Entailment of Entities and Implicature of Attributes in the FRBR Model

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Data models

Domain	Most famous data model	What is it?
text encoding	OHCO model	an "ordered hierachy of content object" that fits nicely into XML
library catalogs	FRBR model	a loose entity-relationship model described in *Fundamental Requirements for Bibliographic Records: Final Report*

FRBR as data model

The FRBR report is often thought of as containing a data model. However, the report admits that its model is not a full data model, and many have documented its shortcomings.

While this was originally aimed at increasing interoperability of catalog records, it has come to be thought of as part of an effort to rethink library catalogs entirely, abandoning the last vestiges of catalog cards.

I acknowledge the FRBR model's inadequacy but argue that the model should more fully embrace its functional approach.

Functional goal of FRBR

FRBR report has as one of its two aims "to provide a clearly defined, structured framework for relating the data that are recorded in bibliographic records to the needs of users of those records."

This strongly functional approach explains the model's appeal in the library community but also has led to its inadequacy as a formal data model.

FRBR entities in "group 1"

Entity	Definition	Examples
work	"a distinct intellectual or artistic creation"	Bulgakov's *Master and Margarita*
expression	"the intellectual or artistic realization of a work in the form of alpha-numeric, musical, or choreographic notation, sound, image, object, movement, etc., or any combination of such forms"	• text of the first version, which Bulgakov burned in a stove • censored version published in *Moskva* magazine • English translation by Michael Glenny
manifestation	"the physical embodiment of an expression of a work"	• Glenny translation published in paperback by Harper & Row • Glenny translation published as an audiotape
item	"a single exemplar of a manifestation"	my copy of the Harper & Row paperback edition of the Glenny translation

Hierarchy of group-1 entities?

The group-1 entities are often thought of as constituting a hierarchy even though the FRBR report isn't explicit about this.

Many have noted that it's problematic to think of the FRBR model this way.

Nevertheless, it's a convenient term for grouping these four entities when speaking loosely.

Attributes in the FRBR model

Attributes apply to certain entities.

Some have the same name but apply to different attributes. These are not the same—they're simply homonymous.

Examples:

- A work, expression, and manifestation can all have a title, but these titles need not be the same.

- A manifestation may have a typeface, but this attribute does not apply to any other entity.

- An expression may have use restrictions, whereas both a manifestation and an item may have access restrictions.

FRBR reflecting cataloging practice

Entity	Attribute	Refers to
work	title	uniform title
manifestation	title	text on the title page
expression	use restrictions	copyright
manifestation	access restrictions	encryption
item	access restrictions	library policy on use of the item

More on FRBR as data model

FRBR can't be formally described using an ER model.

An object-oriented version ("FRBR$_{OO}$") is being developed. This model is harmonized with CIDOC CRM, an ontology from the museum community.

While FRBR$_{OO}$ provides a much more solid foundation, I believe the original FRBR model, with its functional approach, has merit for enhancing common uses of library catalogs.

I propose extending and loosening the FRBR model to more closely correspond with its perception and with common conceptions of how bibliographic entities relate to one another.

I'll draw inspiration from FRBR$_{OO}$ for some of my analysis.

# How do group-1 entities come into existence?

According to FRBR$_{OO}$, the act of creation leads to simultaneous instantiation of abstract and physical entities.

