To: RDA Steering Committee

From: Gordon Dunsire, Chair, RSC Relationship Designators Working Group

Subject: RDA models for relationship data

Abstract

This paper discusses how RDA accommodates relationships between instances of different entities. The paper makes some general recommendations for developing RDA to improve its accommodation of relationship data. It also proposes specific revisions to RDA Toolkit.

This paper was developed in collaboration with the RSC Technical Working Group.

Justification

A task (#1) for the RSC Relationship Designators Working Group in 2016 is to investigate the requirements and review the treatment and structure of relationship designators in RDA Toolkit, clarify the relationship of designators to elements, and clarify the requirements of same-entity and cross-entity designators, building on 6JSC/AggregatesWG/1.

An additional task (#2) is to prepare a proposal/discussion paper for the organization of designators between Persons, Families, and Corporate Bodies in Appendix K, taking into account 6JSC/ALA/43 and JSC responses.

An additional task (#3) is to review the use of parenthetical entity qualifiers and investigate alternative approaches to designator labels.

An additional task (#4) is to propose guidelines on submitting new relationship designators, including labels, definitions, scope, and hierarchies.

A task (#7) for the RSC Technical Working Group in 2016 is to investigate how RDA accommodates relationships between instances of different entities, in collaboration with the RSC Relationship Designators Working Group, and prepare a proposals/discussion paper.

This paper is the outcome of task #1, and partially fulfils tasks #2, #3, and #4, for the RSC Relationship Designators Working Group, and fulfils task #7 of the RSC Technical Working Group.

Scope

The paper takes into account the relationship issues discussed in 6JSC/TechnicalWG/5[1], and is compatible with the 4-fold path for identifying a related entity with an unstructured description, structured description, identifier or access point, and URI.

The paper assumes that RDA will generally comply with the IFLA bibliographic models, consolidated as FRBR-LRM (Library Reference Model).

Terminology

The primary terminology used in this document is from the RDA Toolkit. The equivalent terminology from the RDA Registry is given in parentheses.

Relationships in RDA

RDA provides guidance and instructions for creating descriptions and relationships for things of interest to users of library and cultural heritage services. The underlying conceptual models (FRBR, FRAD, FRSAD) specify the entities (RDF classes) that focus on common attributes and relationships shared by the individual things being described; things can be tangible (for example, persons or manufactured items) or intangible (for example, intellectual or creative works). A unified conceptual model, FRBR Library Reference Model (LRM), is in the final stages for review and approval during 2016-2017.

Entities

The entities used in RDA are:

Work (W), *Expression* (E), *Manifestation* (M), *Item* (I), *Person* (P), *Family* (F), *Corporate Body* (C).

Place (Pl) was added to the RDA Registry to enable the addition of RDA Toolkit elements for place to support the August 2016 release of RDA Toolkit. It is otherwise undeveloped in the Toolkit.

Elements

RDA provides elements (RDF properties) for specific attributes and relationships. Each element has a specified entity to which it applies (RDF domain). Each **relationship element** also specifies the related entity to which it applies (RDF range).

Primary relationship elements

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[1] http://www.rda-jsc.org/sites/all/files/6JSC-TechnicalWG-5.pdf

Primary relationship elements are used to relate the WEMI entities associated with a single resource:

Table 1: RDA primary relationship elements

Entity (domain)	Relationship element	Related entity (range)
W	expression of work	E
E	work expressed	W
W	manifestation of work	M
M	work manifested	W
M	expression manifested	E
E	manifestation of expression	M
M	exemplar of manifestation	I
I	manifestation exemplified	M

Primary relationships form reciprocal pairs.

Manifestation of work is a short-cut for *expression of work + manifestation of expression*; *work manifested* is a short-cut for *expression manifested + work expressed*. The short-cuts and primary relationships are expressed as an RDF graph in Figure 1.
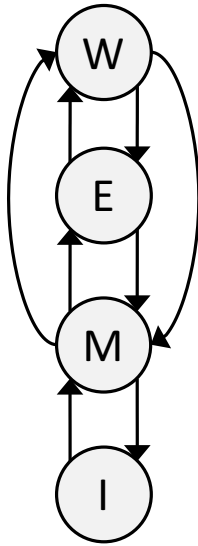
Figure 1: RDF graph of RDA primary relationships.

High-level relationship elements

High-level relationship elements are used to relate WEMIPFC entities with other WEMIPFC entities.

Table 2: RDA high-level relationship elements

Entity (domain)	Relationship element	Related entity (range)
W	related work	W
E	related expression	E
M	related manifestation	M
I	related item	I
PFC	related person	P
PFC	related family	F
PFC	related corporate body	C

WEMI

The WEMI relationships are their own reciprocals (they are symmetric properties).

There are no relationships between **different** WEMI entities associated with **different** resources, that is, **no cross-entity** relationships

The WEMI high-level relationships are expressed as an RDF graph in Figure 2.

There are no high-level relationships between WEMI entities and PFC entities (e.g., W has related P). These relationships are provided using more specific **relationship designators**.

This is a result of differential treatment of the RDA entities. PFC entities are treated as secondary entities only required for access points to WEMI data, reflecting legacy practices based on AACR2 and an interpretation of the original FRBR model. The LRM treats all entities equally, as does the RDA Registry, because it is optimized for linked data environments. The current differential treatment in RDA is likely to impede accommodation of the requirements of cultural heritage communities.

