RECONSTRUCTING AUTHORITIES
NEW APPROACHES TO THE MANAGEMENT AND USE OF AUTHORITY DATA

Gordon Dunsire
Independent Consultant, Edinburgh, Scotland, UK

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Abstract

This paper describes new features of RDA: Resource Description and Access that support the management and use of authority data in bibliographic information retrieval. The development of RDA is closely associated with the development of international models for bibliographic data, including the IFLA Library Reference Model, International Standard Bibliographic Description, and UNIMARC. RDA is improving its support for linked data communities and for the wider cultural heritage communities, including archives and museums, as part of its development strategy. This activity has benefited significantly from the academic research carried out by Mirna Willer in these areas, as well as her contribution to the development and management of the relevant standards. RDA has recently undergone a complete review, and this paper discusses in detail how the treatment of authority control data in RDA has been influenced by Willer's work.

Introduction

This paper describes features of RDA: Resource Description and Access that have been influenced by the development of international standards for bibliographic description and the application of linked data thinking and technologies.

Dunsire and Willer (2014) discusses the "the application of universal bibliographic control (UBC) in the environment of the Semantic Web and linked data" with examples from RDA as well as the standards developed by the International Federation of Library Associations and Institutions (IFLA). Willer and Dunsire (2014) discuss the interoperability of linked data in RDA and IFLA standards.

The introduction to RDA states that it is "a package of data elements, guidelines, and instructions for creating library and cultural heritage metadata that are well-formed according to international models" (RDA Steering Committee, 2019, April 23b). RDA is a successor to the Anglo-American Cataloguing Rules. It is based on the conceptual models for bibliographic and authority data developed by IFLA. Those models, Functional Requirements for Bibliographic Records (FRBR), Functional Requirements for Authority Data (FRAD), and Functional Requirements for Subject Authority Data (FRSAD), were superseded in 2017 by the IFLA Library Reference Model (LRM) (Riva, Le Bœuf and Žumer, 2017). The LRM is a single consolidated model that also incorporates the report of the IFLA Working Group on Aggregates.

The Co-Publishers of RDA initiated a major project in 2016 to review and enhance the design of the RDA Toolkit website that publishes RDA. The RDA Steering Committee (RSC) responsible for the development of RDA decided to use the RDA Toolkit Restructure and Redesign (3R) project to review the content of RDA to bring it into alignment with the LRM (RDA Steering Committee, 2016). In particular, the RSC had waited to develop the treatment of aggregates and authority data until the outcome of the consolidation process, and recognized that RDA did not offer adequate support in these areas. The 3R project is scheduled to finish at the end of 2019 and the RSC expects to declare the "3R Toolkit" as the official version of RDA in 2020. A "beta" version of the new Toolkit was released in May 2018; the content was declared to be stable enough for the development of policy statements, training documentation, and translations in April 2019.

The 3R Project introduces some new terminology to reflect the shift in focus of bibliographic description from "record" to "data", as reflected in the change in title of the original IFLA models from "bibliographic record" to "authority

data".

The RDA Glossary defines a "metadata description set" as "One or more metadata statements that describe and relate individual instances of one or more RDA entities" and a "metadata statement" as "A piece of metadata that assigns a value to an RDA element that describes an individual instance of an RDA entity" (RDA Steering Committee, 2019, April 23b). A metadata description set includes a library catalogue card, a library card catalogue, a machine-readable catalogue record, an online public access catalogue, a data table in a relational database management system, and an information retrieval service. A description set can be applied at any level of granularity, from a single statement about an entity to the "giant global graph" of linked data envisaged by the inventor of the World-Wide Web (Berners-Lee, 2007).

RDA never fully adopted the original IFLA models because of their incompleteness and some areas of mutual incompatibility, such as the definition of Person in FRBR and FRAD. RDA did not develop instructions for describing the FRBR Group 3 entities for Concept, Event, and Object, and provided only a superficial treatment of Place. RDA did not incorporate the FRAD entities for Identifier and Controlled Access Point. Of these entities, only Place survives in the LRM, which also replaces the FRBR Group 2 entities for Corporate Body and Family with a new entity for Collective Agent. The LRM adds new entities for Agent, Nomen and Timespan. RDA has been able to accommodate all of the LRM entities, and retain Corporate Body and Family as sub-types of Collective Agent, with only minor changes to instructions that support current practice (Dunsire, 2018). The major exception is the LRM treatment of Person which covers only "real" human beings and excludes fictitious persons, animals and other non-human entities, and "personas" or different identities for the same person.

