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An Application Profile of MODS to Describe Complex Digital Musical Audio Resources

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Abstract

We describe the development of an application profile of the metadata schema MODS (Metadata Object Description Schema) to describe complex digital musical resources at the University of York (specifically, the Music Preserved archive and John R. T. Davies jazz collection). The profile makes use of the MODS relatedItem element to create 'bi-level' records, in which component parts of a recording can be described in the same amount of detail as the whole. This is useful where recordings contain several musical works and other non-musical elements, such as applause or announcements. Such recordings may be regarded as historical, as well as musical, artefacts, and we discuss the implication of this for metadata. We considered the abstract model FRBR (Functional Requirements for Bibliographic Records) as an alternative approach to MODS, but concluded that our conception of musical recordings as historical artefacts challenged the primacy of the 'Work' concept in FRBR. We concluded that MODS was a suitable schema for the kind of metadata we wanted to create, but that it could benefit from being more flexible in some of its concepts.

Keywords: music, metadata, MODS, FRBR, application profile, bi-level, archives

Introduction

This case study describes a project to develop a metadata application profile for complex digital audio resources in a digital repository, York Digital Library (YODL), at the University of York, UK. The project ran in two main phases, 2008-9 and 2013-4. The problem faced was how to describe sound recordings which contain a number of different musical and non-musical elements in such a way as to allow search and retrieval by diverse user groups including musicologists and music enthusiasts. After considering a number of relevant projects and metadata standards, we selected MODS (Metadata Object Description Schema) as our main metadata schema. A major part of our application profile of MODS is the use of the MODS <relatedItem> element to create bi-level, or complex, records. We are not aware of other MODS applications which use this feature of MODS in this way. Our project also highlights limitations in current metadata standards, including MODS and FRBR (Functional Requirements for Bibliographic Records).

Background

YODL is the University of York's repository for multimedia content created either out of or for teaching and research (University of York Library & Archives, n.d). It began in August 2007 as the JISC-funded SAFIR project and became a full-scale service in August 2011. YODL is based on the open-source software Fedora Commons, onto which a bespoke interface and workflows have been built (Allinson & Harbord, 2009; Stracchino & Feng, 2009).

At the outset, YODL mainly contained image and text-based resources. The first major body of digitised audio content to be included was the Music Preserved archive, the physical manifestation of which is held by the Borthwick Institute for Archives (part of the University of York). Music Preserved is a charity which preserves rare and unique recordings of public

performances of classical music (Music Preserved, n. d). The archive consists of recordings on a variety of media and there has been an on-going project to digitise these. Many were recorded from U.K. radio broadcasts by amateur enthusiasts (notably Lord Harewood) in the days when broadcasters did not routinely record their broadcasts. Others were recorded from live performances. Many are the sole known recordings of particular performances. Music Preserved has a derogation from the U.K. Copyright Act, which allows them to keep and provide access to recordings, some of which would otherwise be illegal under U.K. Copyright law. The archive is, therefore, very important and valuable.

Another significant collection, which we have also begun to work on, is the John R. T. Davies collection of jazz records. Davies (nicknamed "Ristic") was a jazz musician and re-mastering engineer who was a leading expert in the field of restoring early jazz recordings. His collection of 78rpm and other records contains unique and very rare recordings. The metadata for this collection is simpler than for Music Preserved, so this article will focus on the latter.

Literature review

This case study touches on at least three areas which present a challenge to the core tradition of bibliographic library cataloguing: cataloguing within a digital repository environment; the cataloguing of music resources; and the cataloguing of complex.

Park and Tosaka (2010) summarise the challenge of cataloguing in the new digital repository environment very well.

Unlike traditional cataloguing, [...] a digital library project often involves decisions about handling

new formats, various types of resources, and multiple options of using new and dynamic metadata standards for different communities with changing needs and expectations. In addition to the resulting interoperability issues in the aggregated environment, metadata creators must also pay attention to the newer functions of administration, provenance, rights management, and preservation. As a result, the quality of metadata in this increasingly complex environment is based on a much broader set of functional requirements beyond the application of established rules and standards in conventional descriptive and subject cataloguing.

