

# Building resource descriptions with WEMI

**Gordon Dunsire**  0000-0003-2352-0802

Independent Consultant

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## ABSTRACT

This article discusses how implementations of the IFLA Library Reference Model (LRM) support the application of modern data processing tools to construct user-friendly information retrieval services for gallery, library, archive, and museum (GLAM) collections. Processing tools include Semantic Web and relational database technologies. Examples are taken from RDA: Resource Description and Access, and ISBD for Manifestation (ISBDM).

**KEYWORDS** WEMI; RDA

**CONTACT** Gordon Dunsire  [gordon@gordondunsire.com](mailto:gordon@gordondunsire.com)

## WEMI architecture

The LRM and its predecessor Functional Requirements for Bibliographic Records (FRBR) distribute the descriptive aspects of an item in a GLAM collection between four classes or entities: Work, Expression, Manifestation, and Item (WEMI). This contrasts with the centralisation of descriptive data around the entity Resource in the consolidated International Standard Bibliographic Description (ISBD).

The main reason for this distribution is to reduce the duplication of data in the descriptions of collection resources. Such duplication is most evident in library collections, where multiple resources are “functionally” identical, very similar, or similar enough to be the focus of attention of users of catalogues and other finding aids. Minimising duplication in structured data storage systems improves the efficiency of maintenance and the flexibility of processing and presentation. This is the basis of “normalisation” of data in relational databases, first proposed in 1970; the process of “FRBRisation” in library metadata (descriptive data) began in 1998.

Broadly speaking, Work and Expression store metadata for the content of a resource, and Manifestation and Item cover the carrier aspects of the resource.

The four WEMI entities are modular building blocks that can be put together to form a variety of structures that can describe different kinds of resource in a consistent and interoperable manner. These structures can then be clad in various ways to form user-friendly facades; behind the artistry of display is a construction technology. The result is WEMI architecture.

## WEMI structures

### Basic stack

The relationships between WEMI descriptions of a single resource ensure the integrity of the description as a whole and allow it to be re-assembled accurately from the distributed metadata. These relationships are distinct from other relationships between WEMI entities that describe different resources, and are sometimes referred to as “primary relationships”. The description of a single resource, and the WEMI structure that stores it, is known as a “WEMI stack”.

The number (or “cardinality”) of WEMI descriptions linked by primary relationships in a stack is constrained to reflect the characteristics of a resource and the processes that create them. For example, a manifestation may have primary relationships with more than one item, but an item can have only one primary relationship with a manifestation; this covers the creation of multiple identical items via an industrial process such as printing and the creation of a single item via an artisanal process such as painting.

The constraints can be expressed with standard keyboard symbols as:

$$W < E \times M < I$$

“<” means “one to many”, and “x” means “many to many”. The stack can be flipped to:

$$I > M \times E > W$$

“>” means “many to one”. Flipping the stack better resembles the point of view of the cataloguer, who usually begins the description with an “item in hand”.

This general stack model is the basis of specific architectures for the different combinations of WEMI that are needed to describe the range of resources to be found in GLAM collections. The differentiation of such architectures arises from the specification of additional cardinality constraints, for example by reducing “one to many” and “many to one” to “one to one”

