

To: Joint Steering Committee for Development of RDA

From: Gordon Dunsire, CILIP representative

Subject: RDF representation of RDA relationship designators: a follow-up discussion paper

Background

The outcomes of JSC discussion of the recommendations of 6JSC/CILIP rep/2 (RDF representation of RDA relationship designators: discussion paper) [CILIP Rep 2] at the November 2012 meeting were:

1. Change the qnames in the OMR to be consistent and include RDA branding. **Accepted by JSC, Action: GD**
2. Continue to represent RDA relationship designators as RDF properties. **Accepted by JSC**
3. Add the existing "Agent" super-class for the range of the RDA designator properties in the *roles* element set. **Accepted by JSC, Action: GD**
4. Identify and remove redundant unconstrained properties representing RDA relationship designators. **Action: GD to identify, for JSC review, redundant unconstrained properties**
5. Move the unconstrained versions of properties in all RDA element sets to separate namespaces. **Accepted by JSC, Action: GD**
6. Simplify the property labels in all RDA element sets, except for those requiring entity differentiation. **Accepted by JSC, Action: GD, JA**
7. Develop and register inverse properties for RDA relationship designators, including domains and ranges. **Action: GD to prepare a discussion paper**
8. Replace the labels of properties for RDA relationship designators with verbal phrases, and ensure that definitions of properties indicate directionality between domain and range entities. **Action: GD to prepare a discussion paper**
9. Replace the labels of properties for all RDA elements with verbal phrases, and ensure that definitions of properties indicate directionality between domain and range entities. **Action: GD to prepare a discussion paper**
10. Do not represent the RDA designators as RDF classes. **Accepted by JSC**
11. Represent RDA designators as RDF concepts in one or more value vocabularies in addition and in parallel to the current representation as RDF properties. **Action: GD to prepare a discussion paper**

[GD = Gordon Dunsire (CILIP); JA = John Attig (ALA)]

Actions 2 and 10 are static and therefore completed. Actions 1, 3, 5, and 6 are being carried out when resources are available. Actions 4, 7, 8, 9, and 11 are completed by this follow-up discussion paper.

It is difficult to present the discussion in separate papers without duplication because many of the issues are inter-related, so a single, albeit lengthy, paper is offered.

The paper also takes into account related issues raised by:

- Canadian Committee on MARC (CCM). MARC DISCUSSION PAPER NO. 2013-DP04: Separating the Type of Related Entity from the RDA Relationship Designator in MARC 21 Bibliographic Format Linking Entry Fields.¹ [MARBI proposal]
- PCC (Program for Cooperative Cataloging). PCC Relationship Designator Guidelines Task Group Report. October 15, 2012, revised March 13, 2013.² [PCC report]
- Relevant discussion recorded in RDA-L archive.³

The paper is based on the content of the RDA Toolkit with July 2013 updates.⁴

Redundant unconstrained properties

[This section completes Action 4.]

Analysis of the unconstrained properties proved to be difficult:

- The unconstrained properties were not yet separated from the FRBR-constrained RDA element sets.
- The element sets for the designators were not synchronized with the RDA Toolkit. For example, the element set has "honouree (Work)" as the label of the constrained property, and "honouree" for the unconstrained property, while the Toolkit has the label "honouree" for the constrained designator.
- The element sets contain properties for non-existent RDA designators from early drafts. For example, "composer of music for silent film" and "composer of music for sound film".

As a result, the approach of identifying redundant properties by analysing the element sets was abandoned in favour of developing a new set of unconstrained properties from the current Toolkit designators.

The methodology and output are given in *Appendix 1*.

The RDA element set properties include representation of the high-level categories of designator which are referenced in the RDA Toolkit appendices and text; for example "creator", "other person, family, or corporate body associated with a work", etc. The number of properties is therefore greater than the number of specific designators.

There are 126 unconstrained properties and 135 constrained properties for designators in RDA Toolkit Appendix I. That is, the unconstrained redundancy is 7 properties out of a total of 135, or just over 5 percent.

