

# Extending Dublin Core Metadata to Support the Description and Discovery of Language Resources

Steven Bird ([sb@ldc.upenn.edu](mailto:sb@ldc.upenn.edu))  
*University of Melbourne and University of Pennsylvania*

Gary Simons ([gary\\_simons@sil.org](mailto:gary_simons@sil.org))  
*SIL International*

**Abstract.** As language data and associated technologies proliferate and as the language resources community expands, it is becoming increasingly difficult to locate and reuse existing resources. Are there any lexical resources for such-and-such a language? What tool works with transcripts in this particular format? What is a good format to use for linguistic data of this type? Questions like these dominate many mailing lists, since web search engines are an unreliable way to find language resources. This paper reports on a new digital infrastructure for discovering language resources being developed by the Open Language Archives Community (OLAC). At the core of OLAC is its metadata format, which is designed to facilitate description and discovery of all kinds of language resources, including data, tools, or advice. The paper describes OLAC metadata, its relationship to Dublin Core metadata, and its dissemination using the metadata harvesting protocol of the Open Archives Initiative.

**Keywords:** metadata, language resources, open archives

**Abbreviations:** DCMI – Dublin Core Metadata Initiative; OAI – Open Archives Initiative; OLAC – Open Language Archives Community; XML – Extensible Markup Language

## 1. Introduction

Language technology and the linguistic sciences are confronted with a vast array of *language resources*, richly structured, large and diverse. Multiple *communities* depend on language resources, including linguists, engineers, teachers and actual speakers. Many individuals and institutions provide key pieces of the infrastructure, including archivists, software developers, and publishers. Today we have unprecedented opportunities to *connect* these communities to the language resources they need. First, inexpensive mass storage technology permits large resources to be stored in digital form, while the Extensible Markup Language (XML) and Unicode provide flexible ways to represent structured data and ensure its long-term survival. Second, digital publication – both on and off the world wide web – is the most practical and efficient means of sharing language resources. Finally, a standard resource description model, the Dublin Core Metadata Set, together with an interchange method provided by the Open Archives Initiative (OAI), make it possible to construct a union catalog over multiple repositories and archives.



© 2003 Kluwer Academic Publishers. Printed in the Netherlands.

In December 2000, a new initiative which applied the OAI to language archives was founded, with the following statement of purpose:

OLAC, the Open Language Archives Community, is an international partnership of institutions and individuals who are creating a worldwide virtual library of language resources by: (i) developing consensus on best current practice for the digital archiving of language resources, and (ii) developing a network of interoperating repositories and services for housing and accessing such resources.

This paper presents the motivation and governing ideas of OLAC, Dublin Core metadata and the Open Archives Initiative Protocol for Metadata Harvesting (§2), followed by the OLAC Metadata Set (§3). It concludes with an overview of ongoing developments and a call for participation by the wider community. Updated information on OLAC is available from the OLAC Gateway [[www.language-archives.org](http://www.language-archives.org)].

## 2. Locating Data, Tools and Advice

We can observe that the individuals who use and create language resources are looking for three things: data, tools, and advice. By DATA we mean any information that documents or describes a language, such as a published monograph, a computer data file, or even a shoebox full of hand-written index cards. The information could range in content from unanalyzed sound recordings to fully transcribed and annotated texts to a complete descriptive grammar. By TOOLS we mean computational resources that facilitate creating, viewing, querying, or otherwise using language data. Tools include not just software programs, but also the digital resources that the programs depend on, such as fonts, stylesheets, and document type definitions. By ADVICE we mean any information about what data sources are reliable, what tools are appropriate in a given situation, what practices to follow when creating new data, and so forth (Bird and Simons, 2002b). In the context of OLAC, the term *language resource* is broadly construed to include all three of these: data, tools and advice.

Unfortunately, today's user does not have ready access to the resources that are needed. Figure 1 offers a diagrammatic view of the reality. Some archives (e.g. Archive 1) do have a site on the internet which the user is able to find, so the resources of that archive are accessible. Other archives (e.g. Archive 2) are on the internet, so the user could access them in theory, but the user has no idea they exist so they are not accessible in practice. Still other archives (e.g. Archive 3) are not even on the internet. And there are potentially hundreds of archives (e.g. Archive  $n$ ) that the user needs to know about. Tools and advice are out there as well, but are at many different sites.