PFC

The PFC high-level relationships form a **cross-entity** matrix: any PFC entity can be related to any other PFC entity (e.g. C related person P). The PFC high-level relationship are expressed as an RDF graph in Figure 2.
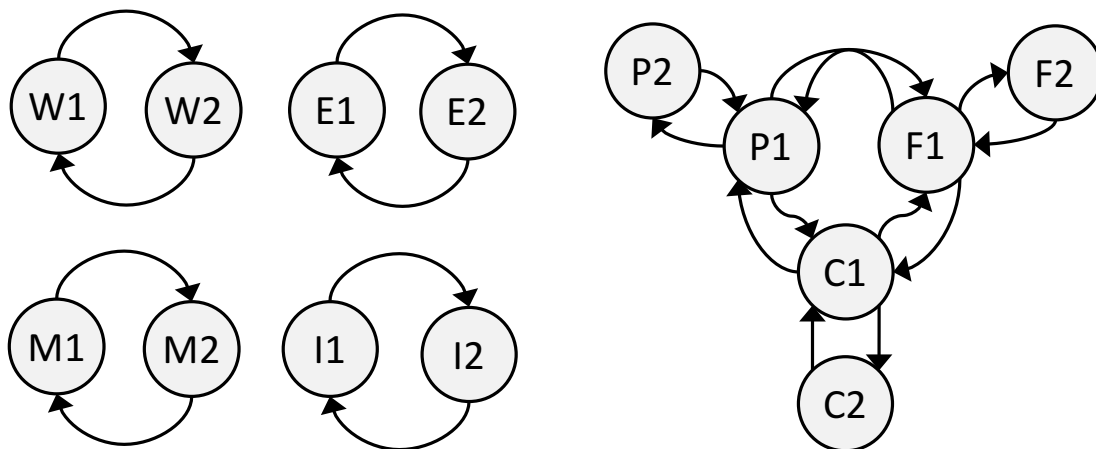
Figure 2: RDF graph(s) of RDA high-level relationships.

Figure 2 shows the absence of high-level cross-entity relationships between many entities, for example between *Work* and related *Expression*.

Agent

RDA does not specify a super-entity for PFC, but the RDA Registry declares *Agent* (A) as a super-class of PFC in order to reduce the number of single-domain properties required to represent the associated designators. For example, the three single-domain properties for "related person", one each for P, F, and C, are replaced by one property with the domain *Agent*:

- A – (has) related person – P

The *Agent* entity is included in the LRM. If this entity is introduced to RDA, the high-level PFC relationship elements will become refinements of:

Table 3: Potential RDA high-level relationships for Agent entity

Entity (domain)	Relationship element	Related entity (range)
A	related agent	A

This relationship is its own reciprocal, as is the case for high-level relationships for WEMI.
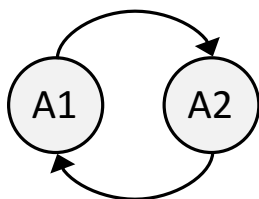

Figure 3: RDF graph of high-level relationships for Agent.

Impact of LRM

Agent entities

The LRM is expected to introduce an *Agent* entity similar to the RDA Registry *Agent* class. It will be, indirectly, a super-type of *Person*, *Family*, and *Corporate body*.

The LRM is expected to introduce a *Collective Agent* entity (G for Group) that is a super-type of *Family* and *Corporate body*; it is defined as two or more *Person*s acting as a unit.

Primary relationships

The equivalent "primary" relationships for the set of agent entities are likely to be:

Table 4: Primary relationship elements for LRM and RDA agent entities

Entity (domain)	Relationship element	Related entity (range)
C	entity sub-type	G
F	entity sub-type	G
G	entity sub-type	A
P	entity sub-type	A

These relationships are required for the semantic integrity of the agent entities. The existing PFC entities become sub-types of the new G and A entities. This is expressed in the RDF graph in Figure 4.
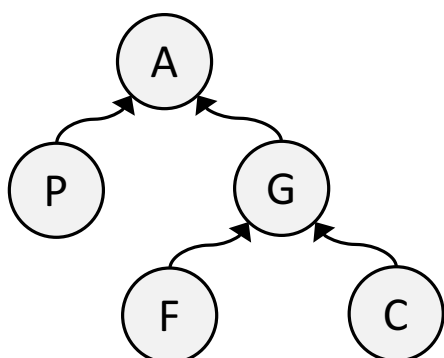
Figure 4: RDF graph of LRM and RDA primary relationships for agent entities.

Place, Time-span

The LRM is expected to introduce new entities for *Place* (Pl) and *Time-span* (T). *Time-span* includes dates. If they are treated in RDA as having the same functionality as the agent entities, then relationship designators between WEMI and *Place* and *Time-span* will be required.

For example:

- M – (has) date of publication – T
- M – (has) place of publication – Pl

It is logical to assume that relationship designators between the agent entities (PFC) and *Place* and *Time-span* will also be required.

For example:

- P – (has) date of birth – T
- P – (has) place of birth – Pl

High-level relationships for relating *Place* and *Time-span* to WEMIPFC(A) and each other will also be required; for example:

- W – (has) related place – Pl
- Pl – (has) related time-span - T

Relationship designators

Relationship designators specify more detailed relationships within the WEMI and PFC sets of high-level relationship elements. They also specify relationships between those sets, but no high-level relationship elements are defined, as noted above.

Designators are arranged in semantic hierarchies. The broader categories reflect the FRBR examples of groups of relationships: for example, RDA J.2.2 Derivative work relationships.

The arrangement is mono-hierarchical; a designator has only one "parent". There is no limit on the level of finer granularity of a designator.

Designator labels

The designators have the general pattern:

- Entity 1 (*has) related entity* Entity 2

The "entity" in the general designator "(has) related entity" is therefore Entity 2, the range of the designator.