¹ Available at: <http://www.loc.gov/marc/marbi/2013/2013-dp04.html>

² Available at: <http://www.loc.gov/aba/pcc/rda/RDA%20Task%20groups%20and%20charges/PCC-Relat-Desig-TG-report.rtf>

³ Available at: <http://www.mail-archive.com/rda-l@listserv.lac-bac.gc.ca/>

⁴ Available at: <http://www.rda-jsc.org/docs/6JSC-ALA-13-Sec-final.pdf> and <http://www.rda-jsc.org/docs/6JSC-Sec-9.pdf>

There are 178 unconstrained properties and 356 constrained properties for designators in RDA Toolkit Appendix J. That is, the unconstrained redundancy is 178 properties out of a total of 356, or 50 percent.

Some specific reasons for the redundancy rates are:

- Properties with similar labels and definitions qualified with FRBR and FRAD terms collapse into the generic "resource" and "agent" unconstrained versions. This is the principle reason for the high redundancy in RDA Toolkit Appendix J.
- FRBR-specific "other" properties (*otherPFCWork* and *otherPFCItem*) collapse into *otherPFCResource*.
- As noted in CILIP Rep 2, "editor of compilation" collapses to "compiler".

Element set issues

Generic terms

The unconstrained properties definition use the generic terms "agent" and "resource".

As noted in CILIP Rep 2 there is a proposed class Agent in the *FRBR Entities for RDA* element set, with no definition although there is a reference to the CIDOC/CRM element set.⁵ The CRM class Actor "comprises people, either individually or in groups, who have the potential to perform intentional actions for which they can be held responsible".

Discussion: A definition for the RDA class Agent based on the CRM might be "People, either individually or in groups, who perform intentional actions on resources for which they can be held responsible". On the other hand, a more specific definition derived from the FRBR/FRAD terms might be "A person, family, or corporate body". This definition is preferable because it reflects the context of the RDA element sets where the Agent class is used as the domain or range of properties with definitions incorporating the same phrase.

Recommendation: Use the FRBR/FRAD-derived definition for the RDA class Agent.

The class Agent is not used for the domain or range of unconstrained properties because they are required to be undefined. There is therefore no requirement for a class Resource in the RDA element set. The RDA Toolkit Glossary defines "resource" as "A work, expression, manifestation or item. The term includes not only an individual entity but also aggregates and components of such entities (e.g., three sheet maps, a single slide issued as part of a set of twenty, an article in an issue of a scholarly journal). It may refer to a tangible entity (e.g., an audiocassette) or an intangible entity (e.g., a Web site)". The term "entity" is not defined in the RDA Toolkit, but presumably here means a manifestation or manifestation/item aggregate. See the discussion in the *Inconsistent definitions* section of *Issues for RDA Toolkit Appendix I* elsewhere in this paper.

Discussion: Although the machine-actionable semantics of the unconstrained properties are not affected by the definition, it may be preferable to use the more specific terms "bibliographic agent"

⁵ <http://rdvocab.info/uri/schema/FRBREntitiesRDA/Agent>

and "bibliographic resource" in the definitions to reflect on-going discussions in the linked data communities about the relationship between real-world objects and their metadata representations. For example the RDA Toolkit Glossary definition of person is "An individual or an identity established by an individual (either alone or in collaboration with one or more other individuals)", which is broader than the real-world person ("individual") because it includes identities representing a group of such persons. This is reflected in the FRBR and FRAD element sets which represent the entities Person and Work, for example, as sub-classes of Bibliographic Entity to accommodate the distinction. The ISBD element set has a Resource class with definition "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 ", but the relationship between this and the FRBR WEMI classes is under current investigation by the ISBD Review Group; this, in turn, should improve interoperability between RDA and ISBD linked data. On the other hand, making this distinction in the definition will make the unconstrained properties appear less general and therefore less applicable to non-RDA communities.

Recommendation: Seek the views of linked data communities on preferences for generic terminology in the unconstrained property definitions.

Choice of definition of unconstrained properties.

There are several cases where there are necessary differences in the phrasing of definitions of constrained RDA Toolkit designators which collapse into a single unconstrained property. The choices of which constrained definition was used to derive the unconstrained definition are:

Unconstrained property label	Definition based on constrained property label
accompanied by	accompanied by (manifestation)
reprint of	reprint of (manifestation)
reproduction of	reproduction of (manifestation)
script for the radio program	script for the radio program (expression)

Recommendation: Accept the current choice of definitions of unconstrained properties where there are necessary differences in the phrasing of definitions of the constrained originals, in order to publish the properties, but review in due course.