Let's apply this to the original FRBR model. We can *entail* the existence of entities at all levels.
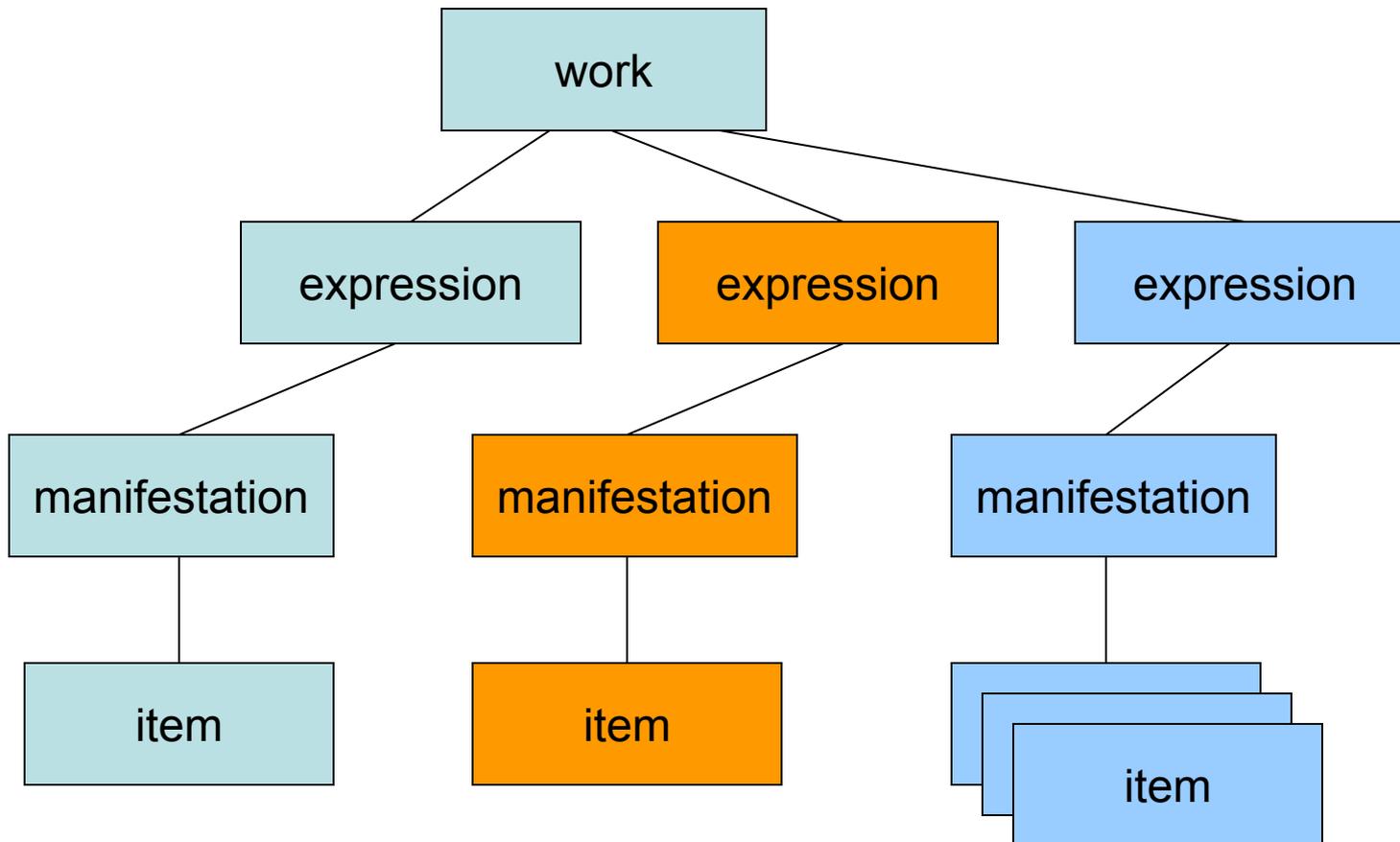