Other authors note that implementers respond to this complex environment by using metadata schemas pragmatically, rather than 'strictly' and by mixing and matching schemas (Heery and Patel, 2000). A 2010 survey by Park (cited in Martin, 2011) indicated that over one third of respondents added home-grown metadata elements to their selected schemas. This is not an entirely negative picture, as technologies such as RDF (Resource Description Framework) and XML (eXtensible Markup Language) enable implementers to declare explicitly how they are using metadata elements and allow interoperability (Heery and Patel, 2000). It does mean, perhaps, that flexibility in the use of schemas will be the norm rather than the exception in the digital environment.

Music cataloguing has always been a specialised area within library cataloguing, with its own particular requirements. With western classical music in particular, the concept of the musical 'work' presents a challenge to the primacy of the physical container (book, compact disc, etc.) in bibliographic cataloguing (Smiraglia, 2002). Hemmasi (2002) and Iglesias, Garijo, Molina and de Juan (2009) present some shortcomings of the 'traditional' bibliographic cataloguing duo of MARC and AACR2 for describing digitised representations of music. Some of these problems, such as the

lack of structural, administrative and intellectual property rights metadata in MARC, relate to the new functions which metadata has to fulfil in the digital repository environment. Others relate to the particular needs of digital music resources. These include the criticism that MARC does not do a good job of supporting searching by musical 'work' (the structure of uniform titles makes them impervious to searchers), or by composers and performers (MARC prioritises authors). (MARC21, however, does allow composers and performers to be individually recorded, so this may be more a matter of implementation).

Music resources often have complex internal relationships, for example where a CD contains recordings of several musical works, each with its own title, composer, composition date, performers etc. This complexity is not new in the world of music cataloguing: Smiraglia (2002) lists a number of different categories of derivation from musical works, including translations, amplifications, adaptations and performances, all of which existed in pre-digital (indeed, pre-recorded music) days. Different approaches to the complexity of resources include those which address the processes of the creation and transmission of resources in order to model them conceptually; and those which, more simply, describe whole-part relationships within the actual content of a resource.

The abstract model FRBR (Functional Requirements for Bibliographic Records) (IFLA Study Group on the Functional Requirements for Bibliographic Records, 2009) represents the first of these approaches. The 'backbone' of FRBR is its set of four 'Group 1' entities (Work, Expression, Manifestation, Item), representing stages in the reification of a resource from an intellectual conception (Work) through to an individual physical or digital object (Item). FRBR also treats creators and subjects as separate entities (Group 2 and 3 entities). The metadata schema METS (Metadata Encoding and Transmission Standard) (Library of Congress, 2015) represents the

second approach. METS allows the creation of XML metadata records which express hierarchical relationships between parts of a resource. Unlike FRBR, it does not impose any conceptual structure or meanings of its own.

The Variations Project at Indiana University has grappled with the complexity of music resources. Variations 2 created a music metadata profile which analysed musical resources in terms of several key entities which resemble FRBR entities (Work, Instantiation, Container, Media Object and Contributor); its successor, Variations 3, mapped these explicitly onto FRBR entities (Riley, 2008). The Variations metadata schema is used in the Variations Digital Music Library, used for teaching at Indiana University, and in the Variations suite of open-source digital library software tools. Of wider potential use, perhaps, is the XML definition of FRBR which has been developed by the Variations Project (Riley, 2010).

Other music cataloguing projects which have been based on FRBR have adapted the model, or combined it with other standards. The Time-based Media Application Profile (Time-Based Media Application Profile, 2009) uses terms from a number of name spaces, including FRBR, Dublin Core, OWL (Web Ontology Language), RDF (Resource Description Framework), FOAF (Friend of a Friend) and its own TBM (Time-based Media) to create a metadata profile for time-based media which includes both descriptive and structural elements. When we began our work on music metadata in 2008, this project was still in progress, but we were not able to locate any implementations of the profile in 2014.