Lack of definitions for high-level categories of designator

The RDA Toolkit does not contain suitable text to use as the basis of definitions for the high-level categories of designator in RDA Toolkit Appendix J. For example there is no specific definition of "sequential expression", and therefore of the unconstrained property "sequential relationship".

Recommendation: Develop definitions for high-level categories of designator in RDA Toolkit Appendix J, from which RDF property definitions can be derived, or develop RDF definitions directly.

Property labels

[This section relates to Action 6.]

Analysis has identified a number of properties where the label can be simplified by making minor amendments to the RDA Toolkit. These are discussed in *Appendix 5*.

Inverse properties

[This section completes Action 7.]

RDA Toolkit Appendix J already contains reciprocal designators which are represented as inverse properties.

A set of inverse properties was developed for RDA Toolkit Appendix I. The methodology and output are given in *Appendix 2*.

A set of unconstrained properties was then derived from the inverse properties; the methodology and output are given in *Appendix 1*.

Discussion: The local URIs, labels and definitions generated are superficially similar to those of the original properties because of their derivation. This is likely to cause confusion if the inverse properties are included in the same element set as the original; for example "abridger" and "abridger of".

Recommendation: Represent inverse properties based on RDA Toolkit Appendix I in a different element set to the original properties by using a separate sub-domain for the URIs, to improve clarity.

Symmetric properties

The following properties based on RDA Toolkit Appendix J are symmetric; that is, they are their own inverse:

- accompaniedByItem
- accompaniedByManifestation
- boundWith
- equivalent
- filmedWithItem
- filmedWithManifestation
- mirrorSite
- onDiscWithItem
- onDiscWithManifestation

Properties based on RDA Toolkit Appendix I cannot be symmetric because they relate two different types of entity, that is, FRBR group 1 and FRBR/FRAD group 2.

The only property based on RDA Toolkit Appendix K that is symmetric is "mergee".

Verbal labels and definitions (designators)

[This section completes Action 8.]

Using verbal phrases in its label and definition clarifies the direction of an RDF property, from its domain to its range, and from the subject of a data triple using the property to its object. The RDA Toolkit relationship designator labels are singular nouns and definitions refer in the main only to the range (the target of the element or designator).

Reasonable verbalization of labels and definitions can be achieved using simple patterns to transform the RDA Toolkit text. The patterns are discussed later in this section.

Appendix 4 gives the results of applying these design patterns to properties based on RDA Toolkit relationship elements and designators.

Recommendation: Use the specified design patterns for the labels and definitions of properties based on RDA Toolkit relationship designators.

Property labels

Appendix I

A simple design pattern for properties based on RDA Toolkit Appendix I designators is to prefix the designator label with the verb "has". An example is:

Designator label	Property label = "has" + Designator label
abridger	has abridger

This results in the data triple template <FRBR group 1 (WEMI)> - <has role> - <Agent (PFC)>. For example, *Expression - has abridger – Agent*.

A simple design pattern for inverse properties based on RDA Toolkit Appendix I designators is to prefix the inverse property label with the verb "is". The inverse property label is in turn derived from the designator label using the suffix preposition "of"; see *Appendix 2*. An example is:

Inverse property label	Property label = "is" + Inverse property label
abridger of	is abridger of

This results in the data triple template <Agent (PFC)> - <has role> - <FRBR group 1 (WEMI)>. For example, *Agent - is abridger of - Expression*.

Table 1.1. Inverse of Appendix 1 gives the results of applying this design pattern to the inverse properties based on RDA Toolkit Appendix I.

Appendix J

A simple design pattern for properties based on RDA Toolkit Appendix J designators is to prefix the designator label with the verb "is" irrespective of the direction of the property. Examples are:

Designator label	Property label = "is" + Designator label
abridged as (expression)	is abridged as (expression)
abridgement of (expression)	is abridgement of (expression)

This results in the data triple templates <FRBR group 1 (WEMI)> - <is relationship> - <FRBR group 1 (WEMI)> and <FRBR group 1 (WEMI)> - <has relationship> - <FRBR group 1 (WEMI)>. For example, *Expression A - is abridged as (expression) - Expression B* and *Expression B - is abridgement of (expression) - Expression A*.

