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# FRBR: THE WAY FORWARD



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ABSTRACT: **Objective** – This paper is a presentation of several issues – including user provided data on relationships and attributes, frbrisation, harmonisation of various models and display of bibliographic data – that have been hindering the full adoption of the Functional Requirements for Bibliographic Records (FRBR) conceptual model as the basis of cataloguing. It also serves as an introduction to the complexity of bibliographic data that is often disregarded in texts on FRBR. **Research method** – Results of several of our studies using a wide range of methods are included to corroborate the statements in this presentation of current state of affairs. **Results and conclusions** – The paper provides research based hints towards solution of the identified issues, while pointing out possible problems along the way.

## INTRODUCTION

Libraries have found themselves in an unenviable situation. As important agents in the ever changing field of information provision they need to create an infrastructure that would support exchange and reuse of their rich data in the networked environment beyond the library domain, providing information where the users are (Tonta, 2008). On the other hand, they also have to take better advantage of their high quality data as well as centuries of experience in order to bring users back to the library by offering unique and effective services.

While using modern technology, cataloguing in large part still follows the tradition of card catalogues, which were developed in another time, for a different information environment, a different type of users, and a different set of technologies. Changes have been happening, but the process is relatively slow.

## FRBR

The *Functional Requirements for Bibliographic Records (FRBR)* conceptual model has been developed to rectify shortcomings of cataloguing and catalogues, as well as other bibliographic systems. It is a conceptual model of the bibliographic universe that was developed under IFLA (*Functio-*

*nal…*, 1998). It consists of three groups of entities, but it is probably most well-known for its Group 1 entities (Work, Expression, Manifestation and Item), often also referred to as WEMI.

One common, yet overly simplified, representation of FRBR Group 1 entities is as a hierarchy going from work to Item. Each work can have several expressions (e.g. original text, texts of the translations, …), each of which can be embodied in various manifestations (different publications), which usually result in many items (copies), as example *a* in Figure 1 shows (omitting the item level). However, the bibliographic universe is more complex, as can be seen by using the bottom-up approach. Manifestations may include various expressions of various works (example *c* in Figure 1), e.g. a book containing texts of three Shakespeare plays. Manifestations may even include expressions of the same work (e.g. a bilingual book; example *d* in Figure 1). Such cases are called aggregates. There are also horizontal relationships in the bibliographic universe (as seen in Figure 2), for instance when a work has a sequel. Thus, by using FRBR, we present the bibliographic universe not only in a linear or hierarchical manner, but also as a network.
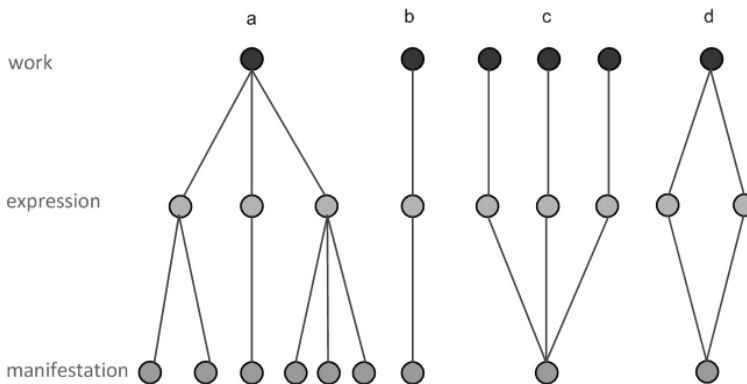


Figure 1: Examples of diversity of the bibiographic universe

While many books have only one edition (example *b* in Figure 1) and therefore seemingly do not profit from FRBR – although sometimes even in these situations we are dealing with aggregates – FRBR is of most benefit for the works with the most variety in publication, i.e. the most popular ones.