The Variazione project (not to be confused with Variations!) has developed a FRBR-based application profile of Dublin Core, called VMAP (Iglesias, Garijo, Molina and de Juan (2009). This redefines all of the FRBR Group 1 entities in response to perceived shortcomings of the original

model. For example, Work is redefined as Composition and Expression is redefined as Musical Content. The project addresses the difficulty of not having a definable Work (e.g. a recorded master class), or of where a recording is an Expression of multiple works (e.g. a video of a concert). The types of relationships possible between entities are altered, allowing many-to-many relationships in place of FRBR's rigid one-to-one relationships. Music Australia (Ayers, 2004) is another project which has attempted to implement FRBR for music resources. Their conclusions are similar to those of Variazione: that FRBR offers significant benefits as a model for music resources, but needs to allow more flexible relationships between entities.

An example of a project which has made use of METS for complex music resources is the British Library Sound Archive's METS profile for archival sound records (British Library, 2008). This has been developed to meet preservation and access needs for digital audio resources. METS is used to define both the logical and physical structure of the resource. The logical structure represents the intellectual content of the resource and the relationships between different parts of it, such as between audio files, images and text. The physical structure represents the structure of the physical analogue originals. Descriptive metadata is provided by embedded MODS and Dublin Core records (the former to describe the whole resource, the latter for the parts). Pre-existing MARC catalogue records are also embedded in the METS, along with a number of technical and transfer metadata records. This approach is fairly conservative compared to attempts to implement FRBR, but it has the virtue of using proven and widely-used standards. This approach was, in some ways, the most influential for our project.

The challenge

The Music Preserved archive had the most complex needs of any of the audio collections we

were dealing with, so we decided to base the metadata profile and object model on this set of content – in the hope that the simpler needs of other content would thereby be met as well. Our colleagues in the Department of Music, Dr. Jenny Doctor and her PhD students, who were working on the digitisation and cataloguing of the collection, presented us with the following paradigm.

A music enthusiast threaded a reel-to-reel tape onto a tape machine and started recording what was on the radio. He (less often she) captured an announcement; then a piece of music; followed by some applause; then another announcement; then some more music. At some point he stopped recording. The interval between the pressing of the record and stop buttons we called the *Event*. An Event is roughly defined a recording session. It doesn't necessarily correspond with a programme as broadcast (it might only be part of a programme, or straddle more than one programme), or with a piece of physical recording medium (an Event might occupy part of a tape, alongside other Events, or run across two tapes). It does not necessarily correspond exactly with a musical performance. To complicate matters further, an Event might include pauses in the recording, as when the recorder recorded an opera performance, but omitted the interval talk. To define an Event you need to understand the intention of the recorder; what they thought that they were recording as one 'thing'. This was the task of our musicologist colleagues.

The Event had to form the basis of our metadata profile. As an historical record, the Event was regarded as being of primary importance by our advisors in the Department of Music. We could not describe the Music Preserved content solely on the basis of any of the normal units of cataloguing, such as physical tapes, or musical works. Of course, all of the musical and other components of the Event needed to be adequately described as well. The challenge from a metadata point of view was to describe both the Event and its component parts using standards where possible.

A large body of metadata had already been compiled, in the form of a Microsoft Access

database, by the PhD students, under the guidance of Dr. Doctor. This consisted of descriptive, technical and administrative metadata, but had weak structural metadata. The database was compiled with a concern for consistency and quality (especially from a musicological point of view), but followed what was effectively a bespoke, home-grown metadata schema, which did not easily translate to any published schema. Converting this existing metadata into our chosen format was also part of the challenge. Another part was to create a metadata form and submission workflow so that the student cataloguers could stop entering data in the database and start submitting metadata and audio files directly to YODL.

Process – choosing a format

Our approach to developing a metadata profile was to begin with the existing database and to try and find the metadata schema which mapped most closely onto its fields. Having adopted VRA Core 4.0 as our standard metadata schema for images, we hoped to find a similar 'off-the-shelf' schema for music recordings which would meet our needs. Sadly, we did not find one. Two standards which we did look at, the European Broadcasting Union (EBU) Core Metadata Set for Radio Archives (European Broadcasting Union, 2014) and the Public Broadcasting Metadata Initiative PBCore (Public Broadcasting Metadata Dictionary Project, n.d.), which are both application profiles of Dublin Core, did not meet our needs. Both seemed promising, as they were designed for describing broadcasts, but neither handled the musical aspect of our recordings or the structural metadata well enough for us.