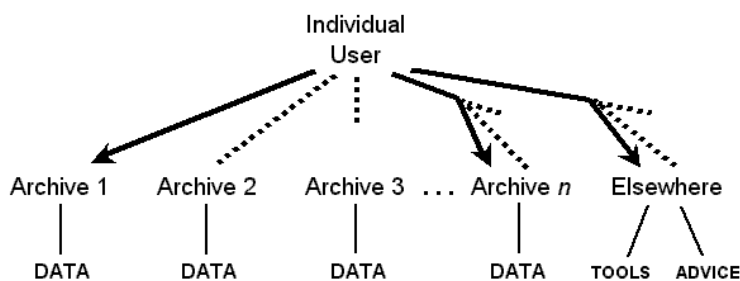


Figure 1. In reality the user can't always get there from here

There are many other problems inherent in the current situation. For instance, the user may not be able to find all the existing data about a language of interest because different sites have called it by different names (low recall). The user may be swamped with irrelevant resources because search terms have important meanings in other domains (low precision). (For a detailed discussion of precision and recall in the context of metadata, see (Svenonius, 2000).) The user may not be able to use an accessible data file for lack of being able to match it with the right tools. The user may locate advice that seems relevant but have no basis for judging its merits.

## 2.1. BRIDGING THE GAP

### 2.1.1. *Why improved web-indexing is not enough*

As the internet grows and web-indexing technologies improve one might hope that a general-purpose search engine should be sufficient to bridge the gap between people and the resources they need. However, this is a vain hope. The first reason is that many language resources, such as audio files and software, are not text-based. The second reason concerns language identification, the single most important property for describing language resources. If a language has a canonical name which is distinctive as a character string, then the user has a chance of finding any online resources with a search engine. However, the language may have multiple names, possibly due to the vagaries of romanization, such as a language known variously as Fadicca, Fadicha, Fedija, Fadija, Fiadidja, Fiyadikya, and Fedicca (giving low recall). The language name may collide with a word which has other interpretations that are vastly more frequent, e.g. the language names Mango and Santa Cruz (giving low precision).

The third reason why general-purpose search engines are inadequate is the simple fact that much of the material is not, and will not, be documented in free prose on the web. Either people will build systematic catalogues of their resources, or they won't do it at all. Of course, one can always export a

back-end database as HTML and let the search engines index the materials. Indeed, encouraging people to document resources and make them accessible to search engines is part of our vision. However, despite the power of web search engines, there remain many instances where people still prefer to use more formal databases to house their data.

This last point bears further consideration. The challenge is to build a system for “bringing like things together and differentiating among them” (Svenonius, 2000). There are two dominant storage and indexing paradigms, one exemplified by traditional databases and one exemplified by the web. In the case of language resources, the metadata is coherent enough to be stored in a formal database, but sufficiently distributed and dynamic that it is impractical to maintain it centrally. Language resources occupy the middle ground between the two paradigms, neither of which will serve adequately. A new framework is required that permits the best of both worlds, namely bottom-up, distributed initiatives, along with consistent, centralized finding aids. The Dublin Core Metadata Initiative and the Open Archives Initiative provide the framework we need to “bridge the gap.”

#### 2.1.2. *The Dublin Core Metadata Initiative*

The Dublin Core Metadata Initiative began in 1995 to develop conventions for resource discovery on the web [dublincore.org]. The Dublin Core (DC) metadata elements represent a broad, interdisciplinary consensus about the core set of elements that are likely to be widely useful to support resource discovery. The Dublin Core consists of 15 metadata elements, where each element is optional and repeatable: title, creator, subject, description, publisher, contributor, date, type, format, identifier, source, language, relation, coverage, rights. This set can be used to describe resources that exist in both digital and traditional formats.