When Bulgakov composed Master and Margarita on handwritten manuscript pages in 1928–29, all four group-1 entities were instantiated.
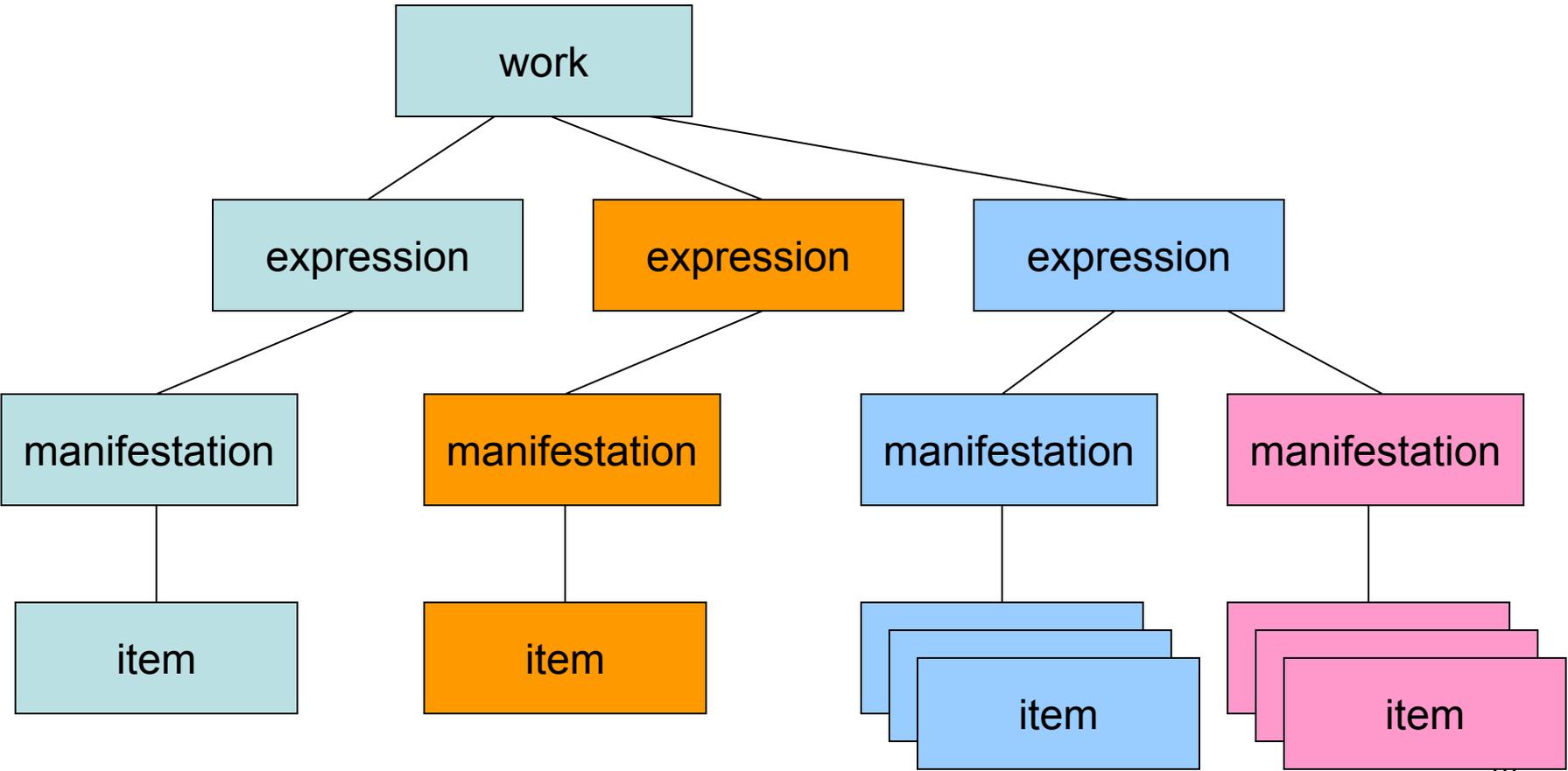