## Simple stack

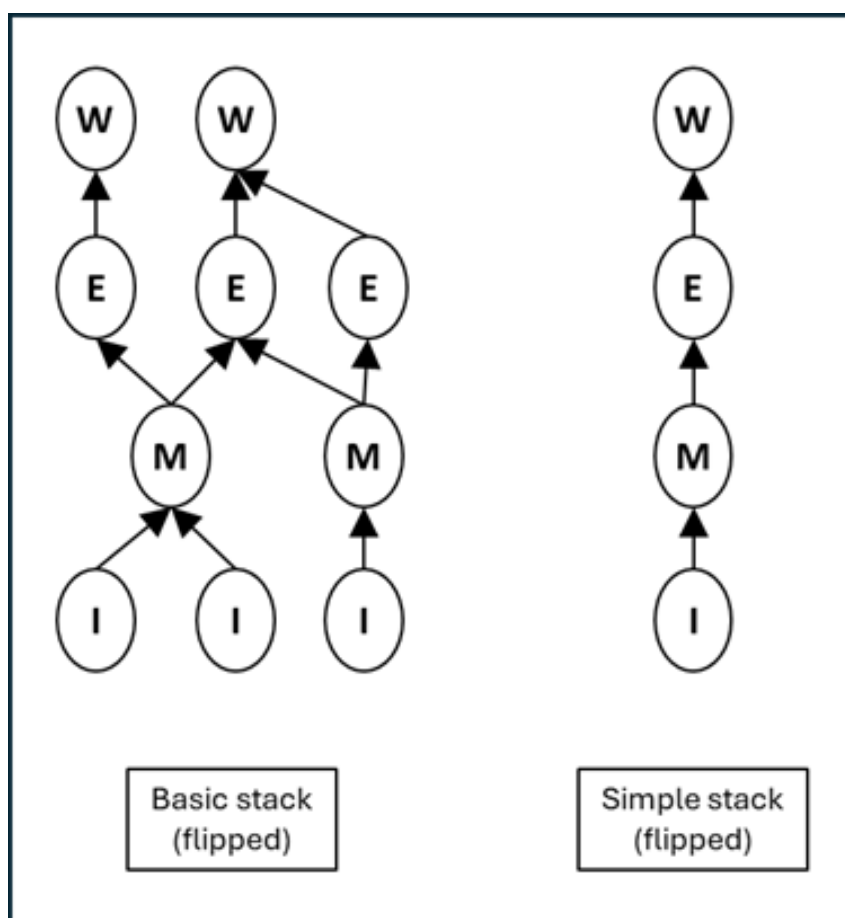
Refining all integrity constraints to “one to one” gives the simple flipped stack

$$I - M - E - W$$

“–” means “one to one”.

This models a resource that is a unique item that carries a single expression: the  $I > M$  constraint is refined to  $I - M$ , and the  $M \times E$  constraint is refined to  $M - E$ . The basic stack implies that there can only be one manifestation and only one work in this stack. Typical examples of resources that are described with a simple stack are manuscripts containing a single letter, poem, musical composition, etc., an art painting or drawing, etc.

Figure 1 shows the basic and simple stacks as entity-relationship diagrams. The relationships represented by the arrows are the LRM and RDA primary relationships; the direction of the arrow indicates the direction of the relationship, which has been inverted or flipped to go from Item to Work.



**Figure 1:** Basic and simple WEMI stacks

## Aggregate stack

The basic architecture of an aggregate applies when one manifestation embodies more than one expression: the  $M \times E$  constraint is refined to  $M < E$ . The aggregate stack is

$$I > M < E > W$$

Each embodied expression realises a single work, and the manifestation may be exemplified by one or more items.

There are three kinds of aggregate stack that are distinguished by the relationships between the embodied expressions:

- An augmentation aggregate embodies an expression of a dominant work and one or more expressions of works that augment the dominant work.
- A collection aggregate embodies expressions of works of equal dominance.
- A parallel aggregate embodies expressions of a single work.

Examples of resources that are best described with an aggregate stack include printed texts with introductions or indexes (an augmentation aggregate), sets of online images (a collection aggregate), music albums (a collection aggregate), official publications in “parallel” languages (a parallel aggregate), etc.

The description of some resources requires a mix of kinds of aggregate stack; for example, a printed set of poems with an introduction is a collection aggregate and an augmentation aggregate. This makes no difference to the architecture of the aggregate stack, which depends on the number of expressions rather than their dominance or utility in resource description.

