# MusicAustralia:
# Building on National Infrastructure

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***Abstract:***

*MusicAustralia is a portal for anyone interested in Australian music. A joint development of the National Library of Australia and ScreenSound Australia, National Screen and Sound Archive, it provides users with access to a federated resource discovery service for Australian music in notated and audio representations and in digital and non-digital formats, and a directory service providing information on people, organisations and services associated with Australian music. This paper outlines the reasons for placing the National Bibliographic Database at the heart of MusicAustralia federation activity and the infrastructure elements and business processes developed to support this architecture.*

# MusicAustralia: The Vision

The MusicAustralia service[1] is a portal for anyone interested in Australian music. A joint development of the National Library of Australia and ScreenSound Australia, National Screen and Sound Archive, MusicAustralia will make the music and music-related materials of the National Library of Australia, ScreenSound Australia and other contributors accessible to the widest possible range of users via a single web interface.

These materials include printed scores, sound recordings, manuscripts, text, images, moving images, and web sites. Some of these materials are born digital or represented online by digital surrogates. However, as the Australian digital music collection is in its infancy[2], only a portion of the materials discoverable through MusicAustralia will be or will become available online in the next few years. MusicAustralia therefore aims to provide seamless access to online music materials from multiple collections, and to descriptive records and links to document delivery services for physical format materials discovered through the service.

The first version of the production service will be released in early 2004, with further service developments continuing post release. This paper outlines MusicAustralia's service model, the reasons for placing the National Bibliographic Database ("NBD") at the heart of the model, and the infrastructure elements and business processes developed to support this architecture. The paper reports on the challenges encountered, and the implications for both MusicAustralia and future discovery services.

# Federated Services: Implemented Models

The National Library of Australia has developed considerable expertise in building federated services and portals over the last several years. The Library has not taken a 'one size fits all' approach to federated services, with the model for each service developed according to user needs, service intentions, material type, and the availability and nature of appropriate metadata.

The NBD itself is a federated service, used by more than 1100 Australian libraries, with the majority of those libraries contributing records on a regular basis. The NBD's parent service, Kinetica[3], provides single point access to those records, in addition to a range of other union catalogues. The NBD currently includes more than 14 million bibliographic and 36 million holdings records, with more than 340 000 of those holdings available online. Direct end user access to the database suite is growing, with postgraduate researchers and academics increasingly searching Kinetica without mediation. However, for the foreseeable future, Kinetica will be mainly a service for libraries, librarians and advanced researchers, rather than one freely available to the general public.

PictureAustralia[4] – perhaps the best known of the fully 'public' federated services, and certainly the largest – provides single point access to more than 600 000 online images of Australian cultural life held, managed and delivered by nearly 30 contributing organisations. Users 'discover' the images through the PictureAustralia service, but 'use' the discovered images via the contributing organisation's own website and delivery system. PictureAustralia adds value to organisational collections by exposing images to a wider audience, and by allowing users to view images in new contexts through co-location of images from multiple

collections. It does not, however, directly add value by enhancing metadata or by providing links between the images provided and other contextual information.

Aggregation of descriptive metadata for PictureAustralia is highly automated. Most contributors embed descriptive metadata from their local collection management systems in either static or dynamically generated web pages for harvesting or make metadata available for harvesting via a local OAI (Open Archives Initiative[5]) repository. OAI harvesting means that the Library can retrieve new and updated records only, rather than all records – resulting in increased efficiency and a significant reduction in harvesting and processing time.

While highly automated, the harvested metadata is collected *separately* from each institution, which must map and convert its own metadata schema to the simple Dublin Core[6] schema deployed in PictureAustralia. This architecture suits the Australian pictorial 'scene', in which a variety of descriptive record formats are deployed to describe image collections, with MARC[7] metadata used by only a few institutions. With such a variety of schemas – many supporting only very minimal descriptive metadata – the PictureAustralia approach is a pragmatic and highly effective solution to the need to provide users with access to the national digital pictorial collection, despite major differences in sectoral or institutional metadata standards.

