

To: Joint Steering Committee for Development of RDA
From: Gordon Dunsire and Deborah Fritz, Chairs, JSC Aggregates Working Group
Subject: RDA and FRBROO treatment of aggregates

Abstract

This paper discusses the treatment of aggregate monographs in the FRBROO model and compares it with the current RDA treatment. The paper identifies issues for developing the treatment of aggregates in RDA.

Introduction

A task (#1) for the JSC Aggregates Working Group for 2015 is to “Investigate the issues for developing *RDA* instructions and elements for aggregate resources and prepare a proposals/discussion paper by Aug. 3, 2015”. The sub-tasks are (#1.1) “Review RDA compliance with the models presented in the main part and appendix of the Final Report of the Working Group on Aggregates” and (#1.2) “Investigate the utility of FRBROO sub-classes of Work, Expression, and Manifestation for the description of aggregates in *RDA*”.

This is an analysis and discussion paper on the application of the FRBROO model to the treatment of aggregates in RDA.

Scope

This paper covers monographs only (including completed multipart monographs) that are collections, selections, anthologies, and augmentations, with a specific focus on augmentations. The paper does not cover incomplete continuing publications that are modelled by the PRESSOO extension to FRBROO. These include series, serials, integrating resources, and incomplete multipart monographs.

The analysis is confined to FRBROO entities and their relationship properties. It ignores the event-based approach of the CIDOC CRM that is extended by FRBROO.

The paper is based on FRBROO version 2.2¹, RDA Toolkit April 2015 release, and RDA Registry v2.3.0.

Methodology

Two examples of aggregate works were analysed using FRBROO entities and properties.

Example 1 is an augmentation. Example 2 is a collection.

¹ http://www.ifla.org/files/assets/cataloguing/frbr/frbroo_v2.2.pdf

This analysis revealed a possible latent relationship between RDA relationship designators and the multiple chains of FRBROO entities used to model such aggregates.

A list of RDA relationship designators between Expression and Agent was then analysed to identify categories and characteristics of relationships that are short-cuts for FRBROO chains.

FRBROO entities

The following FRBROO entities are used:

F3 Manifestation Product Type² - This is a type of FRBR Manifestation, and covers manifestations that are published as more than one identical Items.

F14 Individual Work³ - This is a type of FRBR Work that is realized by one, and only one, Self-Contained Expression.

F17 Aggregation Work⁴ - This is a type of FRBR Work whose essence is the selection and/or arrangement of expressions of one or more other works.

F19 Publication Work⁵ - This is a type of FRBR Work, the conception of a Publication Expression embodied in a Manifestation Product Type.

F22 Self-Contained Expression⁶ - This is a type of FRBR Expression, comprising the realization of an Individual Work that is regarded as a complete whole.

F24 Publication Expression⁷ - This is a type of FRBR Expression, comprising the complete content and layout of a Manifestation Product Type.

Example 1: single work augmented

Emma / Jane Austen ; edited by James Kinsley ; with an introduction and notes by Terry Castle. ISBN 019283357X

FRBROO Analysis

This example seems to be covered by FRBROO Figure 6, comment f, second bullet:

"The concept of re-using some already existing material in order to produce some new creation. This is modelled as: F16 Container Work is a F1 Work, F1 Work R3 is realised in (realises) F22 Self-Contained Expression, and F22 Self-Contained Expression P165 incorporates (is incorporated in) F2 Expression."

² <http://iflastandards.info/ns/fr/frbr/frbroo/F3>

³ <http://iflastandards.info/ns/fr/frbr/frbroo/F14>

⁴ <http://iflastandards.info/ns/fr/frbr/frbroo/F17>

⁵ <http://iflastandards.info/ns/fr/frbr/frbroo/F19>

⁶ <http://iflastandards.info/ns/fr/frbr/frbroo/F22>

⁷ <http://iflastandards.info/ns/fr/frbr/frbroo/F24>

Statements

The results of applying the FRBRoo entities and relationships to an example can be recorded as a set of statements in a unidirectional entity-relationship-entity format.

The statement can be represented by an RDF triple in terse triple language (ttl) using RDA properties for the relationships. Note that “ex” is a default namespace for examples of a specific instance of an entity.

Whole/part relationships

The FRBRoo property *R14 incorporates* and its inverse *R14i is incorporated in* are a type of whole/part relationship between types of *Expression*. The equivalent RDA properties are *is container of (expression)* and its inverse *is contained in (expression)*.

For example, the statement

EmmaKinsley (F24 Publication Expression) *incorporates* Emma (F22 Self-Contained Expression)

is equivalent to

EmmaKinsleyPE *is container of* EmmaSCE

Application of FRBRoo

Starting with *Manifestation* in hand:

The manifestation is a *Manifestation Product Type* because it is a publication.

A *Manifestation Product Type* embodies one, and only one, expression of type *Publication Expression*.

Assign the label “EmmaKinsley” to example 1.

Statement 1.1

EmmaKinsley (F3 Manifestation Product Type) comprises carriers of EmmaKinsley (F24 Publication Expression)

ex:EmmaKinsleyMPT rdam:expressionManifested ex:EmmaKinsleyPE .

A *Publication Expression* has one, and only one, *Publication Work*.

Statement 1.2

EmmaKinsley (F24 Publication Expression) realises EmmaKinsley (F19 Publication Work)

ex:EmmaKinsleyPE rdae:workExpressed ex:EmmaKinsleyPW .

This *Publication Expression* incorporates the content of Emma (label “Emma”).