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work
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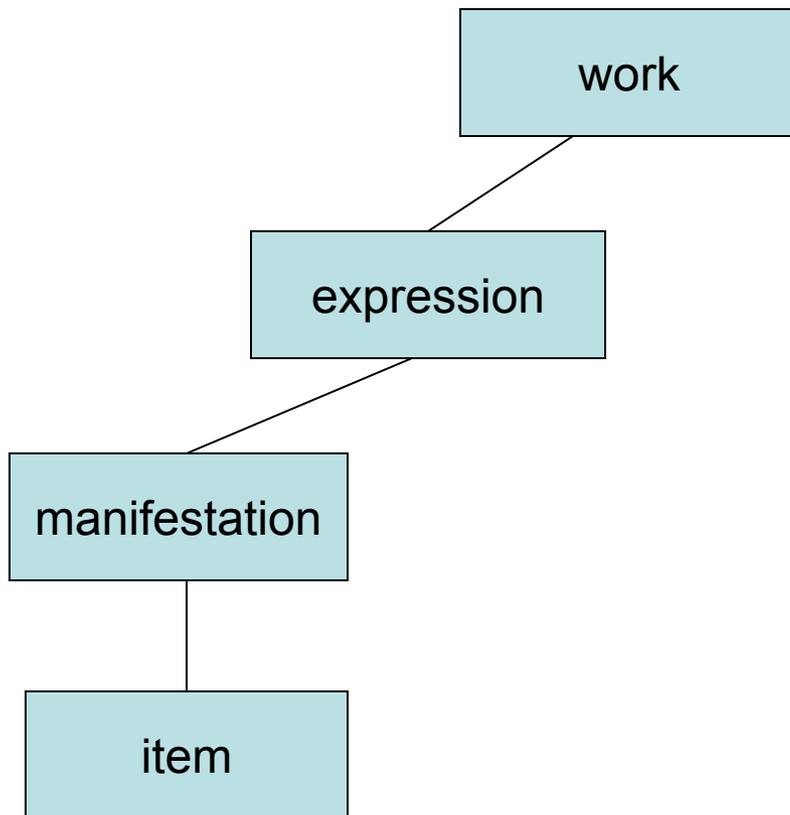
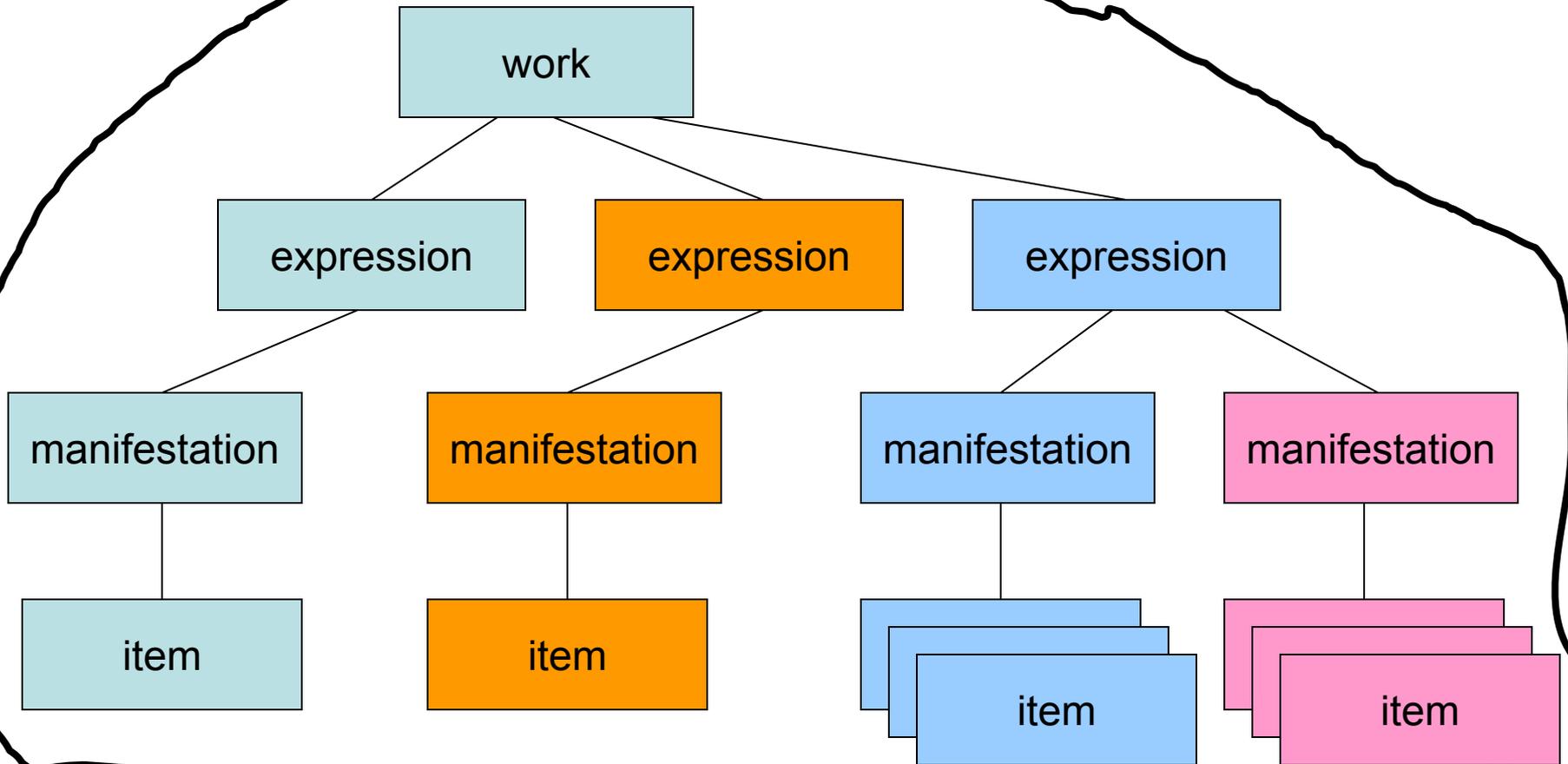