A simple design pattern for properties based on relationship elements for RDA Toolkit Appendix J designators is to prefix the element label with the verb "has" irrespective of the direction of the property. Examples are:

Element label	Property label = "has" + Element label
work expressed	has work expressed
expression of a work	has expression of a work

This results in the data triple template <FRBR group 1 (WEMI)> - <has relationship> - <FRBR group 1 (WEMI)>. For example, *Expression - has work expressed - Work* and *Work - has expression of a work - Expression*.

Appendix K

A simple design pattern for properties based on RDA Toolkit Appendix J designators is to prefix the designator label with the verb "has", irrespective of inverse directions. Examples are:

Designator label	Property label = "has" + Designator label
employee	has employee
employer	has employer

This results in the data triple template <Agent (PFC)> - <has relationship> - <Agent (PFC)>. For example, *Corporate Body - has employee - Person* and *Person - has employer - Corporate Body*.

Property definitions

Appendix I

A simple design pattern for properties based on RDA Toolkit Appendix I designators is to prefix the designator definition with the verbal phrase "Relates a/an" followed by the RDF domain class label followed by the conjunction "to". An example is:

Designator definition [abridger]	Property definition = "Relates a/an" + Domain + "to" + Designator definition
A person, family, or corporate body contributing to an expression of a work by shortening or condensing the original work but leaving the nature and content of the original work	Relates an expression to a person, family, or corporate body contributing to an expression of a work by shortening or condensing the original work but leaving the nature and content of the

substantially unchanged.	original work substantially unchanged.
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A simple design pattern for inverse properties based on RDA Toolkit Appendix I designators is to prefix the designator definition with the verbal phrase "Relates " and suffix it with the conjunctive phrase "to the" and the RDF domain class label. An example is:

Designator definition [abridger]	Property definition = "Relates " + Designator definition + "to the" + Domain
A person, family, or corporate body contributing to an expression of a work by shortening or condensing the original work but leaving the nature and content of the original work substantially unchanged.	Relates a person, family, or corporate body contributing to an expression of a work by shortening or condensing the original work but leaving the nature and content of the original work substantially unchanged to the expression.

Appendix J

A simple design pattern for properties based on RDA Toolkit Appendix J designators is to prefix the designator definition with the verbal phrase "Relates a/an" followed by the RDF domain class label followed by the conjunction "to", or prefix the designator definition with the verbal phrase "Relates " and suffix it with the conjunctive phrase "to the" and the RDF domain class label, depending on the direction of the property. Examples are:

Designator definition [abridged as (expression)]	Property definition = "Relates a/an" + Domain + "to" + Designator definition
An expression of a work that shortens the source entity without changing the general meaning or manner of presentation.	Relates an expression to an expression of a work that shortens the source entity without changing the general meaning or manner of presentation.
Designator definition [abridgement of (expression)]	
An expression of a work that has been abridged, i.e., shortened without changing the general meaning or manner of presentation of the source work.	Relates an expression to an expression of a work that has been abridged, i.e., shortened without changing the general meaning or manner of presentation of the source work.

Appendix K

A simple design pattern for properties based on RDA Toolkit Appendix K designators is to prefix the designator definition with the verbal phrase "Relates a" followed by the RDF domain class label followed by the conjunction "to", irrespective of inverse directions. Examples are:

Designator definition [employee]	Property definition = "Relates a" + Domain + "to" + Designator definition
A person employed by the corporate body.	Relates a corporate body to a person employed by the corporate body.
Designator definition [employer]	
A corporate body that employs the person.	Relates a person to a corporate body that employs the person.

Verbal labels and definitions (other element set properties)

[This section completes Action 9.]

Property labels

A simple design pattern for properties based on RDA Toolkit elements is to prefix the designator element with the verb "has". Examples are:

Element label	Property label = "has" + Element label
other distinguishing characteristic of the expression	has other distinguishing characteristic of the expression
preferred title for the work	has preferred title for the work

This results in the data triple template <FRBR group 1 (WEMI)> - <has attribute> - "literal"/<RDA element>>. For example, *Expression - has other distinguishing characteristic of the expression - <vocal score>* and *Work - has preferred title for the work – "Relationship designators"*.

