and their willingness to maintain internationally recognised standards and specifications will stand them in good stead in any future developments.

As the web evolves, so will user requirements and necessarily the services offered by subject gateways. The future might involve a number of developments that are currently under consideration. The ability to search across the various gateways, subject disciplines, formats, and encompassing other services nationally, and eventually internationally, is very much on the agenda. The availability of funding to develop best practice models for resource discovery, particularly in the Australian context, will determine the future of subject gateways and their ability to satisfy the needs of today's, and tomorrow's information seekers.

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[6] National Library of Australia, *The National Bibliographic Database* (2002 [Accessed July 12]); available from http://www.nla.gov.au/libraries/resource/nbd.html.

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