# Bulgakov's second manuscript (composed 1931–36)
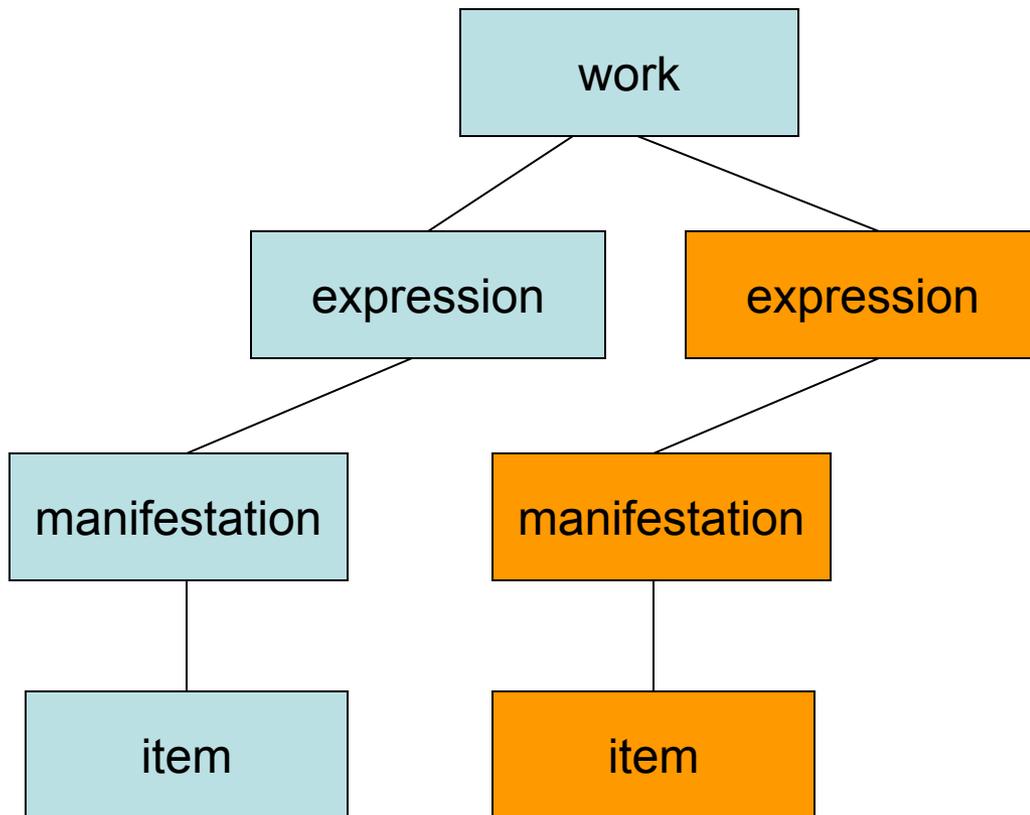
Translation by Glenny published in paperback by Harper & Row