Property definitions

A simple design pattern for properties based on RDA Toolkit Appendix I elements is to prefix the element definition with the verbal phrase "Relates a/an" followed by the RDF domain class label followed by the conjunction "to". An example is:

Element definition [other distinguishing characteristic of the expression]	Property definition = "Relates a/an" + Domain + "to" + Designator definition
A characteristic other than content type, language of expression, or date of expression.	Relates an expression to a characteristic other than content type, language of expression, or date of expression.
Element definition [preferred title for the work]	
A characteristic other than content type, language of expression, or date of expression.	Relates an expression to a characteristic other than content type, language of expression, or date of expression.

Value vocabulary representation

[This section completes Action 11.]

Further analysis of the utility of value vocabulary representations of the RDA Toolkit relationship designators has not identified any pressing need to develop such vocabularies at the present.

There is little evidence of a desire to use the designators as values to disambiguate authorized headings. They are not required to be represented as concepts in the context of the MARBI proposal, discussed in the *Use of RDA relationship elements and designators in MARC 21 records* section, and the MARC Advisory Committee discussion of the proposal asked whether designating the type of relationship, the RDA approach, would be the right choice, or whether designating the type of related entity would fit better. The latter approach would involve representing the related entity as a class or member of a value vocabulary. Another factor is that the MARC relator

namespace declares each relator URI as a value vocabulary SKOS concept as well as an element set RDF property. There appears to be no established best practice in the wider Semantic Web environment.

Recommendation: Continue to monitor the need for value vocabulary representations of the RDA Toolkit relationship elements and designators.

Relationship elements

The phrase "relationship element" is used in RDA:

RDA Toolkit section	Text
0.5	The relationship designators define the relationship more specifically than the relationship element by itself. [x3]
0.6.7	When recording relationships between a work and an entity that is the subject of that work, include as a minimum at least one subject relationship element.
18.5.1.1	The defined scope of a relationship element provides a general indication of the relationship between a resource and a person, family, or corporate body associated with the resource (for example, creator, owner).
24.5.1.1	The defined scope of a relationship element provides a general indication of the relationship between works, expressions, manifestations, or items (for example, related work, related item).
29.5.1.1	The defined scope of a relationship element provides a general indication of the relationship between persons, families, or corporate bodies (for example, related person, related corporate body).
I.1; J.1; K.1	If the relationship element is considered sufficient for the purposes of the agency creating the data, do not use a relationship designator to indicate the specific nature of the relationship.

Only examples of such elements are given; there is no overall list. The elements are given in Appendix I, Appendix J, and Appendix K as part of the categorization or grouping of the relationship designators, for example I.2.1 (Relationship Designators for Creators), where they are scattered by the higher level FRBR/FRAD entity relationship, for example I.2 (Relationship Designators for Persons, Families, and Corporate Bodies Associated with a Work). The RDA Toolkit Element hierarchy lists these elements under the sub-heading "relationships" and then the sub-headings "primary", "core", and "enhanced", which also scatters them.

RDA element	Category	Domain	Range
contributor	enhanced	Expression	Agent
creator	core	Work	Agent
custodian	enhanced	Item	Agent
distributor	enhanced	Manifestation	Agent

exemplar of manifestation	primary	Manifestation	Item
expression manifested	primary	Manifestation	Expression
expression of a work	primary	Work	Expression
manifestation exemplified	primary	Item	Manifestation
manifestation of a work	primary	Work	Manifestation
manifestation of expression	primary	Expression	Work
manufacturer	enhanced	Manifestation	Agent
other person, family, or corporate body associated with a manifestation	enhanced	Manifestation	Agent
other person, family, or corporate body associated with a work	core	Work	Agent
other person, family, or corporate body associated with an item	enhanced	Item	Agent
owner	enhanced	Item	Agent
producer of an unpublished resource	enhanced	Manifestation	Agent
publisher	enhanced	Manifestation	Agent
related expression	enhanced	Expression	Expression
related item	enhanced	*Item	Item
related manifestation	enhanced	*Manifestation	Manifestation
related work	enhanced	Work	Work
work expressed	primary	Expression	Work
work manifested	primary	Manifestation	Work

The relationship elements "custodian" and "other person, family, or corporate body associated with a manifestation" have no specific relationship designators. They are therefore not referenced from RDA Toolkit Appendix I. This is not an issue for the RDF representation, as shown by the hierarchies given in *Appendix 3*.