The RSC also wanted to rationalize and generalize the instructions for recording names and titles, access points, and identifiers by combining instructions for transcribing, recording, and constructing data values with the new LRM Nomen entity. In addition, this was an opportunity to improve support for linked data and Semantic Web applications by accommodating data in the form of an Internationalized Resource Identifier (IRI). An IRI is an extension of the concept of a Uniform Resource Identifier (URI).

As a result, RDA now accommodates four distinct methods for recording data values for a single metadata element:

1. Unstructured description: The value is transcribed as a string of characters from a source of information or is supplied ad hoc by the agent who creates the metadata. The string is generally human-readable.
2. Structured description: The value is constructed using a specific procedure to manipulate and concatenate other data values to create a string. The string is generally human-readable.
3. Identifier: The value is taken from a controlled vocabulary that assigns a unique string within a specific local scope. The string is generally only machine-readable.
4. IRI: The value is assigned by a linked data community and is unique in a global scope. The string is generally only machine-readable.

The same approach is used to categorize RDA elements for data that "name" an instance of an entity. The LRM provides the relationship LRM-R13 "has appellation" between the entity Res (which is a super-type of all other entities) and the entity Nomen. This high-level relationship essentially says "any thing has a name". A nomen is defined both by its "nomen string" and the entity for which it is an appellation; the same string "Mirna Willer" constitutes two different nomens if they are assigned to different entities. A nomen is usually only recorded as an entity if an application needs data about the nomen, such as its relationships to other nomen. This is important for authority control, but in most bibliographic description applications it is sufficient to record only the nomen string. RDA provides new elements that relate an entity to access points and identifiers, and redefines existing elements for names and titles:

1. Name/title of an entity: the value is recorded as an unstructured description string or as an IRI of a nomen.
2. Access point for an entity: the value is recorded as a structured description or as an IRI of a nomen.
3. Identifier for an entity: the value is recorded as an identifier or as an IRI of a nomen.

The following are equivalent metadata description sets:

Set A:

- <Person1><has name of person> "Mirna Willer".

Set B:

- <Person1><has name of person><Nomen1>.
- <Nomen1><has nomen string> "Mirna Willer".

This accommodates the two models for nomens given in Figure 4.1 for alternative entity-relationship models for nomens in the LRM (Riva, Le Bœuf and Žumer, 2017).

RDA does not treat an IRI as a nomen because it is not recorded as a string in linked data applications, and there is no need to provide metadata to describe aspects of an IRI because this is achieved by de-referencing in linked data applications. Further information about de-referencing is available in Willer and Dunsire (2013).

A structured description is a string that may be constructed from other strings that are the values of bibliographic elements. For example, an access point for a person may contain a name, profession, and place of residence of the person: "Willer (Librarian, Zagreb, Croatia)". The specification of which element values to include, their order, and the punctuation used to delimit them is called a "string encoding scheme" (SES) in RDA. The concept is an extension of the concept of a "syntax encoding scheme" defined by the Dublin Core Metadata Initiative (DCMI) as "a string formatted in accordance with a formal notation, such as "2000-01-01" as the standard expression of a date" (DCMI Usage Board, 2007). There is no standardized method for documenting an SES. The scheme for this example might be specified as "<Person: surname> + '(' +<Person: profession or occupation> + ', ' + <Person: place of residence> + ')'". Component values themselves may be the result of applying an SES: the value for <Person: place of residence> is "<Place: preferred name of place>[local place] + ', ' +<Place: preferred name of place> [larger place]".

Authority control

The LRM says "…the model does not make a distinction between data traditionally stored in bibliographic or holdings records and data traditionally stored in name or subject authority records … The modelling of all categories of authority records used in current library practice is quite complex and outside the scope of the model" (Riva, Le Bœuf and Žumer, 2017).