To support more precise description and more focussed searching, the DC metadata set has been extended with encoding schemes and refinements (DCMI, 2000; DCMI, 2002). An encoding scheme specifies a particular controlled vocabulary or notation for expressing the value of an element. An encoding scheme serves to aid a client system in interpreting the exact meaning of the element content. A refinement makes the meaning of the element more specific. For example, a language element can be *encoded* using the conventions of RFC 3066 to unambiguously identify the language in which the resource is written (or spoken). A subject element can be given a language *refinement* to restrict its interpretation to concern the language the resource is about.

#### 2.1.3. *The Open Archives Initiative*

The Open Archives Initiative (OAI) was launched in October 1999 to provide a common framework across electronic preprint archives, and it has since

been broadened to include digital repositories of scholarly materials regardless of their type [[www.openarchives.org](http://www.openarchives.org)] (Lagoze and Van de Sompel, 2001; Van de Sompel and Lagoze, 2002). Each participating archive, or “data provider,” has a network accessible server offering public access to metadata records describing archive holdings. The holdings themselves may be documents, raw data, software, recordings, physical artifacts, digital surrogates, and so forth. Each metadata record describes an archive holding, and includes a reference to an entry point for the holding such as a URL or a physical location.

Participating archives must comply with two standards: the *OAI Shared Metadata Set* (Dublin Core) which facilitates interoperability across all repositories participating in the OAI, and the *OAI Protocol for Metadata Harvesting* which allows “service providers” to combine metadata from multiple archives into a single catalogue. End-users interact directly with a service provider to quickly locate distributed resources.

## 2.2. APPLYING THE OAI TO LANGUAGE RESOURCES USING SPECIALIZED METADATA

The OAI infrastructure is a new invention: it has the bottom-up, distributed character of the web, while simultaneously having the efficient, structured nature of a centralized database. This combination is well-suited to the language resource community, where the available data is growing rapidly and where a large user-base is fairly consistent in how it describes its resource needs.

Recall that the OAI community is defined by the archives which comply with the OAI metadata harvesting protocol and that register with the OAI. Any compliant repository can register as an OAI archive, and the metadata provided by the archive is open to the public. OAI data providers may support metadata formats in addition to DC. A specialist community can define a metadata format specific to its domain and expose it via the OAI protocol. Service providers, data providers and users that employ this specialized metadata format constitute an OAI *subcommunity*.

Consequently, applying the OAI to language resources is chiefly a matter of having a common metadata format tailored for language resource description and discovery. Section 3 reports on such a format, which is already in use by over twenty archives having a combined total of 30,000 metadata records. These OLAC metadata records can be harvested from multiple archives using the OAI protocol and stored in a single location, where end-users can query all participating archives simultaneously. The LINGUIST List now offers an OLAC cross-archive search service at [<http://www.linguistlist.org/olac>].

### 3. A Core Metadata Set for Language Resources

The OLAC Metadata Set extends the Dublin Core set only to the minimum degree required to express basic properties of language resources which are useful as finding aids. All Dublin Core elements and refinements are used in the OLAC Metadata Set. In order to meet the specific needs of the language resources community, certain elements have been extended following DCMI guidelines (DCMI, 2000; Powell and Johnston, 2002). This section describes some of the attributes, elements and controlled vocabularies of the OLAC Metadata Set, then shows how they are represented in XML and how they are mapped to other formats for wider dissemination.

#### 3.1. ATTRIBUTES USED IN IMPLEMENTING THE OLAC METADATA SET

Three attributes – `type`, `code`, and `lang` are used throughout the XML implementation of the metadata elements. The `type` attribute is used to qualify the Dublin Core element, by refining its meaning (to make it narrower or more specific), or by identifying an encoding scheme, or both. If the `type` specifies one of the OLAC vocabularies, then the `code` attribute is used to hold the selected value. For example, with the `subject` element, we may specify the type `olac:language` to indicate that we are describing the subject language of the resource. We may also provide a code `x-sil-BAN` to uniquely identify the language. We may further supply element content, as a freeform elaboration of the coded value. This design permits service providers to uniformly interpret the meaning of any code value, thereby providing good precision and recall. At the same time, data providers may use the element content when there is not an appropriate code or when they want to add qualifications to the coded value.

As with Dublin Core, every element in the OLAC metadata set may use the `lang` attribute. It specifies the language in which the text in the content of the element is written. By using multiple instances of the metadata elements tagged for different languages, data providers may offer their metadata records in multiple languages.