The Registry labels are verbalized using "has …" and "is … of" templates, but this approach is not appropriate for RDA Toolkit. The Toolkit element and designator labels need to be general and suitable for a range of different implementation scenarios. The labels are intended for use in name/value pair formats as well as RDF predicate-properties that have intrinsic verbalization in the semantics of the predicate. The problem is ubiquitous and unresolved, and is why the Technical Working Group has been assigned ongoing task #2 to monitor the need for value

vocabulary representations of the RDA Toolkit relationship elements and designators, following recommendation #7 in 6JSC/CILIP rep/3.

The Toolkit designator labels are essentially confined to the non-verbalized pattern:

- Entity 1 *related entity* Entity 2

Again, the "entity" of *related entity* is Entity 2, not Entity 1.

The OMR therefore accommodates different labels for the Toolkit and the Registry.

Labels for designators for similar relationships between different pairs of entity are distinguished by adding the name of the entity (e.g., "(Expression)") to which the designator applies; that is, the entity being described given as the domain of the property. The result is artificial, like an access point for the designator.

Further distinction between labels will be required if more cross-entity designators are added to RDA. The current method produces two sets of parentheses, as shown in the results of Change 3.

Some labelling issues have been noted and discussed before, for example in 6JSC/CILIP rep/2 and 6JSC/CILIP rep/3.

Issues include:

Confusing labels

RDA Toolkit users find the qualified labels using parentheses confusing, although they are not intended for end-user consumption, for example as display labels. This confusion is likely to increase with cross-entity designators requiring two qualifiers, as shown in the results of Change 3.

Ambiguity of the related entity

The Toolkit labels do not always indicate the direction of the relationship. For example, *reproduced as (manifestation)* can be used unambiguously as:

- Manifestation 1 - *reproduced as (manifestation)* - Manifestation 2

It is clear that Manifestation 2 is the reproduction.

On the other hand, this is ambiguous:

- Manifestation 1 - *electronic reproduction (manifestation)* - Manifestation 2

It is not clear if the reproduction is Manifestation 1 or Manifestation 2.

Note that the parentheses can be removed without aggravating or resolving this issue.

Listing of verbalized labels

It is difficult to list designator labels in alphabetical order of their "root" relationship if they start with a verb such as "has" or "is".

Inconsistency

The "product" and "production method" are both used in labels. For example, the terms "reproduced" and "reproduction" are used in *reproduced as …* and *reproduction …* which are in direct hierarchical order.

Note: *has reproduction* is a registered FRBRoo property.[2]

Cross-entity relationships and designators

High-level relationship elements

The LRM provides a highest-level relationship element between two different instances of a Res (a super-entity of all LRM entities):

- Res 1 - is associated with – Res 2

The current RDA high-level *related* … entity elements are element sub-types of this LRM relationship element; the current RDA entities themselves are sub-types of Res.

There is a requirement for high-level *related* … entity elements between the WEMI entities, for example relating a *Work* to an *Expression* of another *Work*:

- W - (has) related expression – E

The current definitions of the *related …* entity elements are too restrictive, although the definitions have been simplified in the August 2016 release of RDA Toolkit. For example, related work has the definition "A work that is associated with the work being described". Although this definition is directly compatible with the LRM highest-level relationship element, there is an intermediary element required, with the definition "An entity that is associated with the work being described". Intermediate elements are also required for the implicit *Agent* entity:

Res 1 – is associated with - Res 2

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[2] http://metadataregistry.org/schemaprop/show/id/16000.html

Has element sub-type: W – (has) related entity – Res [= any RDA entity]
    Has element sub-type: W – (has) related work – W [current RDA element]
    Has element sub-type: W – (has) related expression – E
    Has element sub-type: W – (has) related manifestation – M
    …
    Has element sub-type: W – (has) related agent – A
        Has element sub-type: W - (has) related person – P
        Has element sub-type: W – (has) related family – F
        …
    …

Current high-level RDA relationship elements occupy the finer levels, as shown in the complete matrix of high-level entity relationships given in Appendix 1.

The full set of relationship elements in Appendix 1 is useful for supporting linked data communities and applications.

It is not necessary, now or in the near future, to accommodate all of the elements in Appendix 1 in RDA Toolkit. Some of the *Agent* relationship elements are already implicit in the definitions of *related person*, *related family*, and *related corporate body*; for example, *related person* has the definition "A person who is associated with the person, family, or corporate body being identified". It is to be expected that nearly all of the elements in Appendix 1 will be accommodated in future development of RDA for cultural heritage communities.

Recommendation 1: Generalize the *related …* entity elements to cover all RDA current and future entities as specified in Appendix 1:

a. Add a general *related entity* relationship element with the definition "An entity that is associated with the entity being described". This element is its own reciprocal.
b. Generalize the definitions of the current *related …* entity elements as element sub-types of *related entity*.
c. Retain the current same-entity *related …* entity definitions but qualify the labels, as element sub-types of the generalized *related …* entity elements.
d. Add specific cross-entity *related …* entity elements for all non-same pairs of RDA entities.
e. Differentiate the labels by adding qualifiers for the source entity.
f. Update the RDA Toolkit instructions for the elements marked **.
g. Add properties for the full set of designators to the RDA Registry.

Cross-entity relationship designators

There is a requirement for designators across the WEMI entities, for example relating a Work to an *Expression* of another *Work*.

Subject relationship elements

The high-level *subject relationship* element has the definition "A term, phrase, classification number, etc., that indicates what the work is about". It has the domain *Work*, but no range.