Statement 1.3

EmmaKinsley (F24 Publication Expression) incorporates Emma (F22 Self-Contained Expression)

ex:EmmaKinsleyPE rdae:containerOfExpression ex:EmmaSCE .

This *Publication Expression* also incorporates the introduction and notes (label “IntroCastle”).

Statement 1.4

EmmaKinsley (F24 Publication Expression) incorporates Introduction and notes (F22 Self-Contained Expression)

ex:EmmaKinsleyPE rdae:containerOfExpression ex:IntroCastleSCE .

This publication may contain the editorial content as a separate expression (label “EditorialKinsley”). In this case, we assume the editorial content is greater than changes to the content of Emma. The case of “editing” that results only in changes to the content of another expression is discussed later.

Statement 1.5

EmmaKinsley (F24 Publication Expression) incorporates [Editorial content] (F22 Self-Contained Expression)

ex:EmmaKinsleyPE rdae:containerOfExpression ex:EditorialKinsleySCE .

Each *Self-Contained Expression* realizes a separate *Individual Work*. An *Individual Work* may have a known creator.

Statement 1.6

Emma (F22 Self-Contained Expression) realises Emma (F14 Individual Work)

ex:EmmaSCE rdae:workExpressed ex:EmmalW .

Statement 1.7

Emma (F14 Individual Work) [has creator] Jane Austen (Person)

ex:EmmalW rdaw:creator ex:JaneAusten .

Statement 1.8

Introduction and notes (F22 Self-Contained Expression) realises Introduction and notes (F14 Individual Work)

ex:IntroCastleSCE rdae:workExpressed ex:EmmalW .

Statement 1.9

Introduction and notes (F14 Individual Work) [has creator] Terry Castle (Person)

Ex:IntroCastleIW rdaw:creator ex:TerryCastle .

Statement 1.10

[Editorial content] (F22 Self-Contained Expression) realises [Editorial content] (F14 Individual Work)

ex:EditorialKinsleySCE rdae:workExpressed ex:EditorialKinsleyIW .

Statement 1.11

[Editorial content] (F14 Individual Work) [has creator] James Kinsley (Person)

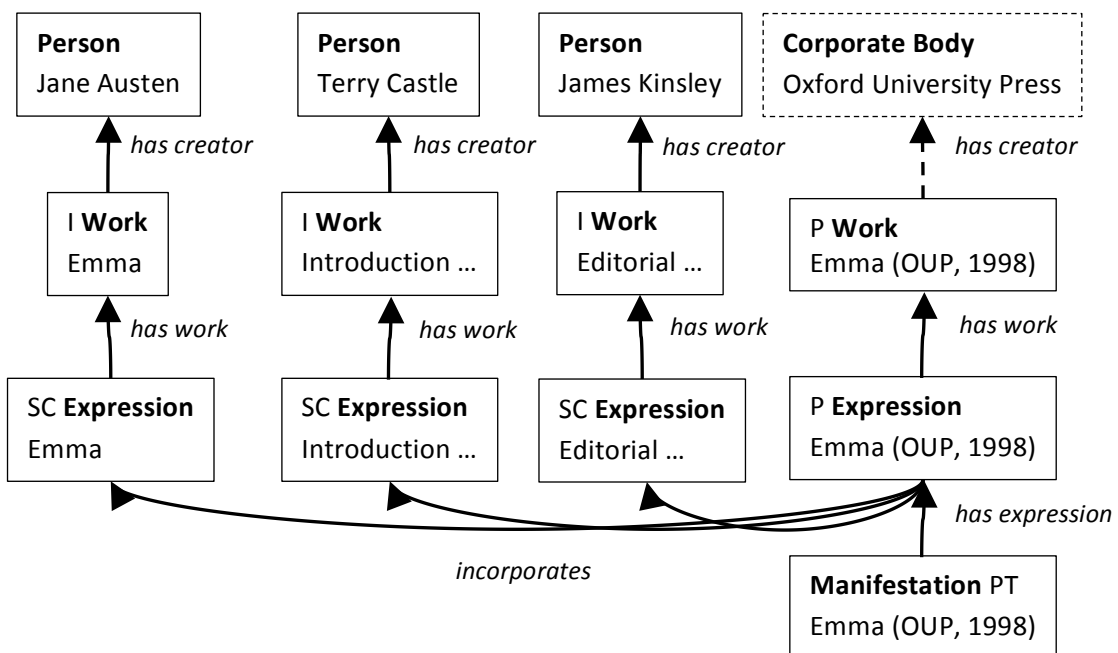
ex:EditorialKinsleyIW rdaw:creator ex:JamesKinsley .

Outcome

This example is modelled as an aggregation of three *Individual Works*, each with a *Person* as its creator, comprising the main work “Emma” by Jane Austen, augmented by an “introduction and notes” work by Terry Castle, and an “editorial content” work by James Kinsley.

Graph

The statements can be represented in graphical form:



Collapsing from FRBROO to current RDA

The full FRBROO model can be collapsed down to reflect current RDA approaches by short-cutting multiple FRBROO entity-relationship chains into single RDA relationships between the first and last entities.

Also, the entities that are retained can be “dumbed” from the FRBROO types of *Work*, *Expression*, and *Manifestation* to the broader FRBRer, and therefore RDA, entities.

Collapsed Version of Example 1

The FRBROO chain is followed >>> by the equivalent RDA chain.