#### 3.2. THE ELEMENTS OF THE OLAC METADATA SET

In this section we present a synopsis of the elements of the OLAC metadata set. For each element, we provide a one sentence definition followed by a brief discussion, systematically borrowing and adapting the definitions provided by the Dublin Core Metadata Initiative (DCMI, 2002). Each element is optional and repeatable.

**contributor:** **An entity responsible for making contributions to the content of the resource.** Examples of a Contributor include a person, an

organization, or a service. Recommended best practice is to identify the role played by the named entity in the creation of the resource using the OLAC Role Vocabulary (Johnson, 2002).

**coverage: The extent or scope of the content of the resource.** Coverage will typically include spatial location or temporal period. Where the geographical information is predictable from the language identification, it is not necessary to specify geographic coverage.

**creator: An entity primarily responsible for making the content of the resource.** As with the contributor element, recommended best practice is to identify the role played by the named entity in the creation of the resource using the OLAC Role Vocabulary (Johnson, 2002).

**date: A date associated with an event in the life cycle of the resource.** Best practice is to use the W3C Date and Time Format (Wolf and Wicksteed, 1997). Dublin Core qualifiers may be used to refine the meaning of the date (for instance, date of creation versus date of issue versus date of modification, and so on). The refinements to date are defined in (DCMI, 2002).

**description: An account of the content of the resource.** Description may include but is not limited to: an abstract, table of contents, reference to a graphical representation of content, or a free-text account of the content.

**format: The physical or digital manifestation of the resource.** Typically, format will specify the media-type or dimensions of a physical resource, or the character encoding or markup of a digital resource. It may be used to determine the software, hardware or other equipment needed to use the resource. Since this element applies both to software and data, service providers can use it to match data with appropriate software tools and vice versa.

**identifier: An unambiguous reference to the resource within a given context.** Recommended best practice is to identify the resource by means of a string or number conforming to a globally-known formal identification system (e.g. by URI or ISBN). For non-digital archives, identifier may use the existing scheme for locating a resource within the collection.

**language: A language of the intellectual content of the resource.** The language element is used for a language the resource is in, as opposed to a language it describes (i.e. a “subject language”). It identifies a language that the creator of the resource assumes that its eventual user will understand. Recommended best practice is to identify the language precisely using a coded value from the OLAC Language Vocabulary.

**publisher: An entity responsible for making the resource available.** Examples of a publisher include a person, an organization, or a service.

**relation: A reference to a related resource.** This element is used to document relationships between resources. Dublin Core qualifiers may be used to refine the nature of the relationship (for instance, is replaced by,

requires, is part of, and so on). The refinements to relation are defined in (DCMI, 2002).

**rights: Information about rights held in and over the resource.** Typically, a rights element will contain a rights management statement for the resource, or reference a service providing such information. Rights information often encompasses intellectual property rights, copyright, and various property rights.

**source: A reference to a resource from which the present resource is derived.** For instance, it may be the bibliographic information about a printed book of which this is the electronic encoding or from which the information was extracted.

**subject: The topic of the content of the resource.** Typically, a Subject will be expressed as keywords, key phrases or classification codes that describe a topic of the resource. Recommended best practice is to select a value from a controlled vocabulary or formal classification scheme. Where the subject of the resource is a language, recommended best practice is to use the OLAC Language Vocabulary (cf. the language element above).

**title: A name given to the resource.** Typically, a title will be a name by which the resource is formally known.

**type: The nature or genre of the content of the resource.** Recommended best practice is to use the Dublin Core controlled vocabulary DC-Type for broad classification of type. OLAC provides additional vocabularies that are relevant for language resources: the OLAC Linguistic Data Type Vocabulary (Aristar Dry and Johnson, 2002), and the OLAC Discourse Type Vocabulary (Johnson and Aristar Dry, 2002).

### 3.3. THE CONTROLLED VOCABULARIES

Controlled vocabularies are enumerations of legal values, or specifications of legal formats, for the code attribute. In some cases, more than one value applies, in which case the corresponding element must be repeated, once for each applicable value. In other cases, no value is applicable and the corresponding element is simply omitted. In yet other cases, the controlled vocabulary may fail to provide a suitable item, in which case a similar item can be optionally specified and a prose comment included in the element content.