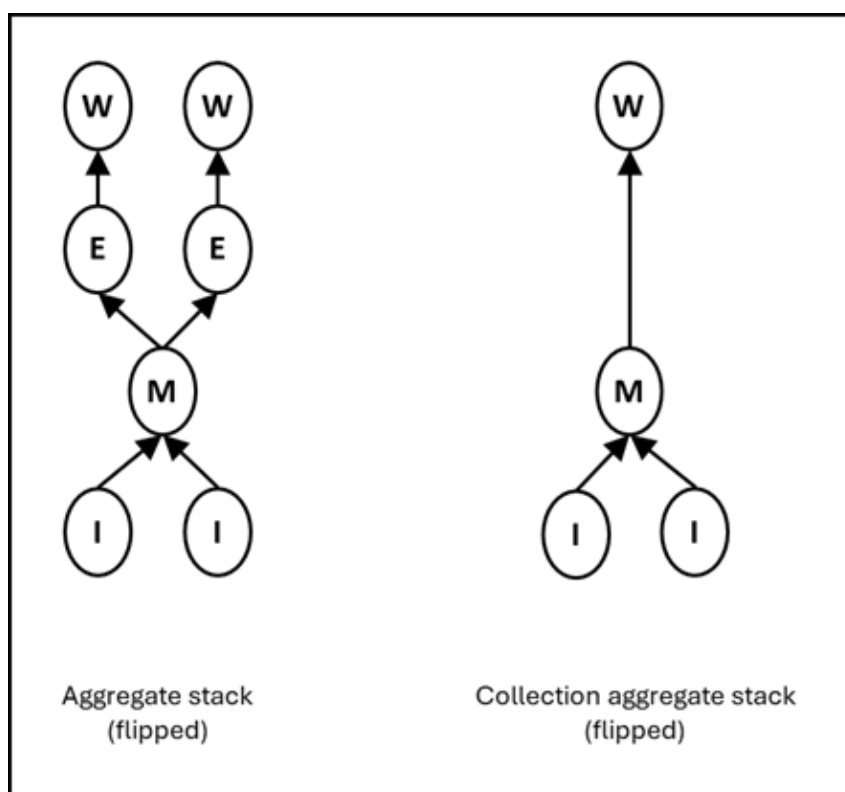
### Collection aggregate stack

The selection and sequencing of expressions in an aggregate manifestation is described by an aggregating expression and its work that is also embodied in the manifestation. In fact, there is generally no need to describe this aggregating expression because it does not inherit the characteristics of the aggregated expressions. However, there is sometimes a need to describe its aggregating work because it is the plan for selection, sequencing, etc. This is often the case with collection aggregates: the aggregating work describes the coverage and scope, context, etc. of the set of aggregated expressions. If the number of aggregated expressions is too large to warrant separate descriptions for them and their works, the aggregating work becomes the main description of the resource’s content. RDA accommodates this with a shortcut primary relationship between Manifestation and Work which does not need to describe the intermediate expression. Furthermore, an aggregating work is realised in only one aggregating expression, so this does not

conflict with the basic WEMI stack. The stack for a resource that is a collection aggregate with too many aggregated expressions to describe separately is

$$I > M - [E] - W$$

The brackets indicate that the entity is not described. This stack simplifies the description of a resource that includes a large set of independent expressions and works. Examples of such resources are a printed anthology of short stories, poems, etc., a “field” or “vox populi” recording of performances or opinions, an online collection of photographs, etc.



**Figure 2:** Aggregate stacks

### Singleton stack

A resource that is unique has only one item. This exemplifies what the LRM calls a “singleton manifestation”. The simple stack discussed above is an example, but the general model of a singleton resource refines only  $I > M$  to  $I - M$  in the basic stack

$$I - M \times E > W$$

Examples of resources that are described with a singleton stack are a sheet carrying multiple manuscript drawings, and the Wu Tang Clan album “Once upon a time in Shaolin”.