It is therefore an element sub-type of the *related entity (work)* element proposed in Appendix 1.

Only WEMI subject relationship designators are accommodated in RDA Appendix M. The EMI designators are cross-entity. No provision is made for PFC or other entities that might be the subject of a *Work*, although they are not excluded by the instructions at RDA 23.4. The RDA Registry includes properties for PFC subject relationship designators to support linked data communities and applications.

Recommendation 2: Add designators for subject-related *Person*, *Family*, and *Corporate Body* entities to Appendix M.

Reproductive relationship designators

An individual *Item* can be the basis of a reproduction *Manifestation*.

New designators are required to accommodate *Item* to *Manifestation* relationships for the *reproduced as* and *reproduction of* groups in RDA Appendix J.5.2.

Recommendation 3: Add cross-entity designators for items that are reproduced as manifestations to Appendix J.

Reciprocal designators

Inverse properties for reciprocal designators are included in the RDA Registry for all RDA relationship designators.

Reciprocal designators are accommodated in RDA Toolkit for same-entity designators for WEMI in Appendix J and PFC in Appendix K, but not for the cross-entity WEMI to PFC designators in Appendix I. This is a result of differential treatment of PFC entities in RDA, reflecting legacy practices based on AACR2.

Recommendation 4: Add reciprocal designators for cross-entity PFC to WEMI designators to RDA Toolkit.

Organization of designators in RDA Toolkit

The Toolkit presents designators in a set of appendices based on the WEMI and PFC groups of entities. The current structure and layout is inconsistent and has weaknesses:

- A new appendix is required for each new entity or group of entities added to RDA, say from the LRM.
- There is no provision for cross-WEMI sub-categories in the arrangement of Appendix J corresponding to the cross-PFC categories of Appendix K.
- Cross-WEMI designators are included in Appendix M.
- The arrangement of same- and cross-PFC designators in Appendix K is provisional and requires development.
- There is no provision for reciprocal relationships in Appendix K.
- There are no active links between designator inverses and other cross-references.
- There is no specific index of designators in the Toolkit. They are presented in hierarchical order in the Appendices.

The Working Groups welcome the inclusion of designators and reciprocals in a comprehensive alphabetical listing as the Glossary in the August 2016 release of RDA Toolkit because it partially resolves the last item.

The new Toolkit and Registry synchronization infrastructure is based on the linked data representation of RDA Reference as RDA Vocabularies in the Open Metadata Registry. This should allow greater flexibility in the presentation of relationship elements and designators in RDA Toolkit.

Toolkit users will benefit from greater interactivity with the hierarchies and cross-references to navigate the increasing numbers of entities and relationships between them.

The basic groupings of elements and designators based on the original FRBR groups are not compatible with the LRM or the previous modification by FRSAD.

Groupings are required because the number of designators will increase if the recommendations of this paper are accepted. It is better to organize the designators primarily by source entity (domain); that is, the entity being described. With each primary group, the designators can be sub-grouped by target entity (range); that is, the related entity. A separate primary group is required for the "any entity" high-level relationship elements, and a separate sub-group is required within each primary group for "any entity" designators, often reciprocals. Separate primary and sub-groups for Agent will allow de-duplication of PFC-to-PFC designators.

Table 5: Primary groupings and sub-groups for relationship designators in RDA Toolkit

Primary group	Sub-group
Any entity	
W	Any entity W E M I P F C *Pl etc.*
E	same
M	same
I	same
A	same
P	same
F	same
C	same
Pl etc.	same

Table 5 reflects these requirements. It is consistent and is scale-able to accommodate new entities. Appendix 1 is organized in the same way.

Recommendation 5: Consider other arrangements of relationship elements and designators and their associated instructions in RDA Toolkit, including tables and thesaurus architectures with navigable broader/narrower and see/see also cross-references, and consider re-organizing the basic layout of designators to reflect Table 5.

Issues requiring resolution

Identification of new designators

New designators are proposed for two main reasons:

A. To reflect the way a Manifestation describes itself, usually in the *Statement of responsibility relating to title proper*.
B. To reflect a model of relationships suggested by FRBR and supported by literary theory and criticism.

A. is essentially a bottom-up design method. B. is a top-down method.

An A-type designator must also be a B-type designator, but not vice-versa.

Creating and maintaining A-type designators for every variation found in manifestations is not sustainable, and impairs utility for the cataloguer and end-user.

There is no formal decision framework for accepting proposals for A-type designators, although proposals must indicate where the proposed designator fits in the existing hierarchy.

The LRM will specify only primary and high-level relationships between entities. The choice of broad categories for RDA relationship designators will not affect compatibility with the LRM.

A specified decision framework for proposed RDA designators is desirable.

All new designators should specify:

- The domain or RDA entity that is being described.
- The range or RDA entity that is related to the entity being described.
- What relationship element or designator it refines. The domain and range of the "parent" designator must be the same as, or super-classes of, the refining designator.
- A distinctive Toolkit label, using domain and range qualifiers as necessary to disambiguate the label.
- A definition of the related entity that qualifies the scope or aspect of the entity.
- A Toolkit label and definition for the inverse designator, if the new designator is not symmetric. The label and definition must be qualified for inverted domain and range.

The Relationship Designators Working Group is continuing its analysis of this issue and welcomes comments and suggestions from RDA communities.

Resolving label issues
A possible resolution of the label issues is to base all labels on the high-level *Related …* elements of Recommendation 1, with one adjustment:

Replace the qualifying parentheses in Appendix 1 with "of ".