#### 3.3.1. *The OLAC Language Vocabulary*

Language identification is an important dimension of language resource classification. However, the character-string representation of language names is problematic for several reasons: different languages (in different parts of



the world) may have the same name; the same language may have a different name in each country where it is spoken; within the same country, the preferred name for a language may change over time; in the early history of discovering new languages (before names were standardized), different people referred to the same language by different names; and for languages having non-Roman orthographies, the language name may have several possible romanizations. Together, these facts suggest that a standard based on names will not work. Instead, we need a standard based on unique identifiers that do not change, combined with accessible documentation that clarifies the particular speech variety denoted by each identifier.

The information technology community has a standard for language identification, namely, ISO 639 (ISO, 1998). Part 1 of this standard lists two-letter codes for identifying 160 of the world's major languages; part 2 of the standard lists three-letter codes for identifying about 400 languages. ISO 639 in turn forms the core of another standard, RFC 3066 (formerly RFC 1766), which is the standard used for language identification in the `xml:lang` attribute of XML and in the `language` element of the Dublin Core metadata set. RFC 3066 provides a mechanism for users to register new language identification codes for languages not covered by ISO 639, but very few additional languages have ever been registered.

Unfortunately, the existing standard falls far short of meeting the needs of the language resources community since it fails to account for more than 90% of the world's languages, and it fails to adequately document what languages the codes refer to (Simons, 2000). However, SIL's Ethnologue (Grimes, 2000) provides a complete system of language identifiers which is openly available on the Web. OLAC will employ the RFC 3066 extension mechanism to build additional language identifiers based on the Ethnologue codes. For the 130-plus ISO-639-1 codes having a one-to-one mapping onto Ethnologue codes, OLAC will support both. Where an ISO code is ambiguous OLAC requires the Ethnologue code. New identifiers for ancient languages, currently being developed by LINGUIST List, will be incorporated. These language identifiers are expressed using the `code` attribute of the `language` and `subject` elements (using the special `x-` prefix of RFC 3066 for user-defined extensions). The free-text content of these elements may be used to specify an alternative human-readable name for the language (where the name specified by the standard is unacceptable for some reason) or to specify a dialect (where the resource is dialect-specific).

### 3.3.2. *The OLAC Linguistic Data Type Vocabulary*

After language identification, another dimension of central importance for language resources is the linguistic type of a resource. Notions such as "lexicon" and "primary text" are fundamental, and the discourse of the language

resources community depends on shared assumptions about what these types mean.

At present, the OLAC Linguistic Data Type Vocabulary (Aristar Dry and Johnson, 2002) distinguishes just three types: *lexicon*, *primary\_text*, and *language\_description*. A *lexicon* is defined as a “systemic listing of lexical entries... Each lexical item may, but need not, be accompanied by a definition, a description of the referent (in the case of proper names), or an indication of the item’s semantic relationship to other lexical items.” A *primary text* is defined as “linguistic material which is itself the object of study, typically material in the subject language which is a performance of a speech event, or the written analog of such an event.” Finally, *language description* is a resource which “describes a language or some aspect(s) of a language via a systematic documentation of linguistic structures.”

### 3.3.3. *Other controlled vocabularies*

Here we list three other OLAC vocabularies. For full definitions, examples and notes, the reader is referred to the cited vocabulary document.

**Discourse Type:** The OLAC Discourse Type Vocabulary describes “the content of a resource as representing discourse of a particular structural type.” (Johnson and Aristar Dry, 2002) The vocabulary terms are as follows: drama, formulaic discourse, interactive discourse, language play, oratory, narrative, procedural discourse, report, singing, and unintelligible speech.

**Role:** The OLAC Role Vocabulary (Johnson, 2002) serves to identify the role of an individual or institution in creating or contributing to a language resource. The vocabulary terms are as follows: annotator, artist, author, compiler, consultant, depositor, developer, editor, illustrator, interviewer, participant, performer, photographer, recorder, researcher, respondent, signer, speaker, sponsor, transcriber, and translator.