The Library's smaller resource discovery services employ different models according to their needs. The Register of Australian Archives and Manuscripts ("RAAM")[8] provides users with single point access to archival collection descriptions, rather than to digital content per se, with only a few institutions able to publish their finding aids online, and even fewer providing online access to any archival collection items. RAAM extracts collection level records from the NBD and supports online inclusion of collection records by smaller contributors. RAAM staff undertake limited scope and quality review of the records extracted or contributed, but do not enhance the metadata in any significant way. RAAM does not currently allow users to simultaneously search the contents of encoded finding aids from multiple collections - only the contents of the upper level collection level descriptions. However, with an increasing number of organisations creating or converting their finding aids to the EAD[9] (Encoded Archival Description) format, such a development is likely in the future.

By contrast, contributors to PADI[10] (Preserving Access to Digital Collection), and to Australia Dancing[11] directly create metadata about resources of interest to their user communities. PADI is a 'traditional' subject gateway, describing online resources only. Australia Dancing is a hybrid service, using Dublin Core based metadata to describe a range of dance resources, some of which are available online, and some of which are not. Australia Dancing also directly creates metadata about Australian dancers, choreographers and dance companies, employing a local 'party' (persons and organisations) schema. Australia Dancing thus incorporates a biographical/organisational history directory in addition to its resource descriptions.

MusicAustralia incorporates elements of these previously implemented federated service models – and adds new service elements that have not been tested in the Australian context, and are indeed in their infancy anywhere in the world.

The MusicAustralia resource repository is most like PictureAustralia in its functionality and potential size. Unlike PictureAustralia, however, and like Australia Dancing, MusicAustralia

will present resource descriptions for physical format and online resources. MusicAustralia aims to enhance resource metadata, primarily by exposing relationships between music items, including the entity relationships described in IFLA's Functional Requirements for Bibliographic Records[12] (FRBR) information model, and other 'horizontal' relationships between music items.

MusicAustralia is also like Australia Dancing and other Australian services such as AustLit: Australian Literature Gateway[13], Bright Sparcs[14], and the Australian Sound Design Project[15],[16] in its coverage of both resources and parties. However, unlike all these services incorporating 'party' description, the MusicAustralia party database will include party records harvested from other services storing party information in databases or XML repositories, in addition to party information created specifically by MusicAustralia contributors.

MusicAustralia also aims to move towards a 'participative' model, in which users do not merely find and use resource and party descriptions and associated online content, but can contribute their own knowledge about the resources, people or organisations described in the service. In time, users may be able to participate in advanced music information retrieval and analysis services associated with digital music collections – but this is still some way off and will require considerable investment at the national level[17].

# MusicAustralia: Architecture Decisions

## Resource Metadata

MusicAustralia has adopted a service architecture that has the National Bibliographic Database (NBD) at the heart of resource metadata aggregation, re-purposing and manipulation activities.

One of the lessons of MusicAustralia's 2002 pilot - which tested the requirements for a federated resource discovery service for music materials in multiple formats and was based firmly on the PictureAustralia model – was that the music materials metadata 'landscape' is very different to that pertaining to pictorial images. It is certainly the case that Australian music materials are described and managed by different sectors, using different metadata schemas and standards. Within the Library sector, however, most music materials are catalogued to Anglo-American Cataloguing Rules ("AACR") and in MARC. In mid 2003, the NBD included holdings records for more than 55 000 Australian printed music items, almost 30 000 Australian music sound recordings, and several hundred Australian manuscript music items. During 2003/2003, music was the fastest growing subject area covered by the NBD.

However, significant portions of the Australian music corpus, especially commercially recorded music, were not represented in the NBD. These include the substantial holdings of ScreenSound Australia (the national collection agency for recorded Australian music, which is also collected by State, tertiary and public libraries), the Australian Music Centre (the premier representative and collecting body for contemporary Australian classical music) the National Archives of Australia (which holds large legacy copyright collections of printed and recorded music), the Australian Broadcasting Corporation ("ABC"), and other significant music collection agencies that use cataloguing standards other than MARC and are not

traditional contributors to the NBD. Many of these organisations create rich and detailed records to describe their music holdings. ScreenSound Australia's MAVIS[18] system, for instance, supports inclusion of both descriptive and collection management data.