We looked very carefully at FRBR, as it seemed to be a good fit with the object-based architecture of Fedora Commons. In the end, however, it was simply too large a task to develop this within the limits of our project. It would have necessitated the creation of a sophisticated

cataloguing interface and workflow in order to handle the complex relationships between entities. These metadata structures would then have to be made searchable and intelligible to users. When we were making these decisions (in 2008), the Variations project had not yet published their FRBR XML schema. Having an off-the-shelf FRBR XML schema might have encouraged us to try this route.

A more fundamental problem which we found with FRBR was that the primacy of the Work is challenged by our concept of the Event. In the Event-model, musical works are regarded as having significance because of their context within the Event, as well as in their own rights. Non-musical elements, such as announcements, interviews and applause are also important parts of the Event and need to be represented alongside musical works. It was difficult to see how some of these 'incidental' elements could be regarded as Works and there is no other FRBR entity which captures them.

No perfect solution to our needs was available and it was clear that we would have to use a pragmatic approach. Our starting point was to select a good standard for descriptive metadata and MODS seemed to provide the best answer. Guenther (2003) has described the aim of MODS as being to meet the needs of “members of the digital library and related communities as they attempt to implement projects involving search and retrieval, management of complex digital objects, integrating metadata from library databases with other non-MARC sources, and other functions”. It is simpler than traditional MARC, but richer than Dublin Core. Although it is a general standard, it provides richer descriptive elements than PBCore or the EBU standard. It thus seemed to us a natural choice to consider for our descriptive metadata needs. We also considered MARC, but its richer set of elements did not add anything which was relevant to our needs.

Two key features of MODS which are essential to our profile are the capability to add local

fields (either by using the <extension> element, or by creating local values for the *type* attribute to the <note> element) and the ability to produce hierarchical records by using the <relatedItem> element.

Developing the metadata profile

Having selected MODS, the actual process of the development of the profile was one which involved on-going discussion with colleagues in the Music Department. Although MODS is a rich metadata standard, it could not handle all of the highly specific fields of the database. Extending MODS would capture more of the database, but with at least two payoffs: making it more difficult to share the metadata; and tying the application profile more closely to the cataloguing practices of the Music Preserved database. The Music Preserved and Davies collections were intended as pilot-projects to develop audio and video cataloguing more generally in YODL, so an eye had to be kept on the possible wider usefulness of the application profile.

The aim was to reach as broad a user group as possible, including music fans, who, arguably, might not want a lot of detailed information about the Event, and academics, who might value this historical context. The application profile had to strike a balance between the needs of these different users. This meant the loss of some fields from the database (though these were mapped onto more generic fields in MODS, so that very little actual information was lost).

The main area where we decided to extend MODS was that of technical metadata. We defined this as information about the physical media and transfer process. A number of standards exist for this sort of metadata (including the AES X098c standard, which forms part of the British Library METS profile), but we took the decision to create our own bespoke schema, based on certain fields in the Access database. None of the standards investigated by the Music Department's audio

technicians were judged to be suitable by them and we thought that technical metadata would interest a narrower group of users (academics and project staff). It is important to keep it from a digital preservation and historical point of view, but of less interest to the average music enthusiast. It matters less if it is missed by harvesters and aggregators. We did, however, keep an eye on the possibility of converting it to a recognised standard in the future. The technical metadata is nested in the MODS <extension> element.