EmmaKinsley (F3 Manifestation Product Type) *comprises carriers of* EmmaKinsley (F24 Publication Expression) *incorporates* Emma (F22 Self-Contained Expression) *realises* Emma (F14 Individual Work) *[has creator]* Jane Austen (Person)

>>> EmmaKinsleyMPT (Manifestation) *has expression manifested* EmmaKinsleyPE (Expression) *has work expressed* EmmaIW (Work) *has author* JaneAusten (Person)

EmmaKinsley (F24 Publication Expression) *incorporates* Introduction and notes (F22 Self-Contained Expression) *realises* Introduction and notes (F14 Individual Work) *[has creator]* Terry Castle (Person)

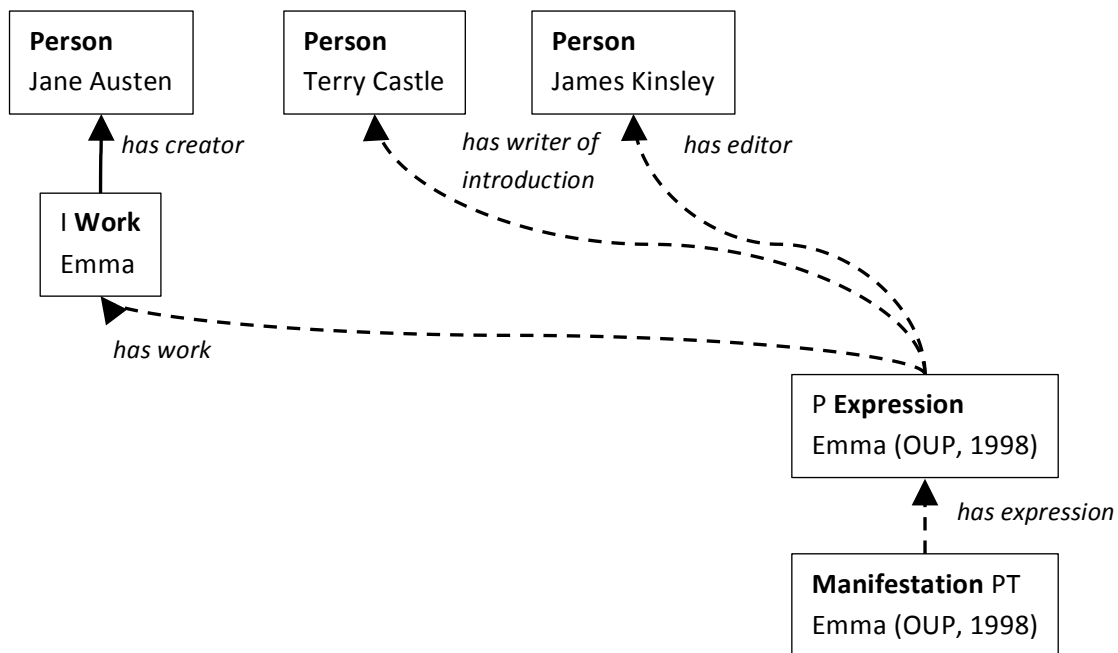
>>> EmmaKinsleyPE (Expression) *has writer of introduction* TerryCastle (Person)

EmmaKinsley (F24 Publication Expression) *incorporates* [Editorial content] (F22 Self-Contained Expression) *realises* [Editorial content] (F14 Individual Work) *[has creator]* James Kinsley (Person)

>>> EmmaKinsleyPE (Expression) *has editor* JamesKinsley (Person)

Collapsed graph

The statements can be represented in graphical form:



The collapsed graph uses only RDA entities and relationships.

Example 2: multiple works augmented

Complete novels / Jane Austen ; with illustrations by Hugh Thomson. ISBN 9781905716630