While the 'traditional' business of the NBD has been to aggregate MARC bibliographic and holdings records from its 1100 Library sector contributors, this business model has been changing in recent years. A primary driver for this change is the need to collect and manage Australian Government Locator Service (AGLS)[19] metadata describing government publications published online – publications that in their previous print manifestations were managed and described for long term access by the National Library. As more of Australia's documentary heritage is published online, the need to re-think ways of acquiring and managing both descriptive metadata and digital content itself will drive further changes to the traditional business of both collecting institutions and the NBD. For example, as the quantum of Australian music 'born digital' (in both score and audio formats) increases, further portions of the Australian music corpus may be uncollected by major cultural institutions, or unrepresented in national description and discovery infrastructure, unless new content and record collection paradigms are in place.

With these larger needs firmly in mind – and with the twin realities of the generally rich records used to describe Australian music materials regardless of sector, and of a large portion of those rich records already existing in the NBD – it became clear that placing the NBD at the centre of resource metadata aggregation had many merits.

## Party Metadata

MusicAustralia will also aggregate metadata about people and organisations for single point access to this scattered biographical and organisational information. Unlike aggregation of resource metadata (which has been a reality in Australia since the implementation of the Australian Bibliographic Network more than twenty years ago, rather than invented with the recent advent of single service access to digital content), automated aggregation of party metadata is new for the cultural sector. Until quite recently, structured metadata about people and organisations has been rare and/or limited in the cultural sector. The NBD Name Authority File, of course, represents considerable investment in structuring and sharing such metadata. But the information stored in name authority files is relatively limited, and falls a long way short of the richer information about people and organisations required by researchers and other users.

New service needs mean that users want to find authoritative data which includes a variety of descriptors – not just preferred and non-preferred names, dates and brief notes. Users want to know where and when people were born and died, or where and when organisations were in existence. They want to discover gender, cultural heritage, occupations and affiliations with other people or organisations. They want to find authoritative biographical entries, pictures and websites associated with people they are interested in. They want to know what services an organisation offers and how they can interact with that organisation. An increasing number of online services now offer such structured party metadata.

Unfortunately, the NBD Name Authority File cannot sit as firmly at the heart of MusicAustralia party metadata aggregation as does the NBD for resource metadata. Ideally, any contributions of or enhancements to party metadata in the MusicAustralia party database would flow through to, or be shared with, the NBD Authority File. This will not be possible

for the near future, as the NBD does not currently support batch loading, or match and merging of party data. While this may be a longer-term aim, for now aggregation and enhancement of party metadata will occur in the MusicAustralia database only.

## Other Metadata

These two main MusicAustralia components will be supplemented by other pages enabling discovery, location and access to information about music in Australia, through links to other relevant sites and services. Many Australian and international music sites containing items of interest to MusicAustralia are not database-driven, and are therefore not amenable to automated data harvesting and sharing activities. In the future, MusicAustralia may be able to offer specific search engine access to the contents of these sites.

The project team also aims to support the addition of user 'annotations' on individual music items, or on relationships between items, so that user knowledge can be browsed, along with the descriptive metadata created by professionals. The team is currently investigating ways of implementing this functionality[20], and mechanisms allowing content managers to determine any action arising from such annotations, including linking records to formally 'code' relationships between items.

# How it works

In early 2003 the National Library approved the development of the Harvester project to support a generic update framework for repositories of data gathered from various sources. Harvester components to support contribution of 'batch' data will be implemented by the end of October 2003, with services to support online data contribution due for completion in early 2004.

The Harvester batch system will use OAI or FTP to gather non-MARC data in standard formats and convert it for input to the NBD or another 'downstream' repository.

The combination of the Harvester and MusicAustralia service models means that contributors will contribute metadata to MusicAustralia by one or more of the following methods.

## Contributors of MARC records to the NBD

Current MARC record contributors to the NBD can continue to add their music records to Kinetica by using the Kinetica cataloguing client or by using Kinetica Batch*link from their local Marc system.