Translation by Glenny published as an audiobook

A "bibliographic family"

At what level in the hierarchy do FRBR attributes apply?

How does an attribute come to be assigned to an entity? FRBR$_{OO}$ doesn't help!

For example:

- How does a work, expression, or manifestation acquire its title?

- How are access restrictions on an item related to access restrictions on a manifestation?

A data model for bibliographic entities needs inference rules that allow a machine to determine—or at least guess—that which is not stated explicitly.
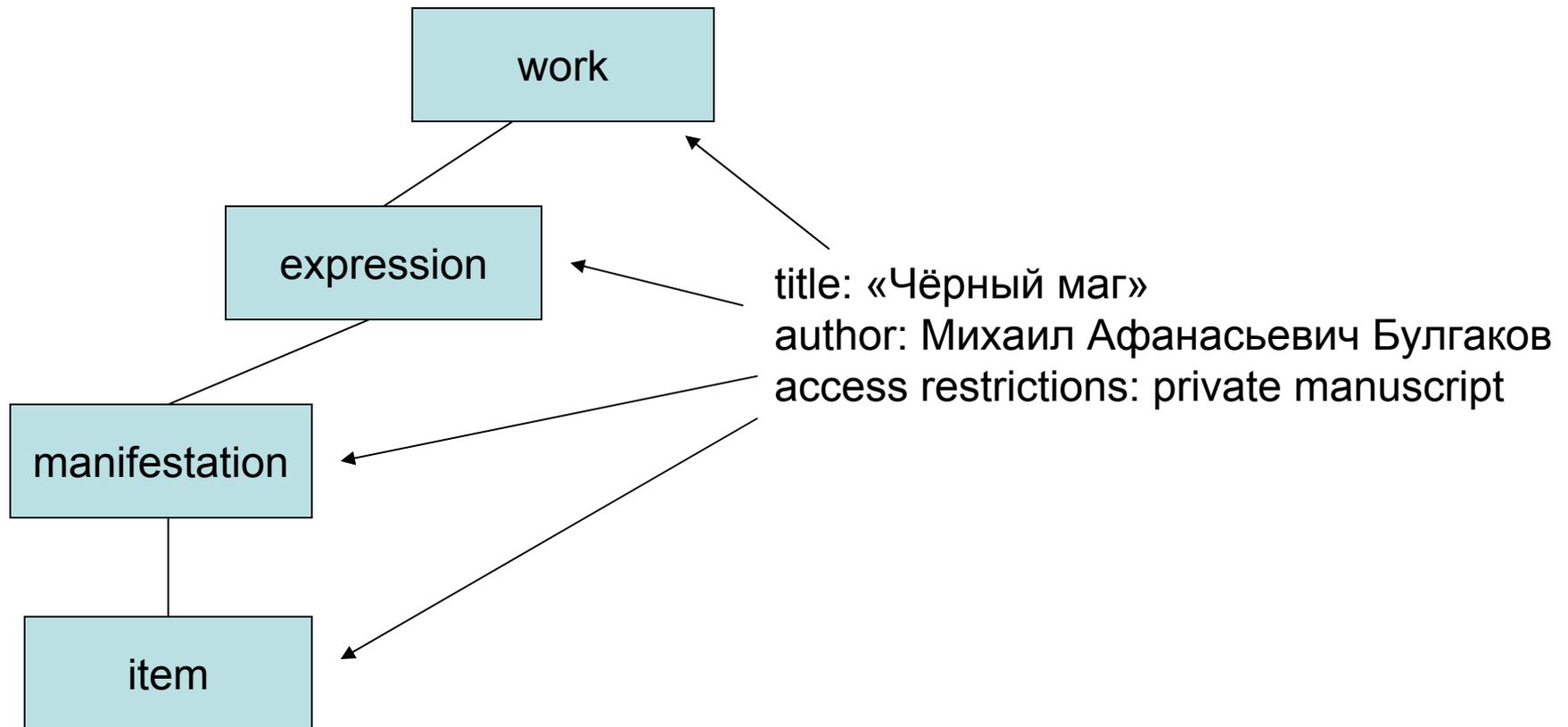
Attributes at any level and inherited
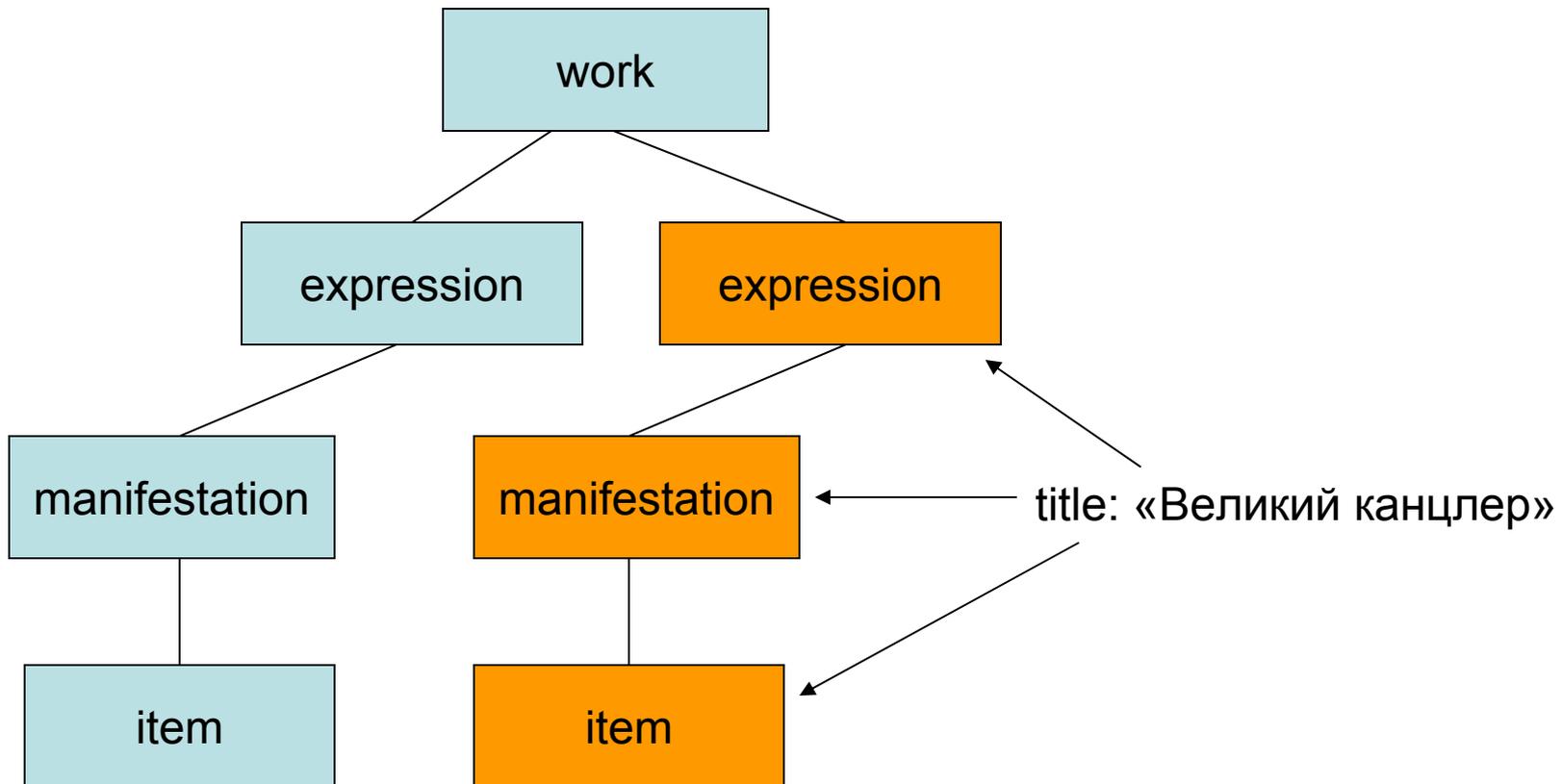
What if FRBR attributes could:

- exist at any "level" in the hierarchy
- be "inherited" from previously existing entities within the bibliographic family
- be "overridden" during the instantiation of a new entity

This leads to usage of attributes in a way more associated with everyday thinking.

Attribute inheritance and at any level: an example loosely based on historical fact

work

expression

manifestation

item

title: «Чёрный маг»
author: Михаил Афанасьевич Булгаков
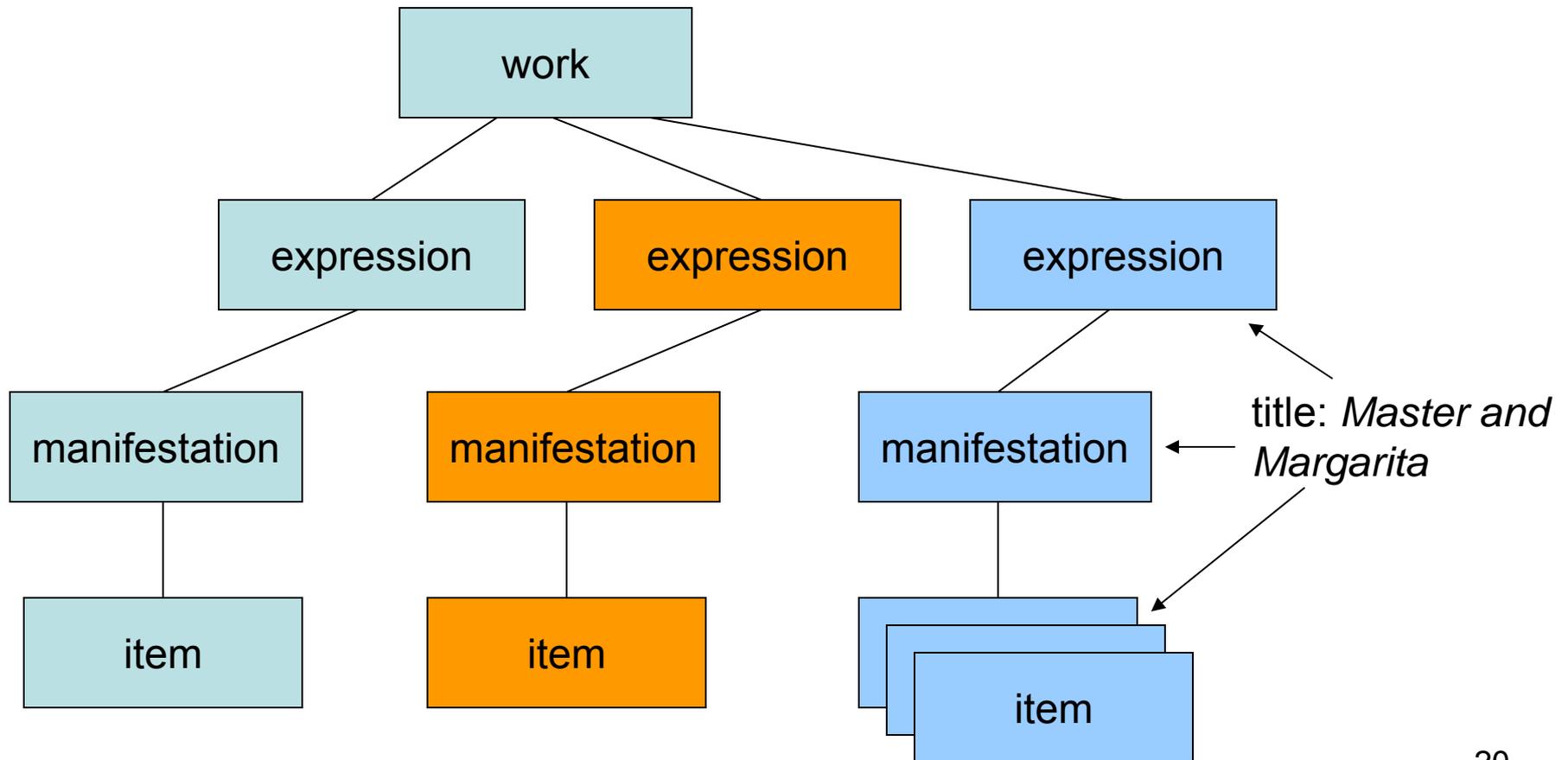access restrictions: private manuscript

Attribute inheritance and at any level: an example loosely based on historical fact

Attribute inheritance and at any level: an example loosely based on historical fact

Attribute inheritance

Inheritance in the FRBR model is usually thought of as going down the hierarchy, but it would be more appropriate to say that attributes inherit from previously existing entities.

But as we see, these attributes can be overridden. How do we model this?

I believe normativity and implicature provide a good model.

Normative nature of FRBR entities

The FRBR model's entities are *normative*. For example:

- If a book (an item) is missing a page, it does not cease to exemplify a particular manifestation.
- If an edition (a manifestation) is published under a different title from previous editions, it does not cease to embody the expression.

In the bibliographic universe, there is much information which you can assume but little which, if you learned otherwise, would change your basic assumptions.

Implicature

Term	Definition	Applies to	Example
entailment (logical implication)	inference must be drawn	entities	Author's creation requires the instantiation of all four group-1 entities.
implicature	inference may be drawn but need not	attributes	The title of an expression is the same as previously existing expressions until someone changes it.

Using FRBR for machine learning

It's evident that implicature rather than entailment means a machine cannot draw conclusions but only make statements about what it possible.

Still, such statements of possibility turn out to be quite useful, and they in fact model human behavior when dealing with bibliographic families. When searching for bibliographic entities, you assume they share attributes with other entities in that bibliographic family but are not surprised to find divergences.

In summary

While it is clear that FRBR is insufficient as a data model, it is based not only on cataloging practice but also on intuitive notions of how entities in bibliographic families relate to one another.

Users searching for bibliographic entities make inferences based on known information, but few definite conclusions can be drawn.

If we make tools to assist users in searching for information and make use of the FRBR model, it might be useful to consider entailment of entities and implicature of attributes.

In summary

My revised model allows attributes to exist at any level of the FRBR model. I believe that in a functionally driven model like FRBR, it may be useful to allow for an even looser ontology than that proposed in the report.