Recommendation: Improve the presentation of the relationship between relationship elements and relationship designators in the RDA Toolkit.

The RDF properties representing relationship elements have no super-properties because they are directly related to FRBR/FRAD entities and generalization to coarser elements or unconstrained versions is either not required or meaningless.

Designator property hierarchies

Appendix 3 shows the hierarchies of properties based on the RDA Toolkit relationship elements and designators. The hierarchies are given in both fine-to-coarse and coarse-to-fine granularity sequences.

Use of RDA relationship elements and designators in MARC 21 records

The MARBI proposal discusses the use of parenthetical qualifiers in RDA Toolkit Appendix J relationship designators which "have been problematic because, while they make sense to catalogers who are familiar with the FRBR model, they are a source of confusion for the public". The

proposal wishes to "find a mechanism that enables a more user-friendly method of displaying the text of the relationship designator, while continuing to accommodate the complete designators defined in RDA". When discussing an earlier proposal that a new set of relationship codes be developed separately from the current MARC relators, the MARBI proposal notes "It would be very interesting to explore the possibility of using a URI pointing to the already established vocabulary of RDA relationship designators in the Open Metadata Registry in §4". The outcome of discussion of the MARBI proposal in January 2012 was to develop another discussion paper which includes a place for user-friendly labels and for codes for future discussion by the MARC Advisory Committee.

Constrained versus unconstrained properties

The constrained properties based on RDA Toolkit relationship elements and designators have domains and ranges of RDA classes based on FRBR and FRAD entities. Domains and ranges contain machine-actionable information about the intended semantics of the property. Specifically, if the property is used in a data triple, then the subject of that triple can be automatically inferred to be an instance of the class which is the domain, and the object of that triple can be inferred to be of the class which is the range. For example, the data triple *ex:123 rda:abridgedAsExpression ex:456* can be processed by automatic reasoner software to output the data triples *ex:123 isA rda:Expression* and *ex:456 isA rda:Expression* (*isA* is a shorthand for the *rdf:type* property).

The semantics of a MARC 21 record remain ambiguous in terms of the FRBR and FRAD models. The historic consensus is that a MARC 21 record describes a manifestation, although it includes data about that manifestation's expression, and the expression's work. It is not clear at this stage whether the BIBFRAME initiative will clarify the semantics; in the context of RDA, this effectively requires a FRBRization process. If the URI of a constrained RDA designator is used in a MARC 21 record in the current circumstances, output of that record as linked data may lead to unwanted and contradictory inferences. One of the simpler ways of outputting legacy records as linked data is to assume that the subject of every data triple is the same thing, that is, the bibliographic resource (manifestation) that the record describes. If constrained designators with different domains are used in that record, an example output might be the two data triples:

- *ex:123 rda:abridgedAsExpression ex:456*
- *ex:123 rda:reprintOfManifestation ex:789*

Here, the example URI *ex:123* is a referent to what the record describes. Reasoner software will infer that:

- *ex:123 isA Expression*
- *ex:123 isA Manifestation*

But the strong semantics of the FRBR model say that something (here identified by the URI *ex:123*) cannot be both an expression and a manifestation, so at least one of the inferred triples is incorrect, which implies that at least one of the original data triples is incorrect.

This suggests that it would be inappropriate to use the constrained RDA properties in MARC 21 records until these issues are resolved.

The unconstrained properties cannot be used to infer these triples because they have no domain or range. For example, no inference about the FRBR group 1 of the resource can be inferred from the two data triples:

- *ex:123 rda:abridgedAs ex:456*
- *ex:123 rda:reprintOf ex:789*

Use of unconstrained properties also removes the issue of parenthetical qualifiers.

Recommendation: Advocate the use of URIs and labels for unconstrained RDA properties based on RDA Toolkit relationship elements and designators for metadata which is not FRBRized.