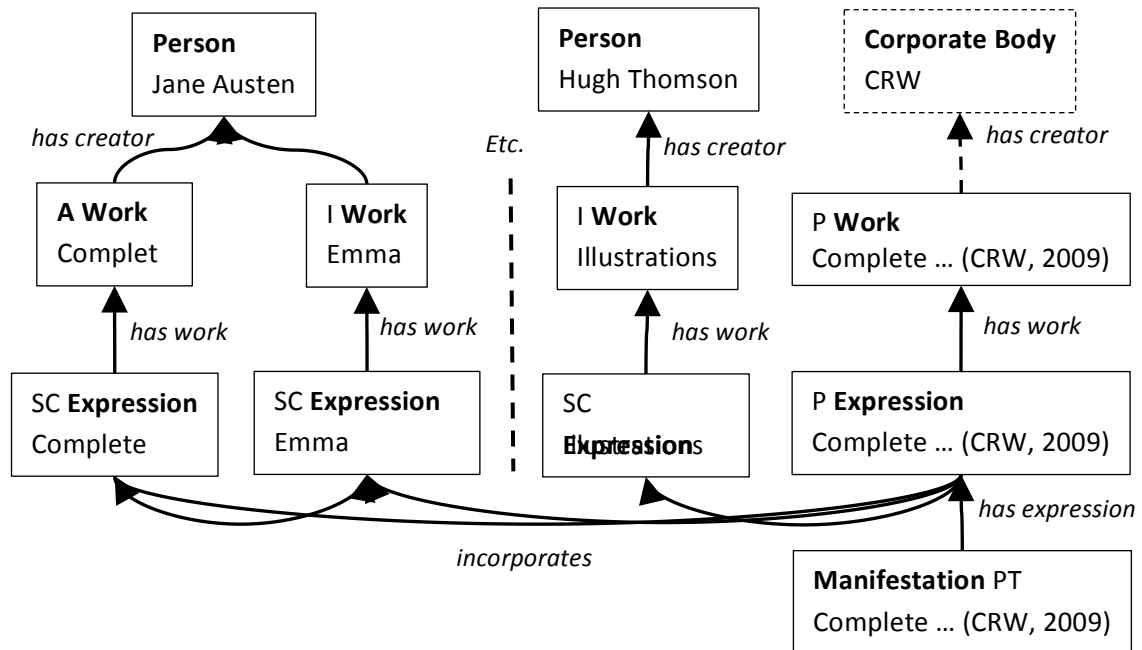
FRBRoo Analysis

	Statement
2.1	Example2 (F3 Manifestation Product Type) <i>comprises carriers of</i> Complete Novels (F24 Publication Expression)
2.2	Complete Novels (Thomson) (F24 Publication Expression) <i>realises</i> Complete Novels (Thomson) (F19 Publication Work)
2.3	Complete Novels (Thomson) (F24 Publication Expression) <i>incorporates</i> Complete Novels (F22 Self-Contained Expression)
2.4	Complete Novels (F22 Self-Contained Expression) <i>realises</i> Complete Novels (F17 Aggregation Work)
2.5	Complete Novels (F17 Aggregation Work) [<i>has creator</i>] Jane Austen (Person)
2.6	Complete Novels (F22 Self-Contained Expression) <i>incorporates</i> Emma (F22 Self-Contained Expression)
2.7	Complete Novels (F22 Self-Contained Expression) <i>incorporates</i> Mansfield Park (F22 Self-Contained Expression)
2.8	Complete Novels (F22 Self-Contained Expression) <i>incorporates</i> Northanger Abbey (F22 Self-Contained Expression)
2.9	Complete Novels (F22 Self-Contained Expression) <i>incorporates</i> Persuasion (F22 Self-

	Contained Expression)
2.10	Complete Novels (F22 Self-Contained Expression) <i>incorporates</i> Pride and Prejudice (F22 Self-Contained Expression)
2.11	Complete Novels (F22 Self-Contained Expression) <i>incorporates</i> Sense and Sensibility (F22 Self-Contained Expression)
2.12	Complete Novels (F22 Self-Contained Expression) <i>incorporates</i> Illustrations (F22 Self-Contained Expression)
2.13	Emma (F22 Self-Contained Expression) <i>realises</i> Emma (F14 Individual Work)
2.14	Emma (F14 Individual Work) <i>[has creator]</i> Jane Austen (Person)
2.15	Mansfield Park (F22 Self-Contained Expression) <i>realises</i> Mansfield Park (F14 Individual Work)
2.16	Mansfield Park (F14 Individual Work) <i>[has creator]</i> Jane Austen (Person)
2.17	Northanger Abbey (F22 Self-Contained Expression) <i>realises</i> Northanger Abbey (F14 Individual Work)
2.18	Northanger Abbey (F14 Individual Work) <i>[has creator]</i> Jane Austen (Person)
2.19	Persuasion (F22 Self-Contained Expression) <i>realises</i> Persuasion (F14 Individual Work)
2.20	Persuasion (F14 Individual Work) <i>[has creator]</i> Jane Austen (Person)
2.21	Pride and Prejudice (F22 Self-Contained Expression) <i>realises</i> Pride and Prejudice (F14 Individual Work)
2.22	Pride and Prejudice (F14 Individual Work) <i>[has creator]</i> Jane Austen (Person)
2.23	Sense and Sensibility (F22 Self-Contained Expression) <i>realises</i> Sense and Sensibility (F14 Individual Work)
2.24	Sense and Sensibility (F14 Individual Work) <i>[has creator]</i> Jane Austen (Person)
2.25	Illustrations (F22 Self-Contained Expression) <i>realises</i> Illustrations (F14 Individual Work)
2.26	Illustrations (F14 Individual Work) <i>[has creator]</i> Hugh Thomson (Person)

Graph

The statements can be represented in graphical form:



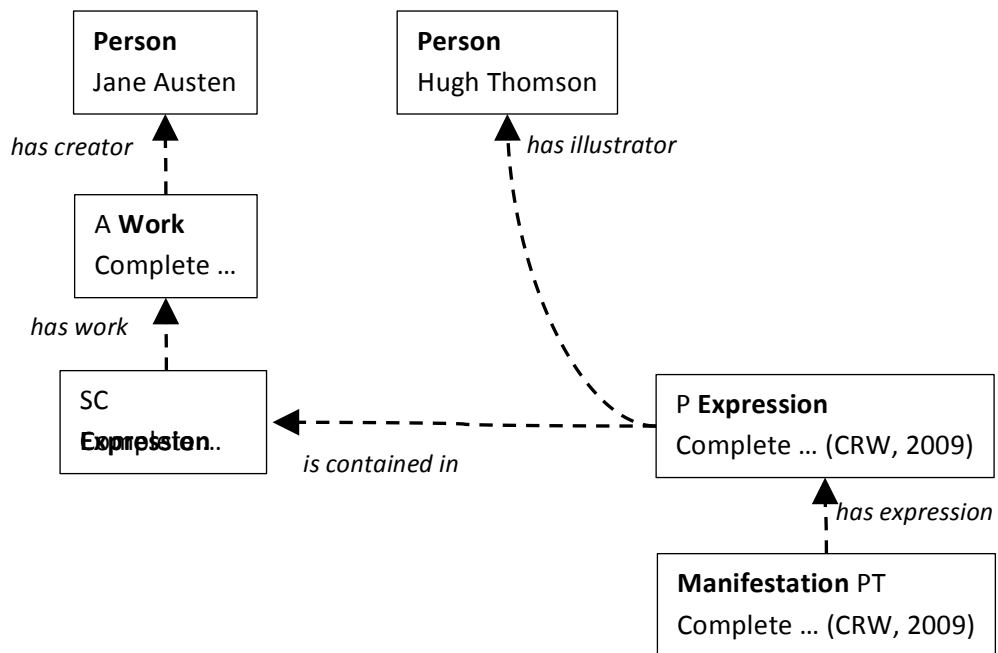
Outcome

This example is modelled as an aggregation of an aggregation of multiple *Individual Works*, each with the same *Person* as its creator, comprising the aggregation work “Complete novels” by Jane Austen, augmented by an “illustrations” work by Hugh Thomson.