In both cases, MARC records will be extracted from the NBD for the MusicAustralia database. This means that while contributors of MARC records will need to create and/or manage and deliver any digital music content (non-trivial tasks by any estimation), they will not need to establish additional methods of presenting their data for inclusion in the MusicAustralia service. Of course, current MARC contributors can choose to add their music records by files in standard formats other than MARC via the Harvester, if this suits their business needs.

## Contributors of non-MARC resource records and party records

Contributors of non-MARC records will present records extracted from their collection management system to the Harvester.

The Harvester must perform the following processing stages:

1. **Harvest the data.** In most cases, contributors will have established an organisational OAI repository and present their records for OAI harvesting. In some cases, contributors will choose to FTP their records to the Harvester. The great advantage of the OAI method for the National Library is that only new and/or updated records are presented, significantly reducing processing loads. The OAI method also represents a significant advantage for contributors: setting up an OAI repository and presenting data in a variety of formats maximises opportunities for contributing to other national and international aggregator services.

2. **Format/analyse the data.** In most cases, data will be presented in the Metadata Object Description Schema[21] (MODS), which the National Library has adopted as its exchange XML schema for Harvester purposes. MODS was developed and is supported by the Library of Congress: it is much richer than Dublin Core and much simpler than MARC, and was developed with digital objects firmly in mind. The Library of Congress offers a number of stylesheet tools for converting data between Dublin Core, MODS and MARC.

   The MODS Schema meets all identified MusicAustralia resource metadata needs, and offers significant advantages over Dublin Core, especially in its capacity to represent 'constituent parts'. In some cases, however, data may be harvested in Dublin Core or institution-specific formats. The Harvester must therefore 'recognise' and invoke any contribution-based rules, including rules specifying automated conversion from one of these formats to MODS. It must also know where to 'find' the data, when the last harvest was, and store associated contributor information (whom to contact if something goes wrong, whom to pass error reports back to etc).

3. **Submit the data for further processing.** The Harvester must be able to submit data to any specified downstream system, and to separate new, updated and deleted records into different processing streams.

   In the case of MusicAustralia resource records, new, updated and deleted resource records (received as MODS) need to be converted to MARC and sent to the NBD. This involves three steps:
   a. Use an XSLT[22] stylesheet (provided by Library of Congress but amended to meet local conditions) to convert the MODS data to the MARCXML[23] schema;
   b. Use a MARCXML to MARC converter (provided by the Library of Congress but amended to overcome some difficulties with character encoding schemes) to convert the MARCXML data to the MARC binary format; and

c. Pass the MARC data via FTP to the Batch*link service, which undertakes additional match and merge and Amicus-specific data processing actions before loading the data into the NBD.

Of course, error and other information needs to be passed back through these processes, and sent to data managers at contributing organisations.

In the case of MusicAustralia party records, new, updated and deleted party records will be received by the Harvester (already converted via stylesheet processes to the MusicAustralia party schema) and passed directly to the MusicAustralia party database, which must directly manage functions such as match, merge and error identification. It is possible that a more generalised, intermediate party database may be developed in the future, or that batch updating of the NBD name authorities will be supported. In these cases, the data path would be more like that described for resources: more complex, but also offering additional data re-purposing opportunities.

The processes described above relate to 'batch' contribution of data via the Harvester. The online update and review component of the Harvester will allow data to be input or edited via a web form, reviewed by repository administrators (or not, depending on business needs) and approved for passing to the NBD or other 'downstream' repository. The Library hopes to develop a generic suite of Update and Review tools that can be used for a variety of individual services, rather than building new online tools for each specialist service.

It should be noted that the decision to pass resource data through the NBD does not impose any additional requirements on non-MARC MusicAustralia contributors beyond those imposed by a non-NBD centred architecture. To contribute to MusicAustralia (or indeed, any federated service), contributors must be able to extract data from their own collection management systems, convert that data to an agreed exchange format (in this case, MODS) and present the data for harvesting. Each MusicAustralia contributor is free to make its own decisions about what and how much of its data it wishes to expose. This includes the freedom to decide to expose all Australian music records, or only those that are associated with digital content.