The issue of qualified labels is not resolved, however for FRBRized metadata schema where it is desirable to use the constrained properties. Possible solutions are:

- Add explicit user-friendly labels without parenthetical qualifiers to the RDA Toolkit and element set. This would require a new RDF property to relate the label to the element, say *hasMARCLabel*. Such labels would be in addition to the labels disambiguated with qualifiers.
- Make the RDA Toolkit labels more user-friendly. For example "abridged as expression" instead of "abridged as (expression)". Although this removes the parentheses, it does not remove the "jargon" of FRBR.
- Issue an instruction to remove the parenthetical qualifier from the RDA Toolkit or element label for specific applications such as MARC 21 and other non-FRBR schema.
- Advise the use of external element sets, such as MARC relator codes and labels.

Recommendation: Encourage further discussion on the issue of "cataloguer-friendly" and "user-friendly" labels in metadata based on the FRBR/FRAD models.

MARC 21 relators

Appendix E of the PPC report contains a spread-sheet table aligning MARC relator codes with RDA relationship designators. This data was used as the basis of an RDF map between the properties representing the designators in RDA Toolkit Appendix I and the URIs of the MARC Code List for Relators [MARC relators]⁶.

Subsequently, the Network Development and MARC Standards Office of the Library of Congress announced a revision to the MARC relators to "facilitate use of a broader set of roles than had previously been available in MARC and in other carrier formats".⁷ In particular, codes, labels, and definitions have been added to or amended within the MARC relators to correspond to the RDA designators; 38 MARC codes were added and 2 deprecated as a result. The MARC relators are linked to the primary RDA roles (primary roles and designators) and the FRBR entities using the *mads:isMemberOfMADSCollection* property from the MADS element set. They are also linked to BIBFRAME entities in the same way.

⁶ Available at <http://id.loc.gov/vocabulary/relators.html>

⁷ Available at <http://www.loc.gov/marc/anmarcrdarelaters.html>

One of the intended functions of the unconstrained versions of the RDA properties is to be used in the environment of non-FRBR communities. The MARC relators are not rigidly coupled to the FRBR entities; for example the RDA designators "composer" and "composer (expression)" have been collapsed into a single MARC relator, which is linked to both Work and Expression entities.

Therefore, the best mapping is between the unconstrained versions of the RDA designators and the MARC relators. However, many of the new and amended MARC relator definitions are based on the definitions of the constrained RDA designators. It should also be noted that the July updates to the RDA Toolkit have de-synchronized some of the new MARC relator definitions; for example librettist is now defined in RDA as "An author of the words of an opera or other musical stage work, or an oratorio." and in MARC relators as "An author of a libretto of an opera or other stage work, or an oratorio."

The PCC alignments have been updated by comparing the RDA designator definitions and scope and usage notes with the revised MARC relators. The alignments are given in *Table 1.1 of Appendix 1*.

The choice of property and pattern to represent the alignment is yet to be decided. The simplest possibilities are:

1. RDA rdfs:subPropertyOf MARCRel
2. MARCRel rdfs:subPropertyOf RDA
3. RDA owl:equivalentProperty MARCRel

The main general differences between the unconstrained RDA designator and MARC relator properties are:

RDA designator	MARC relator
The property label has initial letter in lower-case. For example "abridger".	The property label has initial letter in upper-case. For example "Abridger".
The proposed definition avoids the use of FRBR group 1 terms "work", "expression", "manifestation", and "item" in favour of "resource". For example "A person, family, or corporate body contributing to a resource by shortening or condensing the original resource but leaving the nature and content of the original resource substantially unchanged."	The definition of a new property is based on the constrained RDA property which uses FRBR group 1 terms. For example "A person, family, or organization contributing to a resource by shortening or condensing the original work but leaving the nature and content of the original work substantially unchanged."
The proposed definition uses the term "corporate body" referring to the FRBR group 2 entity.	The definition uses the term "organization", even for a new property based on the RDA property.
The URI is typed as rdf:property.	The URI is typed in addition to rdf:property. For example MADS/RDF Authority; SKOS Concept; MADS/RDF Topic; OWL ObjectProperty.

The extent to which the MARC relator properties are aligned with BIBFRAME is unknown. This suggests that the best choice of mapping property and pattern for the time being is the second, with the MARC relator property given as a sub-property of the unconstrained RDA designator. The RDA

designator is intended to be as unconstrained by BIBFRAME as it is by FRBR, and the ontological equivalence of RDA designators and MARC relators is uncertain until BIBFRAME is stable.