The collapsed statement chains are given in Appendix B.

Collapsed graph

The statements can be represented in graphical form:



Discussion

Different models of aggregates

The FRBRoo approach appears to be significantly different from the approach proposed by the FRBR Review Group's Working Group on Aggregates (WGA).⁸

In the WGA model, it is the *Manifestation* that "contains" the separate *Work/Expressions*. In the FRBRoo model, it is the *Publication Expression* carried by the *Manifestation Product Type* that incorporates the separate *Self-Contained Expressions*.

It is possible this difference may be reconciled by assuming that there is a cardinality of one-to-one between FRBRoo *Manifestation Product Type* and *Publication Expression*. This binds the *Manifestation* to the *Expression* and vice-versa, allowing them to be identified as a single resource.

The same cardinality applies between FRBR *Expression* and *Work*, and FRBR *Item* and *Manifestation*.

⁸ Final Report of the Working Group on Aggregates. Available at:
<http://www.ifla.org/files/assets/cataloguing/frbrwg/AggregatesFinalReport.pdf>

Together, the cardinality constraints allow a complete WEMI stack for a published item to be identified as a single resource. That is, there is a single identifiable structure of entities and relationships that applies to all published Items.

Every item is an aggregate

"All publications are aggregates"

How does this apply to a *Publication Expression* which lacks any supplementary content? For example, the original publication of a work such as Emma (1815) may lack additional content in the form of an introduction, illustrations, etc. This implies that the content of Emma1815 (F24 Publication Expression) of the *Manifestation Product Type* published in 1815 is identical to EmmaNow (F22 Self Contained Expression) incorporated in a new publication of Emma with no additional content. Similarly, Emma1815 (Publication Work) would be identical to EmmaNow (F14 Individual Work).

This argument ignores the fact that a *Publication Expression* with no supplementary content usually has "publication" or publisher content in the form of layout, addition of a title page, page numbering, etc. The exception is a *Manifestation Product Type* that is an exact facsimile. Publisher content is of interest to the rare materials community.

Therefore it is not strictly true to say that all later editions of Emma after 1815 have the same content and layout. There will, at least, be differences in the colophons. The question is to what extent such differences are significant for supporting user tasks.

Identifying aggregate components

It may not be useful to model editorial modifications as a *Self-Contained Expression* and an *Individual Work* due to the difficulty of identifying such changes.

In Example 1, the statement of responsibility for the "editor" relationship is insufficient on its own to indicate whether the agent added supplementary content to or amended the content of the Self-Contained Expression of Emma.

Further information is required to make the distinction. The situation is similar to the general issue of "editions". FRBR assigns the general attribute of edition to *Manifestation edition or issue designation*. Despite the definition, "Relates a manifestation to a word or phrase appearing in the manifestation that normally indicates a difference in either content or form between the manifestation and a related manifestation previously issued by the same publisher/distributor, or simultaneously issued by either the same publisher/distributor or another publisher/distributor", the text of the FRBR report (see 4.3.5, 4.4.3, 5.1, etc.) indicates that changes in content between editions are recorded in the *other distinguishing characteristic* attribute of *Expression*, and that *edition statement* is

treated as an attribute of *Manifestation*. The *edition statement* is insufficient on its own to determine whether a new *Expression* is involved, but the presence of words such as “revised” or “new” should prompt the cataloguer to check the content of the item in hand.

Can a revised edition always be said to incorporate the original work along with an accompanying work consisting of editorial additions? In some cases it may be true, but what if the original author has rewritten the text, but not to the extent of creating a new work?

If Jane Austen made corrections to a proof draft "edition" of Emma, we can imagine a manifestation with title and statement of responsibility such as "The draft of Emma / Jane Austen".

Then the same analysis shows that this can be modelled by a *Self-Contained Expression* for Emma (draft), which is incorporated in the *Publication Expression* for the *Manifestation Product Type*. The new *Self-Contained Expression* realises a new *Individual Work* for the draft of Emma. The two *Individual Works*, for Emma and the draft of Emma, are both members of a FRBRoo F15 *Complex Work* for Emma. This *Complex Work* may be chosen to “dumb-down” the two *Individual Works* in some applications.

For printed volume manifestations, the main source of information for a cataloguer is the item in hand, represented by the *Manifestation* (Product Type). If no editor is named in the statement of responsibility, then no [Editorial content] (Self-Contained) *Expression* is required. If the preface to Emma (draft) indicates that Jane Austen made significant changes to her original manuscript when proof-reading (not just correction of typos, etc.) - or, using cataloguer’s judgment, that there must be a reason to publish the draft with editorial content - then a new Emma (draft) (Self-Contained) *Expression* is required, with an expressed (Individual/Complex) *Work* for Emma. This is in current compliance with RDA instructions. If the preface or other reference sources known to the cataloguer indicate that Austen made substantial changes, for example adding by a new character, then a new *Work* is required.