**Linguistic Subject:** The OLAC Linguistic Subject Vocabulary (Aristar Dry and Appleby, 2003) describes the content of a resource as being about a particular subfield of linguistic science. The list has been developed in the course of classifying resources on the LINGUIST List website. The vocabulary terms are as follows: anthropological linguistics, applied linguistics, cognitive science, computational linguistics, discourse analysis, forensic linguistics, general linguistics, historical linguistics, history of linguistics, language acquisition, language documentation, lexicography, linguistics and literature, linguistic theories, mathematical linguistics, morphology, neurolinguistics, philosophy of language, phonetics, phonology, pragmatics, psycholinguistics, semantics, sociolinguistics, syntax, text and corpus linguistics, translating and interpreting, typology, and writing systems.

In addition to the five vocabularies discussed here, other vocabularies have been proposed and are being considered by the community.

Once a vocabulary is reviewed and accepted by the community as OLAC best practice in language resource description, the corresponding XML schema is hosted on the OLAC website. Archives which use this vocabulary can then be automatically tested for conformance. Prior to acceptance, any new vocabulary can be set up as a “third-party extension” and adopted by archives without any centralized review process. This bottom-up approach encourages experimentation and innovation, yet only leads to community-wide adoption once the benefit of the new vocabulary for resource discovery has been demonstrated.

### 3.4. XML REPRESENTATION

The XML implementation of OLAC metadata follows the “Guidelines for implementing Dublin Core in XML” (Powell and Johnston, 2002). The OLAC metadata schema is an application profile (Heery and Patel, 2000) that incorporates the elements from two metadata schemas developed by the DC Architecture Working Group for implementing qualified DC. The most recent version of the OLAC metadata schema is posted on the OLAC website at [<http://www.language-archives.org/OLAC/1.0/olac.xsd>], and an example record is available at [<http://www.language-archives.org/OLAC/1.0/olac.xml>].

The container for an OLAC metadata record is the element `olac`, which is defined in a namespace called `http://www.language-archives.org/OLAC/1.0/`. By convention the namespace prefix `olac` is used, and the DC namespace is declared to be the default so that the metadata element tags need not be prefixed. For instance, the following is a valid OLAC metadata record:

```
<olac:olac
  xmlns:olac="http://www.language-archives.org/OLAC/1.0/"
  xmlns="http://purl.org/dc/elements/1.1/"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation=
    "http://www.language-archives.org/OLAC/1.0/
    http://www.language-archives.org/OLAC/1.0/olac.xsd">
  <creator>Bloomfield, Leonard</creator>
  <date>1933</date>
  <title>Language</title>
  <publisher>New York: Holt</publisher>
</olac:olac>
```

In addition to this DC metadata, an element may use a DC qualifier, following the guidelines given in (Powell and Johnston, 2002). The element may specify a refinement (using an element defined in the `dcterms` namespace)

or an encoding scheme (using a scheme defined in `dcterms` as the value of the `xsi:type` attribute), or both. Note that the metadata record must declare the `dcterms` namespace as follows: `xmlns:dcterms="http://purl.org/dc/terms"`. For instance, the following element represents a creation date encoded in the W3C date and time format:

```
<dcterms:created xsi:type="dcterms:W3C-DTF">2002-11-28
  </dcterms:created>
```

The `xsi:type` attribute is a directive that is built into the XML Schema standard [<http://www.w3.org/XML/Schema>]. It functions to override the type definition of the current element by the type definition named in its value. In this example, the value of `dcterms:W3C-DTF` resolves to a complex type definition in the XML schema for the `dcterms` namespace.

Any element may also use the `xml:lang` attribute to indicate the language of the element content. For instance, the following represents a title in the Lau language of Solomon Islands and its translation into English:

```
<title xml:lang="x-sil-LLU">Na tala 'uria na idulaa
  diana</title>
<dcterms:alternative xml:lang="en">The road to good
  reading</dcterms:alternative>
```

For further detailed discussion of the XML format, the reader is referred to (Simons and Bird, 2002a; Simons and Bird, 2003).