We also extended MODS itself in a number of ways to capture key musicological metadata from the database. Certain important concepts did not seem to be picked up by standard MODS. These include the geographical place and venue of a performance. In MODS the <place> element refers to place of publication/issuance, which in our case is usually place of broadcast. We needed to clearly disambiguate place of broadcast from place of performance (though they may be identical for live studio recordings). (MODS does recognise the difference between the creation and issuance of resources in its two date fields <dateCreated> and <dateIssued>). In this, MODS seems to compare badly with VRA Core 4.0 (schema for visual resources) which has a much more generic, and useful, <location> element. VRA <location> has a list of type attribute values to cover such things as performance, discovery, creation, exhibition and repository. MODS seems to be much more tied to its library origins and this sometimes makes it less useful than it could be in a digital context. We extended MODS to cover these concepts by using local values for the type attribute for the <note> element: “placeOfPerformance”, for geographic places, and “venue”, for buildings. We also created local type attribute values for <genre> and <note> to cover various controlled lists from the database. These recorded types of premiere (world premiere, UK premiere etc.) and different categories of recording (studio recordings, live performances etc.). All of the nuances would, of course, be lost if our MODS metadata were shared, but they are distinctions which are

important to our local users, especially in the Music Department.

After selecting MODS as the base for our profile, the next decision was that the Event should form the basic cataloguing unit. It would have been possible to catalogue each part of the Event as a separate unit – as separate recordings of musical performances – but it was felt important not to break up the historical record constituted by the Event. Even the applauses were regarded as an important part of the record. We, therefore, needed to be able to create bi-level records; ones which described the Event as a whole and also each of the component parts of the event (performances, announcements, interviews, applause etc.).

MODS can be used to create bi-level records by using the <relatedItem> element. This can be used (with the 'type' attribute and the value 'constituent') to describe constituent parts of a resource. Any other MODS element can be nested within <relatedItem>, creating records within records. (It seems to be technically possible to create deeper hierarchies by repeatedly nesting <relatedItem> within itself, but this is discouraged by the MODS user guidelines. In some ways, it may have been useful to create further layers of hierarchy, but this would have led to far too much complexity. We decided to follow the wisdom of the MODS user guidelines).

The following is a simplified MODS XML record for a Music Preserved recording, where the Event consists of two parts: a performance of Tchaikovsky's *Sleeping Beauty Suite* and an interview with the conductor, Leopold Stokowski.

<mods>

<titleInfo>

<title> Sleeping beauty suite and interview with Stokowski </title>

```
</titleInfo>
<originInfo>
        <place>
                <placeTerm>England, London</placeTerm>
        </place>
        <publisher>British Broadcasting Corporation</publisher>
        <dateIssued point="start" qualifier="">1965-09-12</dateIssued>
</originInfo>
<physicalDescription>
        <extent>1 reel-to-reel tape</extent>
</physicalDescription>
<relatedItem type="constituent">
        <titleInfo>
                <title>Sleeping beauty suite</title>
        </titleInfo>
        <name type="personal">
                <namePart>Tchaikovsky, Peter Ilich, 1840-1893</namePart>
                <role>
                        <roleTerm>composer</roleTerm>
                </role>
        </name>
        <name type="personal">
                <namePart>Stokowski, Leopold, 1882-1977</namePart>
                <role>
```

```
                    <roleTerm>conductor</roleTerm>
                </role>
            </name>
            <genre type="contentType">music-studio</genre>
            <note type="placeOfPerformance">England, London</note>
            <note type="venue">BBC Maida Vale Studios</note>
        </relatedItem>
        <relatedItem type="constituent">
            <titleInfo>
                <title>Interview with Leopold Stokowski</title>
            </titleInfo>
            <name type="personal">
                <namePart>Stokowski, Leopold, 1882-1977</namePart>
                <role>
                    <roleTerm>interviewee</roleTerm>
                </role>
            </name>
            <name type="personal">
                <namePart>Cooke, Deryck</namePart>
                <role>
                    <roleTerm>interviewer</roleTerm>
                </role>
            </name>
        </relatedItem>
```

</mods>

Metadata about the Event as a whole –details of the broadcast and the physical storage medium – are nested at the 'top level' of the MODS record. Metadata about the performance of *Sleeping Beauty Suite* are nested in an instance of <relatedItem> and metadata about the interview are nested in a separate instance of <relatedItem>. Leopold Stokowski's name appears twice, once in each instance of <relatedItem>, because he has two distinct roles, as the conductor and as interviewee.