For example:

- *related work of manifestation* (not *related work (manifestation)*)
- *related manifestation of work* (not *related manifestation (work)*)

The label template is:

"Related " + range entity + designator {+ " of " + domain entity}

{} is only added for disambiguation. Alternatively, it could be included in the basic template for all labels.

Example (from Appendix I):

- *related agent actor* Reciprocal relationship: related expression of actor

Here, "actor of" in the inverse has been inverted to "of actor".

The labels for reciprocals in Appendix I focus on *Agent*, which is the domain entity rather than the range entity. If the reciprocals for Appendix I focused on the WEMI rather than the Agent, then the reciprocal relationship might be *related expression act*, or to emphasize on the process, *related expression acting*.

This issue is connected to the creator/contributor distinction for a Work and its Expression identified in 6JSC/AggregatesWG/1.[3]

Example (from Appendix J):

- *related manifestation facsimile* Reciprocal relationship: related manifestation of facsimile

Here, "facsimile of" has been inverted to "of facsimile".

Note: Appendix K avoids many labelling issues by using naturally different terms for reciprocal roles, for example *teacher* and *student*.

The new synchronization infrastructure may provide innovative solutions to these issues.

Recommendation 6: The RSC Relationship Designators Working Group should undertake a complete review of designator labels in the context of the proposed matrix of high-level relationship elements in Recommendation 1 and the potential for different displays and layouts of the designations in Recommendation 5, in collaboration with the RDA Development Team.

Recommendations
Recommendation 1: Generalize the *Related* … entity elements to cover all RDA current and future entities as specified in Appendix 1:

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[3] http://www.rda-jsc.org/sites/all/files/6JSC-AggregatesWG-1.pdf

    a. Add a general *related entity* relationship element with the definition "An entity that is associated with the entity being described". This element is its own reciprocal.

    b. Generalize the definitions of the current *Related …* entity elements as element sub-types of *related entity*.

    c. Retain the current same-entity *related …* entity definitions but qualify the labels, as element sub-types of the generalized *related …* entity elements.

    d. Add specific cross-entity *related …* entity elements for all non-same pairs of RDA entities.

    e. Differentiate the labels by adding qualifiers for the source entity.

    f. Update the RDA Toolkit instructions for the elements marked **.

    g. Add properties for the full set of designators to the RDA Registry.

Recommendation 2: Add designators for subject-related *Person*, *Family*, and *Corporate Body* entities to Appendix M.

Recommendation 3: Add cross-entity designators for items that are reproduced as manifestations to Appendix J.

Recommendation 4: Add reciprocal designators for cross-entity PFC to WEMI designators to RDA Toolkit.

Recommendation 5: Consider other arrangements of relationship elements and designators and their associated instructions in RDA Toolkit, including tables and thesaurus architectures with navigable broader/narrower and see/see also cross-references, and consider re-organizing the basic layout of designators to reflect Table 5.

Recommendation 6: The RSC Relationship Designators Working Group should undertake a complete review of designator labels in the context of the proposed matrix of high-level relationship elements in Recommendation 1 and the potential for different displays and layouts of the designations in Recommendation 5, in collaboration with the RDA Development Team.

Impact of the revisions

The recommended revisions will serve user needs to fully relate RDA entities using relationship elements and designators.

A new organization of relationship elements and designators and associated instructions will support greater flexibility in finding and identifying the most appropriate relationship to use.

Change 1: Revision of 24.1.3 and 29.1.3

This revision is associated with Recommendation 1.

Only clean copy is provided because these areas of RDA Toolkit are known to be under revision as part of the development of the RDA Reference and Toolkit Glossary infrastructure. The final layout of element label and definition should be consistent with other changes to the Toolkit.

<u>Clean copy</u>

24.1.3 Related Work, Expression, Manifestation, and Item

The terms related entity, related work, related expression, related manifestation, and related item are used as follows:

related entity▼ : An entity that is associated with the entity being described.

related work▼ : A work that is associated with the entity being described.

related expression▼ : An expression that is associated with the entity being described.

related manifestation▼ : A manifestation that is associated with the entity being described.

related item▼ : An item that is associated with the entity being described.

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29.1.3 Related Person, Family, and Corporate Body

The terms related agent, related person, related family, and related corporate body are used as follows:

related agent▼ : A person, family, or corporate body that is associated with the entity being described.

related person▼ : A person that is associated with the entity being described.

related family▼ : A family that is associated with the entity being described.

related corporate body▼ : A corporate body that is associated with the entity being described.

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Change 2: Revision of Appendix M

This revision is associated with Recommendation 2.

The labels use the current RDA disambiguation template.

These are all additions, so only a clean copy version is given.

<u>Clean copy</u>

M.2.6 Person as Subject of a Work

> ***described in (person)*** A work that describes a described person. *Reciprocal relationship*: description of (person)
>
> ***description of (person)*** A person described by a describing work. *Reciprocal relationship*: described in (person)

M.2.7 Family as Subject of a Work

> ***described in (family)*** A work that describes a described family. *Reciprocal relationship*: description of (person)
>
> ***description of (family)*** A family described by a describing work. *Reciprocal relationship*: described in (person)

M.2.8 Corporate Body as Subject of a Work

> ***described in (corporate body)*** A work that describes a described corporate body. *Reciprocal relationship*: description of (person)
>
> ***description of (corporate body)*** A corporate body described by a describing work. *Reciprocal relationship*: described in (person)

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Change 3: Revisions to Appendix J

This revision is associated with Recommendation 3.

No numbering is supplied. There are two short-term options for short-term placement within the Appendix J:

1. As an addition to J.5.2
2. As a new section J.5.6

Option 2 may be less confusing.