Willer and Dunsire(2013) state "The essence of bibliographic information organization is to identify and to collocate." This is expanded and specified

in the objectives and functions of the catalogue given in the 2015 revision of the International Cataloguing Principles (IFLA Cataloguing Section and IFLA Meetings of Experts on an International Cataloguing Code, 2016) which reflect the five user tasks given in the LRM: find, identify, select, obtain, explore (Riva, Le Bœuf and Žumer, 2017).

Authority data is used to support the find, identify, and explore functions. An access point helps a user to find a fuller metadata description set for an entity. An access point may contain sufficient data to identify an entity without the need for other metadata statements. Relationships between access points and the collocation of access points in a sorted list allow a user to navigate metadata description sets for different entities and discover associations between entities.

The "identify" function can be split into two categories: identification by machine in data processing applications, and identification by human users. In local automated authority control systems, this is reflected in the assignment of an authority control number and an authorized access point. For example, a search for "Mirna Willer" in the Library of Congress Name Authority File (Library of Congress, 2019, April 23) displays a label for "Willer, Mirna" as the authorized access point, and an identifier number "no2009154799".

The development of the IRI as an identifier for linked open data and the Semantic Web has had a profound impact on the modelling and practice of authority control. An IRI is the main component of a universal or global machine-readable identification system. It builds on the technologies of the Uniform Resource Locator (URL) used to specify the location of an online document on the World-Wide Web.

The LCNAF label uses a hyperlink with the URL "http://id.loc.gov/authorities/names/no2009154799" to connect to the authority record for "Willer, Mirna". The URL is derived by adding the LCNAF identifier as a "local part" to a base World-Wide Web domain. This is a common method for deriving URLs because the base domain is globally unique, and the identifier is compact as well as being locally unique. The same method is used to derive namespaces for IRIs, as discussed in Willer and Dunsire (2013). A URL is a form of IRI, so the LCNAF URL can be used as a value for the RDA IRI recording method.

The question is: what does the IRI <http://id.loc.gov/authorities/names/no2009154799> identify? More precisely: what real-world object is the referent of the IRI? The URL does not "locate" the person known as "Mirna Willer". It is the location of a document that contains a metadata description set. What is

being described can be difficult to determine. For this example, it seems reasonable to assume that the URL/IRI refers to the access point "Willer, Mirna": a source of information is given as "UNIMARC manual. Authorities format, 2009:t.p." with the form of name found in that source, "Mirna Willer". But other description sets in LCNAF, for example for "Rowling, J. K.", contain metadata statements such as "Birth date" and "Field of activity" which are clearly about the person rather than the name. In fact, LCNAF provides a different IRI for the real-world object, the person or other entity behind the name. The IRI for the person known as "Mirna Willer" is <http://id.loc.gov/rwo/agents/no2009154799>. It can be found in the LCNAF metadata statement labelled "Additional information". It uses the same local part, the authority identifier number, with a different base domain. This IRI is associated with a different metadata description set that is exclusively about the person.

This can be very confusing for agents who create, maintain, and use bibliographic metadata. RDA and LRM concepts can help to clarify the semantics of what is a typical name authority control record. The description set for the record is a combination of description sets for at least one nomen and the real-world object that is associated with it. A "real-world object" is a tangible or intangible thing that exists in the world; it is the referent of an IRI that simulates the thing in linked data (Coyle, 2015). There are three different RDA entities involved: a person; a name of the person; and a work that is a metadata description set embodied in the document that is the authority record for the person and name. The Virtual international authority file (VIAF) clusters access points from multiple authority control systems by treating each access point as a concept in the Simple Knowledge Organization System (SKOS) ontology (Isaac and Summers, 2009) and using the "focus" relationship from the Friend of a Friend (FOAF) ontology (Brickley and Miller, 2014) to relate the concept to the real-world object that the concept is "about". Many other systems model names and access points as SKOS concepts in order to apply the features of subject heading systems and thesauri to their management, including the use of preferred and alternative labels (Isaac and Baker, 2015). The semantics are very loose: the concept is the "idea" of a person named "Mirna Willer", not the person or the name. The preferred label of the concept is "Willer, Mirna"; "Mirna Willer" is an alternative label. In this sense, the concept is a cluster of related nomens. A pseudonym is often treated as a separate concept; for example, LCNAF has a separate metadata description set for each of the names "Robert Galbraith" and "Newt Scamander" that are pseudonyms of J.K. Rowling. Dunsire and Willer (2018) discuss the bases and

implications of this approach.