Object model

Alongside the metadata profile, we have also developed an object model and a cataloguing interface. In a Fedora Repository such as YODL individual resources are represented by 'Fedora Objects' – instances of Fedora's native XML format, FOXML, which contain all of the metadata about the resource, including relationships with other Fedora Objects, access control information and links to content files. Our object model represents each Event by one Fedora Object ('Event-Object'), containing the MODS metadata record for the Event. Where the digitised audio exists as a single audio file, this is also associated with the Event Object. However, the model allows for recordings to be split into multiple audio files, each of which is associated with its own Fedora Object, linked to the Event-Object by a parent/child relationship. Each of these 'Child-Objects' has a very simple descriptive metadata record, consisting of a single Dublin Core field (dc:title), which performs the function of a track title.

This allows for different digitisation practices. Some Music Preserved recordings, the legacy of early digitisation efforts, have been digitised onto audio CD and split into tracks. These are uploaded to YODL with each track as a separate file, utilising the parent/child model. It is easier to manage the multiple files associated with one Event in this way. Current practice is to digitise to

BWAV (Broadcast WAV) format, with the entire recording as a single file which is split up by marker points within the audio file. These are attached directly to the Event-Object in YODL.

A key feature of the object model is that its structure is essentially independent from that of the MODS metadata record. This may seem messy at first glance, but allows a great deal of flexibility. In particular, it allows for the digitised audio to be split up, either as separate files or as single files with track markers, to allow the sort of fine grained access that music fans are used to from commercial recordings, for example, at the level of movements of a symphony, or arias in an opera. FOXML, with its parent/child relationships and flexibility, in our case is doing a similar job to METS in the British Library Sound Archive application profile.

Cataloguing Interface

The cataloguing interface has two steps to it. The first is a screen which allows the cataloguer to upload audio files and create the structure described in preceding paragraphs. A text box allows the creation of the dc:title field for the Child-Objects. Once this is submitted, the object structure is created. Derivative MP3 streaming versions of the master WAV files are also created (at 320kbps). The second step is a metadata form, based on the XForms standard. It is highly flexible and allows the creation of either very simple or very complex MODS metadata records. Depending on requirements, cataloguers can create the nested second level records described above, or skip this section of the form and create simpler single-level records.

The public YODL interface has been developed to display the MODS metadata record alongside links to the digitised audio files and an embedded media player, which plays them. Where the audio files are associated with Child-Objects, the interface draws together all of the child and parent objects into the same page. The dc:title fields of the Child-Objects are displayed as the track

titles. The interface is publicly accessible at the following url: https://dlib.york.ac.uk/yodl/app/collection/detail?id=york%3a817026&ref=search.

Current position and future work

Resource issues have meant that it has taken us longer that we had hoped to implement this project, having done most of the work on the application profile during 2008 and 2009. In 2012 we were able to employ a full-time permanent software developer and we resumed work on the project in early 2013. By late 2012, the MODS metadata profile and object model were finalised. The cataloguing interface was completed by the end of the summer of 2013, with cataloguers able to submit new records and upload audio files. Shortly after this, the public YODL interface was updated to display our metadata and to stream the audio files. By summer 2014 the existing Access database had been converted to our MODS profile and uploaded to YODL. By the end of 2014 a nearly all of the available audio files were uploaded (although only a small proportion of the Music Preserved Collection has been digitised so far). At the time of writing, in early 2015, we are about to begin uploading the Davies metadata and available audio. In total, we have so far added 3307 metadata records, about 20% of which also have audio files attached.

Discussion

Richard Smiraglia (2002) has noted two ways in which musical works have been represented in library retrieval systems: according to their physical characteristics (paper scores, vinyl discs etc.) and according to their musical content (musical works, uniform titles etc.). Our work suggests that a third category might need to be borne in mind in certain circumstances. This is the dimension of the historical record represented by the Event. Musical recordings can constitute a historical record in ways which go beyond the significance of musical works. In this respect, they can be treated in a similar way to written archive material and other forms of recorded history. This is

particularly true of recorded broadcasts, but also of any form of musical recording where anything of the context of the performance is also captured. This speaks into the cultural, economic, political and institutional context in which musical works are created, performed, distributed etc. (Doctor, 2004). Providing a way in to this history is difficult. As with written archives, the historical significance of the records is left to the researcher to discover: it is not made explicit in the retrieval system. Musical works, however, remain crucially important to this history and this suggests that our approach is a hybrid between musical and archival cataloguing; one which treats elements of recorded sound both as musical artefacts and as documents which take their meanings in relation to one another.