The labels use an extension of the current RDA disambiguation template. A version using alternative labels is available in Appendix 3.

All changes are additions, so only a clean copy version is given.

<u>Clean copy</u>

Equivalent Item Relationships

reproduced as (manifestation) (item) A manifestation that reproduces an item of another manifestation. *Reciprocal relationship*: reproduction of (item) (manifestation)

digital transfer (manifestation) (item) A manifestation in a digital format that results from the transfer of an item in another digital format. *Reciprocal relationship*: digital transfer of (item) (manifestation)

electronic reproduction (manifestation) (item) A manifestation in a digital format that is the result of the transfer of an item in analog format. *Reciprocal relationship*: electronic reproduction of (item) (manifestation)

facsimile (manifestation) (item) A manifestation that exactly reproduces an item of another manifestation. *Reciprocal relationship*: facsimile of (item) (manifestation)

preservation facsimile (manifestation) (item) A manifestation that consists of an exact reproduction of an item of another manifestation on preservation-quality media, such as acid-free permanent or archival paper. *Reciprocal relationship*: preservation facsimile of (item) (manifestation)

reprinted as (manifestation) (item) A manifestation that is a reissue of an item that exemplifies another printed manifestation. *Reciprocal relationship*: reprint of (item) (manifestation)

reproduction of (item) (manifestation) An item that is used as the basis for manifestation that is a reproduction. *Reciprocal relationship:* reproduced as (manifestation) (item)

> ***digital transfer of (item) (manifestation)*** An item in a digital format that is transferred to another digital format as a manifestation. *Reciprocal relationship*: digital transfer (manifestation) (item)

> ***electronic reproduction of (item) (manifestation)*** An item in an analog format that is transferred to a digital format as a manifestation. *Reciprocal relationship*: electronic reproduction (manifestation) (item)

> ***facsimile of (item) (manifestation)*** An item that is used as the basis for a manifestation that is an exact reproduction. *Reciprocal relationship*: facsimile (manifestation) (item)

>> ***preservation facsimile of (item) (manifestation)*** An item that is used as the basis for a manifestation that is an exact reproduction on preservation-quality media, such as acid-free permanent or archival paper. *Reciprocal relationship*: preservation facsimile (manifestation) (item)

> ***reprint of (item) (manifestation)*** An item that exemplifies a printed manifestation that is used as the basis for a reissue of a manifestation. *Reciprocal relationship*: reprinted as (manifestation) (item)

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Appendix 1: Full matrix of high-level RDA entity relationship elements

Appendix 1: Full matrix of high-level RDA entity relationship elements

* Existing RDA relationship elements, requiring differentiated labels.
** Recommended relationship elements for RDA Toolkit instructions.

Entity (domain)	Relationship element	Related entity (range)	Definition
	related entity**		An entity that is associated with the entity being described.
	related work**	W	A work that is associated with the entity being described.
	related expression**	E	An expression that is associated with the entity being described.
	related manifestation**	M	A manifestation that is associated with the entity being described.
	related item**	I	An item that is associated with the entity being described.
	related agent**	A	A person, family, or corporate body that is associated with the entity being described.
	related person**	P	A person that is associated with the entity being described.
	related family**	F	A family that is associated with the entity being described.
	related corporate body**	C	A corporate body that is associated with the entity being described.
W	related entity (work)		An entity that is associated with the work being described.
W	related work (work)*	W	A work that is associated with the work being described.
W	related expression (work)	E	An expression that is associated with the work being described.
W	related manifestation (work)	M	A manifestation that is associated with the work being described.
W	related item (work)	I	An item that is associated with the work being described.
W	related agent (work)	A	An agent that is associated with the work being described.
W	related person (work)	P	A person that is associated with the work being described.
W	related family (work)	F	A family that is associated with the work being described.

Appendix 1: Full matrix of high-level RDA entity relationship elements

Entity (domain)	Relationship element	Related entity (range)	Definition
W	related corporate body (work)	C	A corporate body that is associated with the work being described.
E	related entity (expression)		An entity that is associated with the expression being described.
E	related work (expression)	W	A work that is associated with the expression being described.
E	related expression (expression)*	E	An expression that is associated with the expression being described.
E	related manifestation (expression)	M	A manifestation that is associated with the expression being described.
E	related item (expression)	I	An item that is associated with the expression being described.
E	related agent (expression)	A	An agent that is associated with the expression being described.
E	related person (expression)	P	A person that is associated with the expression being described.
E	related family (expression)	F	A family that is associated with the expression being described.
E	related corporate body (expression)	C	A corporate body that is associated expression the work being described.
M	related entity (manifestation)		An entity that is associated with the manifestation being described.
M	related work (manifestation)	W	A work that is associated with the manifestation being described.
M	related expression (manifestation)	E	An expression that is associated with the manifestation being described.
M	related manifestation (manifestation)*	M	A manifestation that is associated with the manifestation being described.
M	related item (manifestation)	I	An item that is associated with the manifestation being described.
M	related agent (manifestation)	A	An agent that is associated with the manifestation being described.
M	related person (manifestation)	P	A person that is associated with the manifestation being described.
M	related family (manifestation)	F	A family that is associated with the manifestation being described.
M	related corporate body (manifestation)	C	A corporate body that is associated manifestation the work being described.
I	related entity (item)		An entity that is associated with the item being described.
I	related work (item)	W	A work that is associated with the item being described.
I	related expression (item)	E	An expression that is associated with the item being described.
I	related manifestation (item)	M	A manifestation that is associated with the item being described.