The application of SKOS has a significant limitation because a label is just a string that cannot be described in its own right. The string must be reified, that is, identified as a thing or real-world object. The SKOS Extension for Labels (SKOSXL) was created as an ontology to support the description of labels, such as etymology or provenance information (Miles and Bechhofer, 2009), but it has not been widely adopted for authority control. The same basic functionality is provided by the LRM and RDA entity Nomen. The LRM assigns several high-level attributes and relationships for describing a nomen, for example LRM-E9-A1 "category" and LRM-R17 "is derivation of". The new RDA does not specify values for "category" of nomen; instead, the regular categories of name or title, access point, and identifier are modelled as subtypes of LRM-R13 "has appellation". The new RDA includes over 150 attribute and relationship elements for Nomen, covering the regular categories as well as legacy approaches such as recording separate "parallel" names and titles. This should support a better approach to bibliographic authority control in the future.

Access points

RDA treats names used in the natural order of their vernacular usage as a category of nomen that is separate from names that are processed as access points for bibliographic information retrieval. In RDA, "Mirna Willer" is a value of the element "name of person", and "Willer, Mirna" is a value of the element "access point for person". An access point for an entity is a structured description that is usually based on a name of the entity, to which values from other attributes of the entity are added. The construction of an access point is governed by an SES that specifies the elements to be used as sources of string values.

In RDA, the general process and workflow for constructing an access point can be broken down into three stages:

1. Find the names used to represent the entity.
2. Select a form of name and process it to produce a "base access point".
3. Add qualifiers to a base access point to produce authorized and variant access points.

The names of an entity are found by consulting multiple sources of information. In a bibliographic application, sources of information include a manifestation being described, following the ICP "principle of representation" of how an entity represents itself (IFLA Cataloguing Section et al, 2016). Other sources of information include manifestations of reference works, associated works such as publisher's catalogues, and other works about the entity. It is usual to find more than one form of name, with variation in initials and spelled-out given names, completeness of name, order of parts such as given names and family names, and other differences caused by changing usage over time, constraints on representation by specific publishers, etc. For example, "Mirna Willer" and "M. Willer" are two forms of name; each is treated as a separate nomen.

A base access point is defined in UNIMARC as "that part of the access point that identifies the name of the entity, excluding any qualifying data" (Willer, 2009). One of the forms of name is chosen or "preferred" and is "normalized" into a form that is more consistent for use in the "explore" function. For example, a name that incorporates one or more given names or forenames followed by a family name or surname may be reorganized to bring the family name to the front: "Mirna Willer" becomes "Willer, Mirna". The choice of preferred name and the normalization rules that are applied may be interrelated, and both are relative to the local application intended for the data. Local factors include cultural naming conventions and audience expectations, and the formats required by data-processing software.

Qualifiers or distinguishing data are added to disambiguate base access points for two or more different entities. The entities may belong to same or different entity types; a person and a family, or two distinct places may share the same preferred name and base access point. The choice of qualifiers and the order of their application may be determined by cultural factors. For example, although date of birth is a typical qualifier for a base access point for a person, with the additional utility of sorting the access point by an implicit date of activity, there may be strong objections to the use of such personal data in public information spaces by people who wish to keep such information private. Similar issues apply to gender, place of birth, and other personal attributes, and are driving data privacy legislation in many countries. The framework for deciding on what qualifying data to apply to an access point for a person, that is, the SES to be used, must now accommodate legal and ethical constraints as well as the needs of the application.

RDA notes that qualifiers have several functions:

- Disambiguation.
- Completeness.
- Information.