## Case Study: the Australian Music Centre

The Australian Music Centre ("AMC")[24] was chosen as the first test case for this approach. The AMC collection database includes approximately 20 000 records describing items of interest to MusicAustralia: scores, sound recordings, text and images. The Australian Music Centre receives many of its scores in digital formats (typically as Finale or Sibelius files[25]). While it currently scans these scores to PDF and hopes to make these PDF surrogates available online, the Centre is also moving forward with plans to retain the original digital scores and publish web accessible derivatives online.

While the AMC is one of Australia's most important Australian music libraries, its records have not hitherto been included in the NBD. The AMC is a very small organisation, with limited funding, and has used an AdLib database for its collection management for many years. While the AMC employs AACR, its records are not in MARC format, and it has not previously had a way of contributing its records to the NBD. This is a disadvantage not only for the AMC (which has long wished to share its data in a national environment), but also for

those Libraries which must create original catalogue records for AMC distributed materials already catalogued in AdLib by AMC librarians.

The AMC data therefore represents a rich dataset important not only to the MusicAustralia service, but also to the NBD and its users.

The following steps were undertaken in this test case:

1. The entire AMC dataset was extracted from the AdLib database using an SQL query. It was zipped and sent to the National Library of Australia.

2. An OAI repository for this data was established on a server at the National Library using open source tools.

3. The data was converted to a 'raw' XML format (AMC_raw).

4. A set of mapping rules was developed to convert the AMC_raw data to both the Dublin Core (Library Applications Profile) and MODS schemas. Expected mappings to MARC were also developed.

5. An XSLT stylesheet was developed to implement the mapping rules for conversion to Dublin Core and MODS.

6. The resulting MODS data was converted to MARCXML using a Library of Congress provided XSLT stylesheet.

7. The resulting MARCXML data was converted to MARC using a Library of Congress tool.

8. The resulting MARC records were loaded to the NBD via Batch*link.

Of course, this was not a simple 'Step 1 to Step 8' process. The Library had no expertise with the MODS Schema at the commencement of this project, and indeed the Schema itself and its associated tools were quite new. The conversion processes involved a lengthy series of iterations, as understanding of the originating dataset, the MODS schema and the conversion processes to MARCXML and MARC grew.

During the course of this work, required modifications to the MODS Schema itself and to the MODS to MARCXML stylesheet were identified and discussed with the Library of Congress MARC Standards Office[26]. It became apparent that while the Library of Congress itself had done considerable work on conversion *from* MARC to MODS, the National Library was the first institution using MODS as an exchange format to facilitate conversion and inclusion of non-MARC data into a MARC database. While this process required considerable investment of time and intellectual resources, the lessons learned, and the opportunity to contribute to MODS schema and stylesheet development, outweighed the costs. The National Library now has a sound understanding of MODS, is confident that it is an appropriate schema for both exchange and data storage, and has the skills to assist contributors to convert and present their data in this schema.

On completion of this test project, the AMC OAI repository will be moved from the National Library to an AMC server. The AMC will then be able to present its data in raw, Dublin Core or MODS formats, enabling the centre to participate in a range of aggregator services, not just MusicAustralia. Australian libraries will benefit by being able to download and copy catalogue AMC records for new Australian scores to their own local catalogues, reducing cataloguing time and costs.

The National Library will work with other data contributors to facilitate inclusion of their records in the NBD, and hopes that tens of thousands of additional music records from the archives and commercial sectors will be represented in the NBD over the coming months and years, and made available for searching in the MusicAustralia service, with its party, annotations and other metadata enhancements.

## MusicAustralia: Extracting and storing resource metadata

Records will initially be extracted from the NBD to MusicAustralia based on a combination of material type (i.e. Leader 06 codes 'c' for notated music, 'd' for manuscript music', and 'j' for recorded music) and the Australian content 'flag'. MusicAustralia will poll the NBD for new and changed records, with these records 'trickling' incrementally to the MusicAustralia database. In the future, these extract criteria may be augmented to include records for materials in other formats with Australian music subject headings.