RDA reflects the FRBRer model, but it intentionally avoids the ambiguity of the FRBRer definition. RDA *edition statement* has definition and scope note “A statement identifying the edition to which a resource belongs. An edition statement sometimes includes a designation of a named revision of an edition. An edition statement sometimes includes a statement or statements of responsibility relating to the edition and/or to a named revision of an edition”. RDA *other distinguishing characteristic of the expression* has the definition and scope note “A characteristic other than content type, language of expression, or date of expression. It serves to differentiate an expression from another expression of the same work”.

Proliferation of entities

There is concern that there is an unnecessary proliferation of entities if every manifestation embodies at least one *Publication Expression* which must realise a *Publication Work* and incorporate at least one *Self-Contained Expression*, which in turn expresses an *Individual Work*.

An agency or application may choose to ignore such content. Not all entities need to be identified or recorded for any specific publication, but the RDA guidelines and instructions should cover all cases and conform to the underlying model. This is reflected in current practice, for example when description of rare books includes data which is not usually recorded for other published resources.

Role of Publisher

The analysis of the examples raised an issue about the creator of a *Publication Work*.

The agent responsible for creating the work seems to be the publisher:

EmmaKinsley (F19 Publication Work) has creator Oxford University Press (Corporate Body)

FRBRoo F1 Work says "A Work may be elaborated by one or more actors ...", so the creator of a *Publication Work* may be a *Corporate Body* (or *Group*).

In reality, the work is not conceived in its entirety by the publisher as a corporate body, but by its agents such as copy-editors and sub-editors, who are usually unknown. The examples given in FRBRoo for F19 Publication Work, which use the phrase "on behalf of", cover the cases of a Person or Group, but not Corporate Body. Further discussion is required with the FRBR Review Group about the creator relationship between *Work* and *Corporate Body*.

Preferred label for the expression

As shown by the examples, the FRBRoo model involves many more *Expression to Expression* relationships than occur in the current RDA model. Labels for those expressions will be required for display and navigation purposes, but there is no RDA element for such a label.

The preferred label for the *Expression* could be derived from preferred label or title for the *Work*.

The modelling of relationship data is being discussed by the JSC Technical Working Group.

Contributors and creators

The examples show that some contributor roles at the Expression level are short-cuts for FRBRoo chains.

JaneThomsonPE (Expression) *has illustrator* HughThomson (Person)

<<<< Complete Novels (F24 Publication Expression) *incorporates* Illustrations (F22 Self-Contained Expression) *realises* Illustrations (F14 Individual Work) [*has creator*] Hugh Thomson (Person)

This can be generalised to:

RDA Expression *has illustrator* Person

<<< FRBRoo (F24 Publication Expression) *incorporates* Illustrations (F22 Self-Contained Expression) *realises* Illustrations (F14 Individual Work) [*has creator*] (Person)

For a collaboration work that is an aggregate work:

<<< FRBRoo (F24 Publication Expression) *incorporates* Text+Photographs (F22 Self-Contained Expression) *incorporates* Images (F22 Self-Contained Expression) *realises* Photographs (F14 Individual Work) [*has creator*] (Person)

The other chain in the latter example, with short-cut RDA Expression *has writer* Person is:

<<< FRBRoo (F24 Publication Expression) *incorporates* Text+Images (F22 Self-Contained Expression) *incorporates* Text (F22 Self-Contained Expression) *realises* Text (F14 Individual Work) [*has creator*] (Person)

The RDA relationship designators for relating an *Expression* to an *Agent* were analysed to identify which of them matched this pattern.

The analysis also identified other potential patterns of RDA short-cuts for FRBRoo chains.

The analysis assumes that a contributory *Self-Contained Expression/Individual Work* is indicated by the identification of creation or modification of a type of work. *Work* is a conceptualization, and *Expression* is content; neither needs to be physically discrete. For example, it may be possible to consider the lighting design of a moving image as a separate *Work* that is “incorporated” into the moving image work because its *Self-Contained Expression* is incorporated into the *Publication Expression* of the *Manifestation Product Type* that carries the images. The contribution of an actor might also be represented as a *Self-Contained Expression*; certainly, other works have the acting of a specific actor, or indeed the lighting design of a specific lighting designer, as a subject.

The set of RDA contributor relationship designators that are short-cuts for the FRBRoo model of simple aggregates is given in Table 1 in Appendix C. The table gives the RDA “creator” designator that would be assigned in the FRBRoo chain, and a generic “type of work” for the FRBRoo *Individual Work*.

A *type of work* term is required as an identifying attribute for the FRBRoo *Work* to potentially act as a qualifier for the Authorized Access Point for the *Work*. It might also be

used to replace the information lost when substituting the broader creator for the contributor; for example “artist of illustrations” is better than “artist of still image work” when moving from “illustrator” to “artist”.

RDA can accommodate this type data in type of work element, a set of refined relationship designators (like element sub-types), or a set of sub-types of the Work entity (for example Graphic Novel Work). The last option is currently not preferred, to avoid proliferation of entity types.

These designators may allow RDA data created with the current instructions to be interchangeable with data created under future instructions compatible with FRBROO and FRBR-LRM. It should be possible for data using a relationship designator from Group 1 to be automatically converted to the corresponding chain of entities and relationships that is compatible with FRBROO. This is dependent on the cardinality between *Manifestation Product Type* and *Publication Expression*: it must be one-and-only-one to allow the short-cut relationship property and complete data chain to be used interchangeably without loss of meaning.