The disambiguation function provides ad hoc strings to create a distinct access point. The function is described in ICP 5.3.4.5 Distinguishing among Names: "If necessary, to distinguish an entity from others of the same name, further identifying characteristics should be included as part of the authorized access point for an entity" (IFLA Cataloguing Section et al, 2016). For example, the original RDA Toolkit instruction RDA 9.19.1.3 states "Include a date of birth and/or a date of death if needed to distinguish one authorized access point from another."

The completeness function provides strings to conform to a string encoding scheme. For example, the original RDA Toolkit instruction RDA 9.19.1.4 has an optional addition that states "Include a fuller form of name even if there is no need to distinguish between access points. Add a fuller form of name before a date of birth and/or a date of death." This instruction specifies the order of concatenation of data values to form the string. The same SES is applied to all access points in the application.

The information function provides strings for an encyclopaedic application that incorporates data in access points as a structured abstract of the full metadata description set of the entity. For example, the original RDA instruction RDA 9.19.1.1 has an optional addition that states "Include the additional elements … even if they are not needed to distinguish access points representing different persons with the same name". The access point is effectively a proxy for the metadata description set.

The categories of function have their roots in the requirements of a dictionary card catalogue. The categories of function are not mutually exclusive. A "complete" access point may be required as a disambiguated access point, and may contain the same data elements as an "information" access point.

The new RDA provides two sub-types of element for a name of an entity: "preferred name" and "variant name". These are intended to support processes for constructing access points and recording metadata description sets for authority control systems. For example, if "Mirna Willer" is recorded as a value of RDA "preferred name of person", then "M. Willer" may be recorded as a value of RDA "variant name of person". An SES can then specify RDA "preferred name of person" as the string to be normalized as a base access point.

ICP states that "Controlled access points provide the consistency needed for collocating the bibliographic data for sets of resources… Uncontrolled access points may be provided as bibliographic data for names, titles (e.g. the title proper as found on a manifestation), codes, keywords, etc., not controlled in authority data" (IFLA Cataloguing Section et al, 2016).

The new RDA provides two sub-types for an access point for an entity: "authorized access point" and "variant access point". An authorized access point has the same collocation function as an ICP "controlled access point", to bring together the metadata description sets for multiple instances of one or more types of entity. It acts as a human-readable identifier for a real-world object in a local bibliographic information retrieval system. A variant access point, on the other hand, is intended to support the syndetic structure of cross-references required to control the vocabulary of an authorized access point. For example, the variant access point "Willer, M. (Librarian, Croatia)" can direct a user to the authorized access point used to collocate description sets in an application. In this respect, a variant access point collocates the human-readable identifiers of an entity.

The new RDA uses the term "vocabulary encoding scheme", taken from DCMI, to cover authority files as well as controlled terminologies for entity characteristics such as "media type". This reflects the use of SKOS for linked data representations of access points and identifiers. The choice of which kinds of variant are useful for a syndetic structure is determined by the application of one or more SESs that differ from, but are usually based on, the SES used to construct an authorized access point. For example, the "preferred name" element may be replaced by the "variant name" element: "Willer, Mirna …" is replaced by "Willer, M. …". The order of elements may be changed to produce "Willer, M. (Croatia, Librarian)", and so on.

WEMI

The LRM Work, Expression, Manifestation, and Item entities are collectively titled "resource entity" in the Glossary of the new RDA (RDA Steering Committee, 2019, April 23b). ISBD defines the class Resource as "An entity, tangible or intangible, that comprises intellectual and/or artistic content and is conceived, produced and/or issued as a unit, forming the basis of a single bibliographic description" (Dunsire, 2013). A metadata description set for a bibliographic resource needs to include elements from the connected net of item, manifestation,

expression, and work entities specified in Figure 5.1 of the LRM (Riva, Le Bœuf and Žumer, 2017).

The relationship elements that form the net can accommodate machine-readable or human-readable labels to collocate the metadata description sets for each entity in the net. In sources of information, a title of manifestation acts as a collective title of the items that are exemplars, and is used interchangeably to refer to the expressions and works that are embodied. The preferred title of a manifestation, traditionally known as a "title proper", is therefore a useful string for collocating access points for the component resource entities of a resource metadata description set. This is reflected in the ICP statement that "An authorized access point for a work, expression, manifestation, or item may be created either from a title that can stand alone or from a title combined with the authorized access point for the creator(s) of the work" (IFLA Cataloguing Section et al, 2016).