This mapping pattern also caters for the non-equal alignment of the MARC relators "Cinematographer" and "Videographer" with the single RDA designator "director of photography". There is no reason, of course, why every case has to be accommodated by a single pattern.

Recommendation: Publish an RDF representation of the alignment between RDA Toolkit Appendix I and MARC relators using the *MARC relator property sub-property of RDA designator property* mapping pattern, dependent on acceptance of the definitions of the unconstrained RDA properties, to improve utility.

Recommendation: Develop liaison with the Library of Congress Network Development and MARC Standards Office to improve interoperability between the RDA designators and MARC relators.

Synchronization of RDA Toolkit and RDA namespace

The simple design patterns discussed in the *Verbal labels and definitions* sections allow a single source of text to be machine-processed for the text of the RDA Toolkit and the significantly different text of the RDA namespace, including the Registry name in CamelCase as well as the proposed verbal labels and definitions and unconstrained property labels and definitions. The current process for the RDA Toolkit is direct copy.

The results are not perfect, for example the definition of "equivalent" in *Table 1.J in Appendix 1* is "Relates a resource to a resource embodying the resource" when the simple design pattern is applied. In most cases, however, the results are tolerable.

The use of definite and indefinite articles in definitions is not completely coherent, which may reflect different patterns used in RDA Toolkit templates, but it does not significantly impair the utility of the namespace.

Single sentence definitions

Definitions which are single sentences can be readily synchronized, as is demonstrated by the examples in this paper.

Synchronization is more difficult when definitions are composed of more than one sentence because simple sets of machine processes have to be augmented with specific processes. This issue is connected with the issue of separation of RDA namespace definitions and scope notes within RDA Toolkit definitions by using separate sentences.

Appendices

Appendix 1: Unconstrained properties for RDA relationship designators

Appendix 2: Inverse properties for RDA relationship designators

Appendix 3: Property hierarchies for RDA relationship designators

Appendix 4: Directional labels and definitions for RDF properties based on RDA relationship elements and designators

Appendix 5: Issues relating to minor changes in the RDA Toolkit

Appendices 1-4 contain methodologies and output data tables.

Appendix 5 contains recommendations for Fast-track and other internal JSC processes.

Recommendations

The general recommendation is to accept the methodologies and processes discussed in this paper and demonstrated by the output data. Simple variations in pattern can be readily tested and implemented because the data are output from a spread-sheet with simple design patterns for unconstrained, inverse, and verbal labels and definitions represented by functions, augmented by simple text find/replace processes.

Recommendations involving Fast-track and other internal JSC processes are listed in *Appendix 5*.

Specific recommendations are:

1. Use the FRBR/FRAD-derived definition for the RDA class Agent.
2. Seek the views of linked data communities on preferences for generic terminology in the unconstrained property definitions.
3. Accept the current choice of definitions of unconstrained properties where there are necessary differences in the phrasing of definitions of the constrained originals, in order to publish the properties, but review in due course.
4. Develop definitions for high-level categories of designator in RDA Toolkit Appendix J, from which RDF property definitions can be derived, or develop RDF definitions directly.
5. Represent inverse properties based on RDA Toolkit Appendix I in a different element set to the original properties by using a separate sub-domain for the URIs, to improve clarity.
6. Use the specified design patterns for the labels and definitions of properties based on RDA Toolkit relationship designators.
7. Continue to monitor the need for value vocabulary representations of the RDA Toolkit relationship elements and designators.
8. Improve the presentation of the relationship between relationship elements and relationship designators in the RDA Toolkit.
9. Advocate the use of URIs and labels for unconstrained RDA properties based on RDA Toolkit relationship elements and designators for metadata which is not FRBRized.
10. Encourage further discussion on the issue of "cataloguer-friendly" and "use-friendly" labels in metadata based on the FRBR/FRAD models.
11. Publish an RDF representation of the alignment between RDA Toolkit Appendix I and MARC relators using the **MARC relator property sub-property of RDA designator property** mapping pattern, dependent on acceptance of the definitions of the unconstrained RDA properties, to improve utility.

12. Develop liaison with the Library of Congress Network Development and MARC Standards Office to improve interoperability between the RDA designators and MARC relators.