This means that if RDA follows the full FRBROO model, then it should also be able to continue to accommodate the current flat FRBR model, which is not affected by the consolidated FRBR-LRM model. RDA might therefore provide instructions compatible with both models, and the resulting data could be dumbed-down, etc. for interoperability.

Analysis of the “contributor” designators also indicates another potential short-cut pattern. This is exemplified by the translator designator. The role creates a new *Self-Contained Expression*, with its own *Individual Work*. The *Individual Work* is a member of a *Complex Work* which includes all translations and other similar variations in content, such as transcriptions.

The set of RDA contributor relationship designators that are short-cuts for the creation of new expressions that are part of a FRBROO complex work is given in Table 2 in Appendix C.

Table 3 in Appendix C lists the designators that appear to be hybrids of Group 1 and Group 2. Their definitions incorporate both the addition of content (indicating an *Aggregation Work/Self-Contained Expression*) and change of content (indicating a *Complex Work/Self-Contained Expression*). Separate relationships may need to be added to differentiate these roles.

Table 4 in Appendix C lists the remaining contributor designators.

These groupings indicate gaps and areas of inconsistency in a potentially structured framework. Improving the consistency of the semantics of the designators will significantly benefit RDA’s compatibility with FRBROO.

Appendix A: RDA contributor roles mapped to creator roles

Notes, for further discussion:

[1] Need a creator designator for an aggregate work with a self-contained expression incorporating recorded performances, corresponding to the contributor designators of the performances, similar to the idea of participant in an interview, court proceedings, etc.

[2] Need a new creator designator, a mixture of compiler/composer for visual works.

[3] Need a creator designator similar to filmmaker.

Table 1. Group 1: Short-cuts

Toolkit Label	Toolkit Definition	RDA Creator	Type of Work created
actor	... acting as a cast member or player in a musical or dramatic presentation, etc.	[1]	act/acting
animator	... giving apparent movement to inanimate objects or drawings.	artist	animation
commentator	... providing interpretation, analysis, or a discussion of the subject matter on a recording, film, or other audiovisual medium.	author [1]	commentary/commentating
conductor	... leading a performing group (orchestra, chorus, opera, etc.) in a musical or dramatic presentation, etc.	[1]	conducting
costume designer	... designing the costumes for a moving image production or for a musical or dramatic presentation or entertainment.	designer	costume
court reporter	... preparing a court's opinions for publication.	author	court report
dancer	... dancing in a musical, dramatic, etc., presentation.	[1]	dance/dancing
draftsman	... making detailed plans or drawings for buildings, ships, aircraft, machines, objects, etc.	artist	plans/planning
editor of moving image work	... assembling, arranging, and trimming film, video, or other moving image formats, including both visual and audio aspects.	designer [2]	moving image
host	... leading a program (often broadcast) that includes other guests, performers, etc. (e.g., talk show host).	[1]	hosting

illustrator	... supplementing the primary content with drawings, diagrams, photographs, etc.	artist	illustrations
instrumentalist	... playing a musical instrument.	[1]	music
interviewee (expression)	... responding to an interviewer, usually a reporter, pollster, or some other information gathering agent.	interviewee	interview/interviewing
interviewer (expression)	... acting as an interviewer, reporter, pollster, or some other information gathering agent.	interviewer	interviewer/interviewing
letterer	... drawing the text and graphic sound effects.	artist	lettering
lighting designer	... designing and creating lighting components.	designer [2]	lighting
minute taker	... recording the minutes of a meeting.	author	minutes/minute taking
moderator	... leading a program (often broadcast) where topics are discussed, usually with participation of experts in fields related to the discussion.	[1]	moderation/moderating
narrator	... reading aloud or giving an account of an act, occurrence, course of events, etc.	[1]	narration/narrating
on-screen presenter	... appearing on screen to provide contextual or background information.	[1]	presentation/presenting
panelist	... participating in a program (often broadcast) where topics are discussed, usually with participation of experts in fields related to the discussion.	[1]	panel discussion
performer	... performing music, acting, dancing, speaking, etc., often in a musical or dramatic presentation, etc.	[1]	performance/performing
production designer	... designing the overall visual appearance of a moving image production.	designer [2]	production
puppeteer	... manipulating, controlling, or directing puppets or marionettes in a moving image production or a musical or dramatic presentation or entertainment.	[1]	puppeteering
recording engineer	... supervising the technical aspects of a sound or video	designer [2]	recording

	recording session.		
recording	... using a recording device to capture sound and/or video during a recording session, including field recordings of natural sounds, folkloric events, music, etc.	[3]	recording
singer	... using his/her/their voice, with or without instrumental accompaniment, to produce music.	[1]	singing
sound designer	... by designing and creating audio/sound components.	designer [2]	sound
speaker	... speaking words, such as a lecture, speech, etc.	[1]	speaking
special effects provider	... designing and creating on-set special effects (on-set mechanical effects and in-camera optical effects).	designer [2]	special effects
storyteller	... relaying a creator's original story with dramatic or theatrical interpretation.	[1]	storytelling
surveyor	... providing measurements or dimensional relationships for the geographic area represented.	author	survey/surveying
teacher	... giving instruction or providing a demonstration.	[1]	teaching
visual effects provider	... designing and creating post-production visual effects.	designer [2]	visual effects
voice actor	... providing the voice for characters in radio and audio productions and for animated characters in moving image works, as well as by providing voice-overs in radio and television commercials, dubbed resources, etc.	[1]	voice acting
writer of added commentary	... providing an interpretation or critical explanation of the original work.	author	commentary
writer of added lyrics	A writer of words added to an expression of a musical work.	lyricist	lyrics
writer of added text	... providing text for the non-textual work (e.g., writing captions for photographs, descriptions of maps).	author	complementary textual work
writer of afterword	... providing an afterword to the original work.	author	afterword

writer of foreword	... providing a foreword to the original work.	author	foreword
writer of introduction	... providing an introduction to the original work.	author	introduction
writer of postface	... providing a postface to the original work.	author	postface
writer of preface	... providing a preface to the original work.	author	preface
writer of supplementary textual content	... providing supplementary textual content (e.g., an appendix, an introduction, a preface) to the original work.	author	accompanying textual work