The MARC records extracted from the NBD will be converted to MODS using a Library of Congress XSLT stylesheet and stored in the MusicAustralia resource database on the Library's Teratext[27] platform.

# Benefits

The service architecture adopted for MusicAustralia offers significant benefits to the National Library, to the MusicAustralia service itself, to MusicAustralia contributors, and to music researchers.

The benefits to MusicAustralia of deriving all resource descriptions from the NBD – of incorporating, in fact, an Australian music NBD subset - include:

- Utilisation of existing and developing infrastructure to handle contributor profiles, contributor business processes, offline and online contribution processes, and record de-duplication and bumping processes;

- Lower costs to MARC based MusicAustralia contributors, as they will not need to support contribution processes to both the NBD and MusicAustralia; and

- Provision of a more complete set of holdings data to MusicAustralia users due to the low costs of contribution for MARC contributors.

The benefits to the NBD of acting as a source of all resource descriptions include:

- Increase in representation of Australian music records through contribution of records from organisations and sectors not currently contributing to the NBD

- Increase in number of electronic music resources described in the NBD

- Enhancement of Australian music resource descriptions and name authorities through involvement of a larger number of specialist music librarians and archivists

- Opportunity to test processes for harvesting, gathering and converting data in a range of non-MARC formats

- Potential to develop new Kinetica products, e.g. high quality music authority files.

# Challenges

Of course, there are never benefits without challenges!

The development of the Harvester system itself has required considerable development resources, and the next phase of development - for online update and review processes - is likely to be even more resource intensive. However, the benefits of a generalised data gathering system, capable of harvesting and recognising multiple data formats, invoking conversions according to pre-determined stylesheets for multiple purposes and passing data to any of a number of downstream databases, are very significant. This is especially the case in an environment that is no longer dominated by a single bibliographic record format.

The learning curve required for converting non-MARC records into MARC has also been considerable. However, the need to convert such records for inclusion in the NBD is a reality of the current bibliographic business environment - and will continue to be so. A key challenge will be to continue to share data standards activity work across many sectors. This will require building knowledge about the features and benefits of the various metadata schemas, commitment to using standard forms of the schemas, and a willingness to convert and make organisational records available in multiple formats for multiple data sharing purposes.

A key challenge for the Library and its NBD and specialist service managers is to broaden data contribution options and therefore the data contributor profile, but to retain data quality and consistency as much as possible. Non-MARC records converted for inclusion into the NBD (and perhaps in the future to the NBD Name Authority File) are not necessarily of lower quality or granularity than MARC records. But it is the case that choosing to include records from organisations that may not be as expert in creating and managing descriptive metadata as is the MARC community may mean compromises on data quality in some instances. In a sense, such data quality issues are probably of more concern to those libraries downloading records to their own local library management system than they are to end users. End users, especially those who 'discover' materials through a specialist service such as MusicAustralia or RAAM, tend to use simple search terms and their discovery needs can largely be met through relatively simple records. Balancing these needs - of cataloguers, reference librarians and end users - is likely to be an iterative process requiring considerable trial and some error.

Another challenge is the need to find an appropriate business model for the service. This is a challenge for any online cultural service, and perhaps more so for federated services, which require real resources for maintenance and development, and which benefit both contributors and users, neither of whom may want to pay for those resourcing needs. In the case of MusicAustralia – and of any current and future services wanting to build on or re-use existing NBD infrastructure – there are further issues surrounding provision of 'free to end user' access to a subset of data from a subscription based service. These issues will require careful consideration and negotiation in the coming months and years, both for MusicAustralia and other similar services.

# Conclusion

As with the national pictorial collection, the national music collection has for many years been split between sectors that have not traditionally shared information. Users have therefore been unable to use a single service to discover the location of music materials – even strongly related music materials such as the score and an associated recorded performance of an Australian work.

In setting out to address this need, the MusicAustralia project team knew that they would be creating an innovative discovery service - and concurrently encouraging and supporting the creation of the national digital music collection. It would be fair to say, however, that at the outset of the project, the team anticipated developing a 'parallel' music discovery service alongside the NBD, rather than developing a service that built so firmly on existing national infrastructure. The team certainly did not anticipate that it would ultimately trigger and drive innovation in the way NBD business is done, and the way that it might be done in the future.