Much attention has been directed to the concept of musical works and their relationships to their creators and to the direct process of their transmission. FRBR has been the focus of a lot of this discussion, as it is easy to see how it fits the paradigm of western art music and its transmission (Riley, 2008). Our concept of the Event challenges the primacy of the FRBR Work entity. The Event concept places elements of the context of a musical performance, such as announcements and applause, on the same level as performances of musical works. An announcement might just about constitute a Work, but how about applause? Would the intellectual content of the applause – i.e. appreciation – be the Work? Would separate instances of applause all count as different Expressions of a single Work representing the abstract concept of musical enjoyment? An Event could conceivably be counted as a Work in its own right, because it represents an intellectual act on behalf of the recorder (the act of selection), but then incidental elements, such as applause, are lost as there is no FRBR concept that picks them up. The applause and other incidental elements are important as part of the historical record of both concert and broadcast, but escape the FRBR model as it stands

Our experience of going through the process of considering FRBR highlighted a couple of

points which mirror Chaudhri's (2009) critique of FRBR. Firstly, we were put off by the complexity of FRBR. Secondly, we found FRBR too inflexible to accommodate all that we wanted to describe about our resources. Chaudhri's comment about FRBR "impos[ing] inappropriate decisions about canonical *Work* level metadata" seems particularly pertinent to us.

Another area in which our experience reflects a common theme in the literature on repository metadata is that of pragmatic approaches to metadata. In our case, we have been forced to adapt and extend standards because, as they stand, they do not meet our needs. My own reflection on this is that useful schemas need to have more general real world concepts and be less tied to library or other domain-specific precedents. A comparison between the <location> element in VRA Core 4.0 and the MODS <place> element, where the former is a much wider concept, illustrates the direction which schemas need to go in. Concepts like *location*, *name* and *date* need to be able to be applied and qualified in as flexible a way as possible.

Conclusion

Cataloguing complex music resources within a digital repository poses a challenge to traditional cataloguing practices. However, those practices, as represented for us by MODS, can form the basis for new ways of cataloguing which are appropriate for the new environment. Flexibility would seem to be the key to this. Where MODS proved to be the most useful to us was in the ability to create hierarchical, bi-level records which enabled us to describe complex, multi-part resources. This was possible because the concepts behind the MODS <relatedItem> element and 'type' attribute were sufficiently open to allow us to define them in our own terms, but specific enough to provide basic intelligibility. We found MODS restrictive, conversely, where the concepts it employed were tied too narrowly to traditional library cataloguing.

The resources we were cataloguing were not traditional library (or even music-library)

materials, in that the latter are usually fairly discreet artefacts. As digital resources, the Music Preserved recordings are complex and 'messy', often containing disparate elements and incomplete fragments, which take their meanings from the fact that they are together. In this respect they are more like archival documents, where relationships between documents are often as important as individual documents. The ability to create hierarchies and draw links is therefore important in this and there is a lot more that we could do with this. We have not really begun to explore the possibilities of controlled vocabularies and linked data, but these would be useful for standardising the names of composers, performers, ensembles, locations and titles. They also have the potential for augmenting the existing metadata by drawing in metadata from other sources (e.g. biographical details of composers).

Abstract models such as FRBR and those inspired by it are very useful as catalysts for developing thinking, but, if they are to be useful beyond traditional library materials they need, again, to allow greater flexibility. Our concept of the Event is one way of challenging the primacy of FRBR Work. Less conceptually-driven approaches, such as METS, RDF and the object-based architecture of Fedora may provide a greater degree of flexibility and may prove more practical for many repository projects.