Table 2. Group 2: Contributor creates new expression

Toolkit Label	Toolkit Definition	RDA Creator	Type of Work created
abridger	... shortening or condensing the original work but leaving the nature and content of the original work substantially unchanged.	author	abridgment
arranger of music	... rewriting the composition for a medium of performance different from that for which the work was originally intended.	composer?	arrangement
transcriber	... writing down or notating previously unwritten or unnotated content, or by changing it from one system of notation to another.	author	transcription/transcribing
translator	... expressing the linguistic content of the work in a language different from that of previous expressions of the original work.	author	translation/translating

Table 3. Group 3: Hybrid Group 1 and 2

Toolkit Label	Toolkit Definition	RDA Creator	Type of Work created
cartographer (expression)	... providing additional cartography, or by modifying the previous cartography.	cartographer	cartography
choreographer (expression)		choreographer	choreography
composer (expression)	... adding music to a work that originally lacked it, by composing new music to substitute for the original music, or by composing new music to supplement the existing music.	composer	composition
editor	... revising or clarifying the content, e.g., adding an introduction, notes, or other critical matter.	author	supplementary work

Table 4. Group 4: Other

Toolkit Label	Toolkit Definition	RDA Creator	Type of Work created
art director	... overseeing the artists and craftspeople who build the sets for moving image productions.	n/a	n/a
musical director	... coordinating the activities of the composer, the sound editor, and sound mixers for a moving image production or for a musical or dramatic presentation or entertainment.	designer [2]	moving image music/musical direction/musical directing
presenter	... mentioned in an “X presents” credit for moving image materials and who is probably associated	n/a	n/a

	with production, finance, or distribution in some way.		
stage director	... the general management and supervision of a performance.	n/a	n/a

Appendix B: Collapsed chains for Example 2

Complete Novels (F24 Publication Expression) *incorporates* Complete Novels (F22 Self-Contained Expression) *realises* Complete Novels (F17 Aggregation Work) [*has creator*] Jane Austen (Person)

>>> JaneThomsonPE (Expression) *is container of* JaneSCE (Expression) *has work expressed* JaneAW (Work) *has author* JaneAusten (Person)

Complete Novels (F22 Self-Contained Expression) *incorporates* Emma (F22 Self-Contained Expression) *realises* Emma (F14 Individual Work) [*has creator*] Jane Austen (Person)

>>> JaneSCE (Expression) *is container of* EmmaSCE (Expression) *has work expressed* EmmaIW (Work) *has author* JaneAusten (Person)

Complete Novels (F22 Self-Contained Expression) *incorporates* Mansfield Park (F22 Self-Contained Expression) *realises* Mansfield Park (F14 Individual Work) [*has creator*] Jane Austen (Person)

>>> JaneSCE (Expression) *is container of* MansfieldParkSCE (Expression) *has work expressed* MansfieldParkIW (Work) *has author* JaneAusten (Person)

Complete Novels (F22 Self-Contained Expression) *incorporates* Northanger Abbey (F22 Self-Contained Expression) *realises* Northanger Abbey (F14 Individual Work) [*has creator*] Jane Austen (Person)

>>> JaneSCE (Expression) *is container of* NorthangerAbbeySCE (Expression) *has work expressed* NorthangerAbbeyIW (Work) *has author* JaneAusten (Person)

Complete Novels (F22 Self-Contained Expression) *incorporates* Persuasion (F22 Self-Contained Expression) *realises* Persuasion (F14 Individual Work) [*has creator*] Jane Austen (Person)

>>> JaneSCE (Expression) *is container of* PersuasionSCE (Expression) *has work expressed* PersuasionIW (Work) *has author* JaneAusten (Person)

Complete Novels (F22 Self-Contained Expression) *incorporates* Pride and Prejudice (F22 Self-Contained Expression) *realises* Pride and Prejudice (F14 Individual Work) [*has creator*] Jane Austen (Person)

>>> JaneSCE (Expression) *is container of* PrideAndPrejudiceSCE (Expression) *has work expressed* PrideAndPrejudiceIW (Work) *has author* JaneAusten (Person)

Complete Novels (F22 Self-Contained Expression) *incorporates* Sense and Sensibility (F22 Self-Contained Expression) *realises* Sense and Sensibility (F14 Individual Work) [*has creator*] Jane Austen (Person)

>>> JaneSCE (Expression) *is container of* SenseAndSensibilitySCE (Expression) *has work expressed* SenseAndSensibilityIW (Work) *has author* JaneAusten (Person)

Complete Novels (F24 Publication Expression) *incorporates* Illustrations (F22 Self-Contained Expression) *realises* Illustrations (F14 Individual Work) [*has creator*] Hugh Thomson (Person)

>>> JaneThomsonPE (Expression) *has illustrator* HughThomson (Person)