The National Library looks forward to developing the MusicAustralia service with its partners over the next few years - and to contributing to the development of other new innovative services that might now be only a gleam in a visionary's eye.

# Endnotes

[1] Available: http://www.musicaustralia.org

[2] By the end of 2003, approximately 5000 Australian scores will be available online (4000+ from the National Library of Australia's collections, and up to 1000 from five State Libraries involved in a cooperative printed music digitisation project supported by the National Library). Several thousand Australian sound recordings have been digitised by ScreenSound Australia, the National Library of Australia, and a small number of Australian tertiary institutions. However, only a fraction of these sound recordings are currently available online due to complexities of delivering web derivatives of preservation digital files, and of clearing copyright for public access.

[3] Available: http://www.nla.gov.au/kinetica/. Searching for subscribers only.

[4] Available: http://www.pictureaustralia.org

[5] Information on the Open Archives Initiative available: http://www.openarchives.org/

[6] Information on Dublin Core available: http://dublincore.org/. The Library Applications Profile available: http://dublincore.org/documents/library-application-profile/

[7] Information on MARC 21 available: http://lcweb.loc.gov/marc/bibliographic/ecbdhome.html

[8] Available: http://www.nla.gov.au/raam/

[9] Information on Encoded Archival Description (EAD) available: http://www.loc.gov/ead/

[10] Available: at http://www.nla.gov.au/padi/

[11] Available: http://www.australiadancing.org

[12] The International Federation for Library Association (IFLA) Study Group on the Functional Requirements for Bibliographic Records, 1998, *Functional Requirements for*

*Bibliographic Records: Final Report.* Available: http://www.ifla.org/VII/s13/frbr/frbr.pdf. (Accessed: 2003, September 15)

[13] AustLit, an online service describing Australian writers and their works, available: http://www.austlit.edu.au. Searching for subscribers only.

[14] Bright Sparcs, an online service describing Australian scientists and their archival collections, available: http://www.asap.unimelb.edu.au/bsparcs/bsparcshome.htm

[15] Australian Sound Design Project, an online service describing Australian sound designers and their installations, available: http://www.sounddesign.unimelb.edu.au/site/index1.html

[16] Papers of the Joint Steering Committee for Revision of Anglo-American Cataloguing Rules available: http://www.nlc-bnc.ca/jsc/AACR

[17] Advanced music applications are discussed annually by the International Symposium for Music Information Retrieval. Details of the 2003 conference available: http://ismir2003.ismir.net/ (Accessed 2003, September 15)

[18] The Library of Congress and several Scandinavian audio-visual archives use the MAVIS system and data format, developed by ScreenSound Australia in association with Wizard Consulting

[19] The Australian Government Locator Standard element set available: http://www.naa.gov.au/recordkeeping/gov_online/agls/metadata_element_set.html

[20] Including W3C's Annotea server, described at http://www.w3.org/2001/Annotea/

[21] Information about the Metadata Object Description Schema (MODS) and associated conversion tools available: http://www.loc.gov/standards/mods/MODS

[22] Information about extensible Stylesheet Language Transformations (XSLT) available: http://www.w3.org/TR/xsltXSLT

[23] Information about the MARCXML Schema and associated conversion tools available: http://www.loc.gov/standards/marcxml/MARCXML

[24] The Australian Music Centre's website available: http://www.amcoz.com.au/home.htm

[25] Finale (http://www.finalemusic.com/Finale) and Sibelius (http://www.sibelius.com/links) are the two industry standard composition softwares: both now support web publication of reference files. The National Library and the Australian Music Centre have developed and published a set of guidelines for composers wishing to publish or permit publishing of their Finale or Sibelius scores online.

[26] The Library of Congress Network Development and MARC Standards Office is a major developer and disseminator of standards based metadata schemas. Information about the Office's activities available: http://www.loc.gov/marc/ndmso.html

[27] Teratext (http://www.teratext.com/home.html) is a text management database currently deployed in a number of National Library of Australia metadata repositories.