## Diachronic stack

A resource which is planned to be instantiated over time is a “diachronic” resource. It is initially instantiated and then its content is amended by deletion, updating, or addition. This may be accompanied by corresponding changes in its carrier. However, some changes in carrier are treated as work boundaries; for example a change in carrier type indicates the need for a description of a new diachronic resource. A diachronic work is a plan for the change of content, but unlike a plan for aggregation, it extends into an unpredictable future. The naturally changing values of extent or other physical characteristics of a diachronic manifestation can be recorded with data provenance (timespan of validity, etc.), but a change of carrier type engenders new values for elements that are specific to the type. These practical considerations complement the WEM-lock for describing diachronic works: there is a one-to-one refinement of the primary relationship constraints between Work, Expression, and Manifestation

$$W - E - M < I$$

Furthermore, the “planning” characteristics of the expression can be recorded for the work using representative expression elements because there is only one expression. This means that changes in description need to be recorded only for the resource work and manifestation

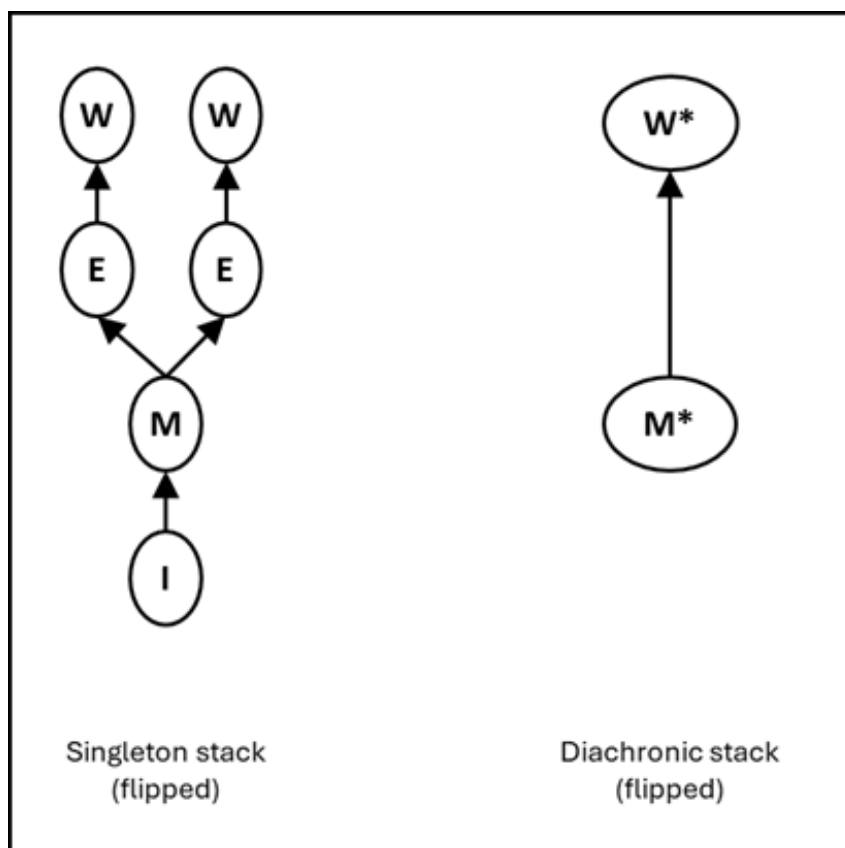
$$[I] > M^* - [E] - W^*$$

The asterisk indicates that the description of this entity (aspect) is expected to change over time. If the change in plan is significant, a new resource description is required. Note that any requirement to record an item description is likely to be for administrative purposes outside of the scope of RDA. The diachronic stack can describe resources such as a printed serial, a video diary, a publisher series, an updating service, etc. This applies to the resource as a whole; issues and snapshots of iterations are described as distinct resources related to the diachronic resource.

## WEMI facades

The user-friendly presentation of RDA and ISBDM metadata is determined by the use of an application profile which selects the elements to display and the kinds of data value that may be processed before display.

There are minimal restrictions on the selection of elements. RDA requires a human-readable label for each entity, at least one recorded in any appellation element (name/title, access point, identifier). For a nomen, the nomen string meets the same purpose. This provides great flexibility in how simple or ornate a façade can be attached to a WEMI stack.