Appendix 1: Full matrix of high-level RDA entity relationship elements

Entity (domain)	Relationship element	Related entity (range)	Definition
I	related item (item)*	I	An item that is associated with the item being described.
I	related agent (item)	A	An agent that is associated with the item being described.
I	related person (item)	P	A person that is associated with the item being described.
I	related family (item)	F	A family that is associated with the item being described.
I	related corporate body (item)	C	A corporate body that is associated item the work being described.
A	related entity (agent)		An entity that is associated with the agent being described.
A	related work (agent)	W	A work that is associated with the agent being described.
A	related expression (agent)	E	An expression that is associated with the agent being described.
A	related manifestation (agent)	M	A manifestation that is associated with the agent being described.
A	related item (agent)	I	An item that is associated with the agent being described.
A	related agent (agent)	A	An agent that is associated with the agent being described.
A	related person (agent)*	P	A person that is associated with the agent being described.
A	related family (agent)*	F	A family that is associated with the agent being described.
A	related corporate body (agent)*	C	A corporate body that is associated agent the work being described.
P	related entity (person)		An entity that is associated with the person being described.
P	related work (person)	W	A work that is associated with the person being described.
P	related expression (person)	E	An expression that is associated with the person being described.
P	related manifestation (person)	M	A manifestation that is associated with the person being described.
P	related item (person)	I	An item that is associated with the person being described.
P	related agent (person)	A	An agent that is associated with the person being described.
P	related person (person)	P	A person that is associated with the person being described.
P	related family (person)	F	A family that is associated with the person being described.
P	related corporate body (person)	C	A corporate body that is associated person the work being described.
F	related entity (family)		An entity that is associated with the family being described.

Appendix 1: Full matrix of high-level RDA entity relationship elements

Entity (domain)	Relationship element	Related entity (range)	Definition
F	related work (family)	W	A work that is associated with the family being described.
F	related expression (family)	E	An expression that is associated with the family being described.
F	related manifestation (family)	M	A manifestation that is associated with the family being described.
F	related item (family)	I	An item that is associated with the family being described.
F	related agent (family)	A	An agent that is associated with the family being described.
F	related person (family)	P	A person that is associated with the family being described.
F	related family (family)	F	A family that is associated with the family being described.
F	related corporate body (family)	C	A corporate body that is associated family the work being described.
C	related entity (corporate body)		An entity that is associated with the corporate body being described.
C	related work (corporate body)	W	A work that is associated with the corporate body being described.
C	related expression (corporate body)	E	An expression that is associated with the corporate body being described.
C	related manifestation (corporate body)	M	A manifestation that is associated with the corporate body being described.
C	related item (corporate body)	I	An item that is associated with the corporate body described.
C	related agent (corporate body)	A	An agent that is associated with the corporate body being described.
C	related person (corporate body)	P	A person that is associated with the corporate body being described.
C	related family (corporate body)	F	A family that is associated with the corporate body being described.
C	related corporate body (corporate body)	C	A corporate body that is associated corporate body the work being described.

Appendix 2: Full matrix of high-level RDA entity relationship elements (alternate labels)

Appendix 2: Full matrix of high-level RDA entity relationship elements (alternate labels)

This is Appendix 1 with non-parenthetical labels, using the potential resolution to label issues in Recommendation 6.

Entity (domain)	Relationship element	Related entity (range)	Definition
	related entity**		An entity that is associated with the entity being described.
	related work**	W	A work that is associated with the entity being described.
	related expression**	E	An expression that is associated with the entity being described.
	related manifestation**	M	A manifestation that is associated with the entity being described.
	related item**	I	An item that is associated with the entity being described.
	related agent**	A	A person, family, or corporate body that is associated with the entity being described.
	related person**	P	A person that is associated with the entity being described.
	related family**	F	A family that is associated with the entity being described.
	related corporate body**	C	A corporate body that is associated with the entity being described.
W	related entity of work		An entity that is associated with the work being described.
W	related work of work*	W	A work that is associated with the work being described.
W	related expression of work	E	An expression that is associated with the work being described.
W	related manifestation of work	M	A manifestation that is associated with the work being described.
W	related item of work	I	An item that is associated with the work being described.
W	related agent of work	A	An agent that is associated with the work being described.
W	related person of work	P	A person that is associated with the work being described.
W	related family of work	F	A family that is associated with the work being described.
W	related corporate body of work	C	A corporate body that is associated with the work being described.
E	related entity of expression		An entity that is associated with the expression being described.

Appendix 2: Full matrix of high-level RDA entity relationship elements (alternate labels)

Entity (domain)	Relationship element	Related entity (range)	Definition
E	related work of expression	W	A work that is associated with the expression being described.
E	related expression of expression*	E	An expression that is associated with the expression being described.
E	related manifestation of expression	M	A manifestation that is associated with the expression being described.
E	related item of expression	I	An item that is associated with the expression being described.
E	related agent of expression	A	An agent that is associated with the expression being described.
E	related person of expression	P	A person that is associated with the expression being described.
E	related family of expression	F	A family that is associated with the expression being described.
E	related corporate body of expression	C	A corporate body that is associated expression the work being described.
M	related entity of manifestation		An entity that is associated with the manifestation being described.
M	related work of manifestation	W	A work that is associated with the manifestation being described.
M	related expression of manifestation	E	An expression that is associated with the manifestation being described.
M	related manifestation of manifestation*	M	A manifestation that is associated with the manifestation being described.
M	related item of manifestation	I	An item that is associated with the manifestation being described.
M	related agent of manifestation	A	An agent that is associated with the manifestation being described.
M	related person of manifestation	P	A person that is associated with the manifestation being described.
M	related family of manifestation	F	A family that is associated with the manifestation being described.
M	related corporate body of manifestation	C	A corporate body that is associated manifestation the work being described.
I	related entity of item		An entity that is associated with the item being described.
I	related work of item	W	A work that is associated with the item being described.
I	related expression of item	E	An expression that is associated with the item being described.
I	related manifestation of item	M	A manifestation that is associated with the item being described.
I	related item of item*	I	An item that is associated with the item being described.
I	related agent of item	A	An agent that is associated with the item being described.