A common SES for an authorized access point for a work precedes the collocating title with an authorized access point for a creator of a work. Effectively, the access point for the work provides a human-readable collocation of the metadata description sets that constitute a traditional bibliographic description of a "resource".

Authority as description

The original RDA allows data values of elements specified in an SES for an access point to be recorded extrinsically, as a value of the element, or intrinsically, as a component string of the access point. For example, RDA 9.16.1.3 states "Record a profession or occupation as a separate element, as part of an access point, or as both". However, the treatment of other, similar elements is more restrictive; RDA 9.15.1.3 states "Field of activity is not recorded as part of an access point." This distinction is removed in the new RDA. An access point may be generated "on the fly" by applying an SES to the values of other recorded data elements, or be recorded as an access point element, or both. A well-designed SES can be used to de-encode an access point into its constituent strings and elements, so an application can choose which data recording approach to use.

In fact, it is possible that every attribute element that is deemed to be useful for a metadata description set for an entity may be deemed useful, across a range of applications, as a component of an SES for an access point. A "super"

access point for an entity may be a complete (structured) description of the entity. From a data perspective, there is no real difference between the established approach to bibliographic description and to authority control that corresponds to RDA's database implementation scenario 2 (Delsey, 2009). This approach is reflected in the separate historical development of the MARC 21 and UNIMARC bibliographic and authority formats in UNIMARC and MARC 21, although this is not a limitation of the machine-readable catalogue (MARC) encoding system. The INTERMARC format used in France is responding to these challenges: "The features of this next-generation format… can be declined into 3 core principles: implementing the entity-relationship design of the IFLA LRM model; expressing relationships at a finer-grained level than that of a "record"; expressing controlled values through individual entities" (Peyrard and Roche, 2018).

The new RDA adds linked data as an implementation scenario, and expects a scenario to determine the fundamental shape of an application profile. Heery and Patel (2000) define application profiles as "schemas which consist of data elements drawn from one or more namespaces, combined together by implementors, and optimised for a particular local application". The implementation of application profiles has been under development by DCMI for a number of years, ranging from the development of guidelines (Baker, Dekkers, Fischer and Heery, 2005) to the recent formation of an Application Profiles Interest Group (Dublin Core Metadata Initiative, 2019, April 23). Typically, an application profile specifies what data elements to use in a standard metadata description set for an entity. The profile may also specify how element values are grouped and combined, whether they are mandatory or repeatable, and what vocabulary encoding schemes are used as sources of element values. The functions of specifying what elements to use and how they are grouped are common to SESs and application profiles.

Conclusion

Social and cultural factors that impact on the management of authority data include naming conventions, language, and user expectations. Such factors affect many aspects of authority control, including:

- Representation of names and titles of entities in sources of information.
- Selection of a value of a name or title to act as a base access point.
- Normalization of a name or title in a base access point.
- Specification of string encoding schemes for access points.
- Specification of application profiles for metadata description sets for authority data.

This suggests that authority control should be treated as a cultural good by national governments, with national libraries taking a leading role. A key recommendation of the Library Linked Data Incubator Group is "That librarians and archivists preserve Linked Data element sets and value vocabularies and apply library experience in curation and long-term preservation to Linked Data datasets" because "Many Linked Data vocabularies are essentially cultural reference works …" (W3C Library Linked Data Incubator Group, 2011). VIAF shows that data produced with a local focus can be interoperable at a global level, but it also demonstrates the duplication of effort that occurs when the scope of authority control is a national collection that extends beyond the bibliographic output of a country; "Willer, Mirna" occurs in at least 17 separate national authority files and VIAF generates yet another IRI <http://viaf.org/viaf/29776655>. It would be much more efficient and effective if national memory institutions focus on managing local authority content according to local cultural norms, within a global framework that allows such content to be processed and re-used in local environments with different cultural approaches to the identification and collocation of metadata for bibliographic information retrieval. The development of RDA and the IFLA standards is intended to support this shift.

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Ključne riječi:
nadzor autoriziranih podataka, bibliografski standardi, povezani podaci

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