**Figure 3:** Singleton and diachronic stacks

The four recording methods in RDA Toolkit accommodate the kinds of data value that are appropriate for resource description. These are associated with data processing techniques: an unstructured description can be displayed in a block or processed for general keyword extraction; a structured description can be used in a browse function, as a heading, or processed for controlled term extraction; an identifier can be used in direct search; an IRI can be used in linked open data presentation. This provides great flexibility in how simple or ornate a surface can be applied to a façade.

An application profile may also determine how mandatory a selected element is, and how repeatable, and other aspects such as language or script of data values. These are akin to town-planning regulations that ensure overall architectural freedom does not confuse or displease the user. An application profile can be embedded in the Toolkit as a set of policy statements, or as a local document or service linked to specified RDA elements and instructions.

### **ISBD for Manifestations**

ISBDM is the outcome of an ongoing project to develop ISBDs for the other LRM entities. The opportunity was taken to provide elements, stipulations, and guidance for only the Manifestation entity so that the standard can be used stand-alone. It provides much of the descriptive coverage of the consolidated ISBD, albeit it with different elements, and introduces coverage of relationships with other entities via access

points, identifiers, and IRIs. ISBDM is developed to be interoperable with RDA and other implementations of the LRM. It is more prescriptive than RDA: there are a few more mandatory Manifestation elements; controlled values must use ISBDM vocabularies; and there is a preference order for data recording methods. It is also at a broader level of granularity than RDA. These are aspects of an RDA application profile if ISBDM elements are mapped to RDA Manifestation elements – such a map is in development.

## Examples

Element	Value
title proper	"Asterix and the gowden heuk"
manifestation title and responsibility statement	"Goscinny and Uderzo present ane Asterix adventure, Asterix and the gowden heuk, scribeit by René Goscinny, illustratit by Albert Uderzo, translatit by Matthew Fitt"
identifier for manifestation	"9781845028886"
extent of manifestation	"1 volume (44 pages)"
expression manifested	"Goscinny, René, 1926-1977. Serpe d'or (text; Scots)"
related entity of manifestation	<a href="http://www.wikidata.org/entity/Q7620503">http://www.wikidata.org/entity/Q7620503</a>

**Figure 4:** Cut-down RDA description of a printed volume.

These examples are extracted from ISBDM examples, with ISBDM elements replaced with their RDA equivalent. The focus is on the Manifestation entity within the WEMI stack.

Figure 4 is taken from the ISBDM description of "Asterix and the gowden heuk (2014; Itchy Co; volume)"<sup>1</sup>. The description is conformant with RDA: it uses RDA elements, it has two appellations (title proper and identifier), and it has a primary relationship to the embodied expression. The related entity is the IRI for the character Asterix in Wikidata.

<sup>1</sup> <https://www.iflstandards.info/ISBDM/docs/fullex/fx059.html>



Element	Value
title proper	"Revolver"
authorized access point for manifestation	"Revolver (2022; Apple Corps Limited; audio disc; 2 CD edition)"
manifestation title and responsibility statement	"2002 stereo mixes of Revolver, Paperback writer and Rain, produced and mixed by Giles Martin ... Sessions mixed by Giles Martin"
extent of manifestation	"2 audio discs (29 performed songs in 73 min 51 sec) + 1 volume (40 pages)"
note on manifestation	"Contents: CD 1: Taxman; Eleanor Rigby; I'm only sleeping; Love you to; Here, there and everywhere; Yellow submarine; She said she said; Good day sunshire; And your bird can sing; For no one; Doctor Robert; I want to tell you; Got to get you into my life; Tomorrow never knows (all 2022 stereo mixes). CD 2: Paperback writer (2022 stereo mix); Rain (2022 stereo mix); Tomorrow never knows (take 1); Got to get you into my life (early mix); Love you to (take 7); Doctor Robert (take 7); And your bird can sing (first version take 2); Taxman (take 11); I'm only sleeping (take 2); Eleanor Rigby (take 2); For no one (take 10 backing track); Yellow submarine (take 4 before sound effects); I want to tell you (speech and take 4); Here, there and everywhere (take 6); She said she said. (take 15 backing track rehearsal)."
work manifested	"The Beatles. Revolver (2 CD edition)"