Appendix 2: Full matrix of high-level RDA entity relationship elements (alternate labels)

Entity (domain)	Relationship element	Related entity (range)	Definition
I	related person of item	P	A person that is associated with the item being described.
I	related family of item	F	A family that is associated with the item being described.
I	related corporate body of item	C	A corporate body that is associated item the work being described.
A	related entity of agent		An entity that is associated with the agent being described.
A	related work of agent	W	A work that is associated with the agent being described.
A	related expression of agent	E	An expression that is associated with the agent being described.
A	related manifestation of agent	M	A manifestation that is associated with the agent being described.
A	related item of agent	I	An item that is associated with the agent being described.
A	related agent of agent	A	An agent that is associated with the agent being described.
A	related person of agent*	P	A person that is associated with the agent being described.
A	related family of agent*	F	A family that is associated with the agent being described.
A	related corporate body of agent*	C	A corporate body that is associated agent the work being described.
P	related entity of person		An entity that is associated with the person being described.
P	related work of person	W	A work that is associated with the person being described.
P	related expression of person	E	An expression that is associated with the person being described.
P	related manifestation of person	M	A manifestation that is associated with the person being described.
P	related item of person	I	An item that is associated with the person being described.
P	related agent of person	A	An agent that is associated with the person being described.
P	related person of person	P	A person that is associated with the person being described.
P	related family of person	F	A family that is associated with the person being described.
P	related corporate body of person	C	A corporate body that is associated person the work being described.
F	related entity of family		An entity that is associated with the family being described.
F	related work of family	W	A work that is associated with the family being described.
F	related expression of family	E	An expression that is associated with the family being described.

Appendix 2: Full matrix of high-level RDA entity relationship elements (alternate labels)

Entity (domain)	Relationship element	Related entity (range)	Definition
F	related manifestation of family	M	A manifestation that is associated with the family being described.
F	related item of family	I	An item that is associated with the family being described.
F	related agent of family	A	An agent that is associated with the family being described.
F	related person of family	P	A person that is associated with the family being described.
F	related family of family	F	A family that is associated with the family being described.
F	related corporate body of family	C	A corporate body that is associated family the work being described.
C	related entity of corporate body		An entity that is associated with the corporate body being described.
C	related work of corporate body	W	A work that is associated with the corporate body being described.
C	related expression of corporate body	E	An expression that is associated with the corporate body being described.
C	related manifestation of corporate body	M	A manifestation that is associated with the corporate body being described.
C	related item of corporate body	I	An item that is associated with the corporate body described.
C	related agent of corporate body	A	An agent that is associated with the corporate body being described.
C	related person of corporate body	P	A person that is associated with the corporate body being described.
C	related family of corporate body	F	A family that is associated with the corporate body being described.
C	related corporate body of corporate body	C	A corporate body that is associated corporate body the work being described.

Appendix 3: Change 3 with alternative labels

This variant revision for Change 3 uses labels constructed according to the possible resolution of label issues in Recommendation 6.

> **related manifestation reproduction of item** A manifestation that reproduces an item of another manifestation. *Reciprocal relationship*: related item reproduction of manifestation

>> **related manifestation digital transfer of item** A manifestation in a digital format that results from the transfer of an item in another digital format. *Reciprocal relationship*: related item digital transfer of manifestation

>> **related manifestation electronic reproduction of item** A manifestation in a digital format that is the result of the transfer of an item in analog format. *Reciprocal relationship*: related item electronic reproduction of manifestation

>> **related manifestation facsimile of item** A manifestation that exactly reproduces an item of another manifestation. *Reciprocal relationship*: related item facsimile of manifestation

>>> **related manifestation preservation facsimile of item** A manifestation that consists of an exact reproduction of an item of another manifestation on preservation-quality media, such as acid-free permanent or archival paper. *Reciprocal relationship*: related item preservation facsimile of manifestation

>> **related manifestation reprint of item** A manifestation that is a reissue of an item that exemplifies another printed manifestation. *Reciprocal relationship*: related reprint of manifestation

> **related item reproduction of manifestation** An item that is used as the basis for manifestation that is a reproduction. Reciprocal relationship: related manifestation reproduction of item

>> **related item digital transfer of manifestation** An item in a digital format that is transferred to another digital format as a manifestation. *Reciprocal relationship*: related manifestation digital transfer of item

>> **related item electronic reproduction of manifestation** An item in an analog format that is transferred to a digital format as a manifestation. *Reciprocal relationship*: related manifestation electronic reproduction of item

>> **related item facsimile of manifestation** An item that is used as the basis for a manifestation that is an exact reproduction. *Reciprocal relationship*: related manifestation facsimile of item

Appendix 3: Change 3 with alternative labels

> ***related item preservation facsimile of manifestation*** An item that is used as the basis for a manifestation that is an exact reproduction on preservation-quality media, such as acid-free permanent or archival paper. *Reciprocal relationship*: related manifestation preservation facsimile of item

> ***related item reprint of manifestation*** An item that exemplifies a printed manifestation that is used as the basis for a reissue of a manifestation. *Reciprocal relationship*: related manifestation reprint of item