### 3.5. MAPPING OLAC METADATA TO OTHER FORMATS

As we have seen, OLAC metadata uses attributes to support resource description using controlled vocabularies, and service providers may use these attributes to perform precise searches. However, service providers also need to be able to display metadata records to users in an easy-to-read format. This involves translating coded attribute values into human-readable form, and combining this information with the element content to produce a display of all information pertaining to a metadata element (Simons, 2003).

Transforming OLAC metadata records into such a display format is a non-trivial task. Instead of having each service provider perform this task independently, OLACA, the OLAC Aggregator (Simons and Bird, 2003) offers a human-readable version of all OLAC metadata. Service providers can harvest this metadata, and expose the content of the metadata elements to end-users without any further processing.

Beyond this, the OLAC website exposes human-readable versions of OLAC metadata to wider communities. First, a simple DC version of the human-readable metadata is exposed to OAI service providers, so that all

OLAC archives show up in digital library catalogs of the wider OAI community (e.g. in the ARC service <http://arc.cs.odu.edu/>). Second, an HTML version of the human-readable metadata is exposed to web crawlers, permitting all OLAC metadata records to be indexed by web search engines and to be stored in internet archives.

#### 4. Conclusions

As language resources proliferate, and as the associated community grows, the need for a consistent and comprehensive framework for resource description and discovery is becoming critical. OLAC has addressed this need by providing metadata tailored to the needs of language resource description, minimally extending the DC standard. At the same time, the OAI Protocol for Metadata Harvesting on which the OLAC infrastructure is built permits end-users to search the contents of multiple archives from a single location.

OLAC provides a ready *template* for resource description, with two clear benefits over traditional full-text description and retrieval. First, the template guides the resource creator in giving a *complete description* of the resource, in contrast to prose descriptions which may omit important details. And second, the template associates the elements of a description with *standard labels*, such as *creator* and *title*, permitting users to do focussed searching. Resources and repositories can proliferate, yet a common metadata format will support centralized services, giving users easy access to language resources.

Despite its many benefits, simply making resources findable is insufficient on its own. There must also be a framework in which the community can identify and promote best practices for digital representation of linguistic information to ensure re-usability and long-term preservation. To support this need, OLAC has developed a process which specifies how the community can identify best practices (Simons and Bird, 2002b).

We conclude by calling for wider participation in OLAC. First, the controlled vocabularies used by the OLAC Metadata Set and described in this article are works in progress, and are continuing to be revised with input from participating archives and members of the community. We hope to have provided sufficient motivation and exemplification for readers to be able to contribute to ongoing developments. Second, the OLAC process can be used by community members to develop new vocabularies and other best practice recommendations. Finally, the core infrastructure of data providers and service providers is operational, and individuals and institutions are encouraged to use it for the widespread dissemination of their language resources.

## Acknowledgements

This material is based upon work supported by the National Science Foundation under grants: 9910603 *International Standards in Language Engineering*, and 9978056 *TalkBank*. Earlier versions of this material were presented at the Workshop on Web-Based Language Documentation and Description in Philadelphia, December 2000 (Bird and Simons, 2000), the ACL/EACL Workshop on Sharing Tools and Resources for Research and Education (Bird and Simons, 2001), and the IRCS Workshop on Open Language Archives (Bird and Simons, 2002a). We are indebted to members of the OLAC community for their active participation in the creation and development of the OLAC metadata format.