**Figure 5:** Basic RDA description of a music CD set.

Figure 5 is taken from the ISBDM description of "Revolver (2022; Apple Corps Limited; audio disc; 2 CD edition)"<sup>2</sup>. All versions of The Beatle's Revolver album are aggregates of the individual songs they contain, and many of the reissues of the album contain extra tracks. Each variation in the tracks, including alternate versions, mixes, etc. forms a new aggregating work. In this example the original tracks have been remixed to create new expressions and additional expressions of earlier mixes, takes, etc. have been added. The RDA relationship between this aggregating work and the original work (The Beatles, Revolver) is "inspired by".

<sup>2</sup> <https://www.iflstandards.info/ISBDM/docs/fullex/fx049.html>

Element	Value
manifestation title and responsibility statement	"IFLA series on bibliographic control"
has manifestation identifier statement	"ISSN 1868-8438"
title proper	"IFLA series on bibliographic control"
authorized access point for manifestation	"IFLA series on bibliographic control (2004-2012; De Gruyter Saur; volume)"
carrier type	"volume"
note on manifestation	"First issue published in 2004 as volume 26; last issue published in 2012 as volume 45."
work manifested	"ISSN 1868-8438"

**Figure 6:** Minimal description of the manifestation of a series as a whole.

Figure 6 is taken from the ISBDM description of the manifestation of "IFLA series on bibliographic control (2004-2012; De Gruyter Saur; volume)"<sup>3</sup>, a diachronic work with an ISSN. The ISSN is an identifier for the work, not the manifestation (although the WEM-lock blurs the distinction). However, the manifestations of the issues of the work (the individual volumes) bear the ISSN and this common statement is treated as a manifestation statement for the "whole" manifestation of the diachronic work. The description uses the "work manifested" shortcut primary relationship. Note that the description is open-ended; IFLA might decide to issue another volume in the future, or not. This may be recorded in a change to the existing note, or the addition of a note, or by a more sophisticated method of data provenance. In this example it would also require a change to the authorised access point because it is based on publication date; this can be avoided if a different string encoding scheme is use for diachronic manifestation access points.

## References

- Escolano Rodríguez, E., Caro Martín, A., Fejes, J., García-Monge Carretero, I., Gentili-Tedeschi, M., McGarry, D., Ouf, R., Santos Muñoz, R. and White H. C. (2022) *ISBD International Standard Bibliographic Description : 2021 Update to the 2011 Consolidated Edition*. International Federation of Library Associations and Institutions. Available at: <https://repository.ifla.org/handle/20.500.14598/1939> [Accessed 5 December 2025]
- ISBD for Manifestation* (version September 2025) (2025). International Federation of Library Associations and Institutions. Available at: <https://www.iflstandards.info/ISBDM/> [Accessed 5 December 2025]
- RDA Registry* (v5.4.10) (2025) Available at: <https://www.rdaregistry.info/> [Accessed 5 December 2025]

<sup>3</sup> <https://www.iflstandards.info/ISBDM/docs/fullex/fx013.html>

*RDA Toolkit* (2025-10 release) (2025) ALA Digital Reference. Available at: <https://access.rdatoolkit.org/> [Accessed 5 December 2025]

Riva, P., Le Bœuf, P. and Žumer, M. (2024) *IFLA Library Reference Model: A Conceptual Model for Bibliographic Information*. International Federation of Library Associations and Institutions. Available at: <https://repository.ifla.org/items/214c74cb-c075-4428-a138-39f8d06c55aa> [Accessed 5 December 2025]