References

Allinson, J. & Harbord, E. (2009). SHERPA to YODL-ING: Digital Mountaineering at York. *Ariadne*, 60. Retrieved from http://www.ariadne.ac.uk/

Ayres, M.-L. (2004). Case studies in implementing Functional Requirements for Bibliographic Records [FRBR]: AustLit and Music Australia. *The Australian Library Journal,* 54, 43-54. doi: 10.1080/00049670.2005.10721712

British Library (2008). *METS profile – sound recordings 2*. Retrieved from http://www.bl.uk/profiles/sound/METS_profile.pdf

Chaudhri, T. (2009). Assessing FRBR in Dublin Core application profiles. *Ariadne,* 58. Retrieved from http://www.ariadne.ac.uk/

Doctor, J. (2004). 'Vital to the very survival of music as a living art': Hans Keller's radio world. *Music and Letters*, 85, 614-623. doi:10.1093/ml/85.4.614

European Broadcasting Union (2014). *EBU Core metadata set (EBUCore).* Retrieved from https://tech.ebu.ch/docs/tech/tech3293.pdf

Guenther, R. S. (2003). MODS: The metadata object description schema. *Portal – Libraries and the Academy,* 3, 137-150. doi: 10.1353/pla.2003.0006

Heery, R. & Patel, M. (2000). Application profiles: Mixing and matching metadata schemas. *Ariadne, 25.* Retrieved from http://www.ariadne.ac.uk/

Hemmasi, H. (2002, October). *Why not MARC?* Paper presented at the ISMIR 2002 3rd International Conference on Music Information Retrieval, Paris, France. Retrieved from: http://variations2.indiana.edu/pdf/hemmasi-ismir2002.pdf

IFLA Study Group on the Functional Requirements for Bibliographic Records. (2009). *Functional requirements for bibliographic records: Final report.* Retrieved from http://www.ifla.org/files/cataloguing/frbr/frbr_2008.pdf

Iglesias, C. A., Garijo, M., Molina, D. & de Juan, P. (2009). VMAP – A Dublin Core application profile for musical resources. In F. Satori, M. A. Sicilia & N. Manouselis (eds.), *Metadata and Semantic Research: Third International Conference* (pp. 1-12). Berlin: Springer. Retrieved from http://link.springer.com/book/10.1007%2F978-3-642-04590-5

Library of Congress (2015). *METS Metadata Encoding & Transmission Standard official website*. Retrieved from http://www.loc.gov/standards/mets/

Martin, K. E. (2011). Marrying local metadata needs with accepted standards: The creation of a data dictionary at the University of Illinois at Chicago. *Journal of Library Metadata,* 11, 33-50. doi:10.1080/19386389.2011.545006

Music Preserved. (n.d.) *Music Preserved*. Retrieved from http://www.musicpreserved.org.uk/index.php

Park, J.-R. & Tosaka, Y. (2010). Metadata quality control in digital repositories and collections: criteria, semantics, and mechanisms. *Cataloguing & Classification Quarterly*, 48, 696-715. doi:10.1080/01639374.2010.508711

Public Broadcasting Metadata Dictionary Project (n.d.). *PBCore.* Retrieved from http://pbcore.org/

Riley, J. (2008). *Application of the Functional Requirements for Bibliographic Records (FRBR) to music.* Paper presented at the 2008 International Society for Music Information Retrieval (ISMIR) Conference. Retrieved from http://www.dlib.indiana.edu/~jenlrile/presentations/ismir2008/riley.pdf

Riley, J. (2010). *Enhancing interoperability of FRBR-based metadata*. Paper presented at 2010 International Conference on Dublin Core and Metadata Applications. Retrieved from http://www.dlib.indiana.edu/~jenlrile/presentations/dc2010/riley_fullDCpaper.pdf

Time-based media application profile. (2009). Retrieved from http://wiki.manchester.ac.uk/tbmap/index.php/Main_Page

Smiraglia, R. P. (2002). Musical works and information retrieval. *Notes,* 58, 747-764. Retrieved from http://www.musiclibraryassoc.org/?page=Notes

Stracchino, P. & Feng, Y. (2009). Learning to YODL: Building York's Digital Library. *Ariadne*, 61.

Retrieved from http://www.ariadne.ac.uk/

University of York Library & Archives (n.d). *York Digital Library (YODL)*. Retrieved from http://www.york.ac.uk/library/electroniclibrary/yorkdigitallibraryyodl/