## References

- Aristar Dry, H. and M. Appleby: 2003, ‘OLAC Linguistic Subject Vocabulary’.  
<http://www.language-archives.org/REC/field.html>.
- Aristar Dry, H. and H. Johnson: 2002, ‘OLAC Linguistic Data Type Vocabulary’.  
<http://www.language-archives.org/REC/type.html>.
- Bird, S. and G. Simons (eds.): 2000, ‘Proceedings of the Workshop on Web-Based Language Documentation and Description’.  
<http://www ldc.upenn.edu/exploration/exp12000/>.
- Bird, S. and G. Simons: 2001, ‘The OLAC Metadata Set and Controlled Vocabularies’. In: *Proceedings of ACL/EACL Workshop on Sharing Tools and Resources for Research and Education*. <http://arXiv.org/abs/cs/0105030>.
- Bird, S. and G. Simons (eds.): 2002a, ‘Proceedings of the IRCS Workshop on Open Language Archives’. <http://www.language-archives.org/events/olac02/>.
- Bird, S. and G. Simons: 2002b, ‘Seven Dimensions of Portability for Language Documentation and Description’. In: *Proceedings of the Workshop on Portability Issues in Human Language Technologies, Third International Conference on Language Resources and Evaluation*. pp. 23–30, Paris: European Language Resources Association. <http://arXiv.org/abs/cs/0204020>.
- DCMI: 2000, ‘Dublin Core Qualifiers’.  
<http://dublincore.org/documents/2000/07/11/dcmes-qualifiers/>.
- DCMI: 2002, ‘DCMI Elements and Element Refinements – a current list’.  
<http://dublincore.org/usage/terms/dc/current-elements/>.
- Grimes, B. F. (ed.): 2000, *Ethnologue: Languages of the World*. Dallas: Summer Institute of Linguistics, 14th edition. <http://www.ethnologue.com/>.
- Heery, R. and M. Patel: 2000, ‘Application profiles: mixing and matching metadata schemas’. In: *Ariadne*, Vol. 25. UK Office for Library and Information networking (UKOLN), University of Bath. <http://www.ariadne.ac.uk/issue25/app-profiles/>.
- ISO: 1998, ‘ISO 639: Codes for the Representation of Names of Languages-Part 2: Alpha-3 Code’. <http://lcweb.loc.gov/standards/iso639-2/langhome.html>.
- Johnson, H.: 2002, ‘OLAC Role Vocabulary’.  
<http://www.language-archives.org/REC/role.html>.
- Johnson, H. and H. Aristar Dry: 2002, ‘OLAC Discourse Type Vocabulary’.  
<http://www.language-archives.org/REC/discourse.html>.

- Lagoze, C. and H. Van de Sompel: 2001, 'The Open Archives Initiative: Building a low-barrier interoperability framework'. In: *Proceedings of the First ACM/IEEE-CS Joint Conference on Digital Libraries*. pp. 54–62.  
<http://www.cs.cornell.edu/lagoze/papers/oai-jcdl.pdf>.
- Powell, A. and P. Johnston: 2002, 'Guidelines for implementing Dublin Core in XML'.  
<http://dublincore.org/documents/2002/09/09/dc-xml-guidelines>.
- Simons, G.: 2000, 'Language identification in metadata descriptions of language archive holdings'. In: S. Bird and G. Simons (eds.): *Proceedings of the Workshop on Web-Based Language Documentation and Description*.  
<http://www ldc.upenn.edu/exploration/expl2000/papers/simons/>.
- Simons, G.: 2003, 'Specifications for an OLAC metadata display format and an OLAC-to-OAI\_DC crosswalk'.  
[http://www.language-archives.org/NOTE/olac\\_display.html](http://www.language-archives.org/NOTE/olac_display.html).
- Simons, G. and S. Bird: 2002a, 'OLAC Metadata'.  
<http://www.language-archives.org/OLAC/metadata.html>.
- Simons, G. and S. Bird: 2002b, 'OLAC Process'.  
<http://www.language-archives.org/OLAC/process.html>.
- Simons, G. and S. Bird: 2003, 'Building an Open Language Archives Community on the OAI Foundation'. *Library Hi Tech* **21**(2). <http://www.arxiv.org/abs/cs.CL/0302021>.
- Svenonius, E.: 2000, *The Intellectual Foundation of Information Organization*. The MIT Press.
- Van de Sompel, H. and C. Lagoze: 2002, 'Notes from the interoperability front: A progress report on the Open Archives Initiative'. In: *Proceedings of the European Conference on Digital Libraries*. pp. 144–157.  
<http://www.openarchives.org/documents/ecdl-oai.pdf>.
- Wolf, M. and C. Wicksteed: 1997, 'Date and Time Formats'.  
<http://www.w3.org/TR/NOTE-datetime>.

*Address for Offprints:* Department of Computer Science and Software Engineering, University of Melbourne, Vic 3010, AUSTRALIA