Part of the greater complexity of the bibliographic universe – still without agents or subjects – is seen in Figure 2. For the simplicity of presentation, examples and relationships are not explicitly named, as they would be in any FRBR-based system. Therefore explanations that follow only suggest what might be represented. Solely for the purposes of explanation we will assume that the work in the middle is a novel and call it "central work", although in reality all the works in bibliographic universe should be seen as equally important.
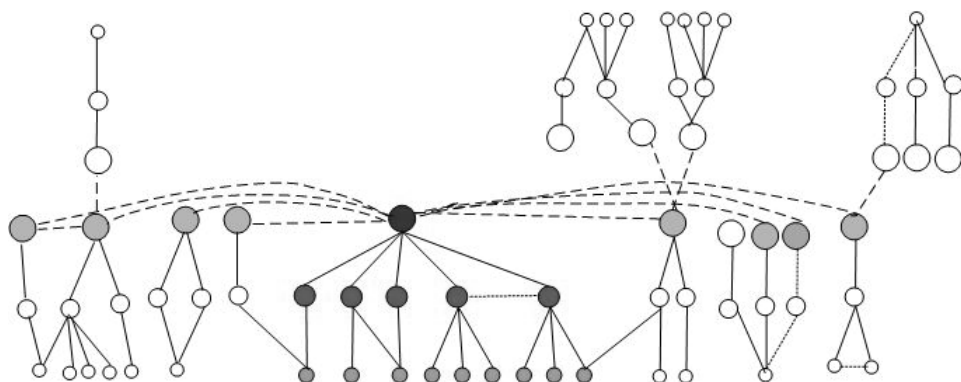
Figure 2: Complexity of the bibliographic universe

Multiple dashed lines indicate that the central work is in some way connected to many other works (e.g., novels based on this novel, novels on which it is based, movie versions, …), which may in turn be related to other works. The central work also has five expressions (e.g., the original text and different translations, perhaps even different texts in the same language). Each of the expressions is included in one or more manifestations. The third manifestation from the left includes two different expressions of the central work (scenario equal to example *d* in Figure 1).

Also, both manifestations at the extreme ends of the central work example include expressions of another work in addition to the central work. The work on the left might be a foreword, (non-integral) illustrations, etc. The work on the right hand side might be a novel that was also published separately.

Perhaps less intuitively, the fourth and fifth expression of the central work are connected (e.g. the fourth expression was the direct source for the resulting translation). It has to be noted that usually such information is either unavailable or may be deemed unimportant. Ultimately all the recorded information should be based on user needs.

Our research (Pisanski & Žumer, 2010a; Pisanski & Žumer, 2010b; Pisanski & Žumer, 2012) has shown that users find the Group 1 abstract levels intuitive. As such, FRBR could serve as a building block for cataloguing. However, FRBR is not an implementation model and needs to be supplemented by various other important developments, if users are to take full advantage of FRBR. These developments include changes in cataloguing principles, cataloguing rules, cataloguing practice, format of data, computer systems and user interfaces.

Although it has taken more than a decade, FRBR is starting to be used in various practical cataloguing developments throughout the world. Perhaps most notably, FRBR is the basis for the follow-up to AACR2, RDA (*Resource Description and Access*), which is a cataloguing code used in an increasing

number of countries. However, it has to be noted that RDA and other current developments do not take full advantage of FRBR's potential.

Part of the problem is that there are still some FRBR-related issues that have not been completely resolved, many of which (such as identifying user based relationships and attributes to include in the bibliographic records, providing legacy bibliographic data using FRBR structures, displaying FRBR-based data and harmonization of various models of the bibliographic universe) have been the focus of our research in recent years. What follows is an explanation of these issues and some discussion on how to solve them.

## RELATIONSHIPS AND ATTRIBUTES

While FRBR is user oriented and it offers a set of attributes and relationships, the set is admittedly relatively vague. Additionally, there is still a distinct lack of user studies, especially with regard to attributes and relationships that would support user needs, as creation of the model did not "involve studies of how actual users approach and make use of bibliographic records" (Madison, 2000). A Delphi study by Zhang and Salaba (2009) confirmed the necessity to verify attributes and relationships through user studies. Some of the important questions that have not yet been fully answered are: Which attributes and relationships are missing in current catalogues and which are redundant? Which attributes and relationships are most important to users? Are they the same for all user groups, all types of materials and all information needs? Which attributes and relationships are essential for supporting FRBR user tasks? (Merčun et al., 2013)

Research (Yee, 1998; Leskovec, 2005) tells us that while some users search for manifestations (i.e. particular editions) when they are particularly interested in the first or the latest edition or when they are looking for publications with additional materials, such as illustrations or commentaries, most users seek works, expressions, and groups of expressions (e.g. any edition of a work in a particular language). This is in contrast to current catalogue records, which focus on manifestations and describe them in detail, while information about works and expressions is not always evident (Žumer, 2011).

## FRBRISATION AND BIBLIOGRAPHIC FORMATS

*Frbrisation* is the (automated) transformation of existing bibliographic data according to FRBR. While it may seem like as a relatively intuitive and trivial task, there are various factors to consider. Bibliographic records exist in various versions of MARC. While MARC provides a framework for structuring information that librarians have been familiar with for years, it

was not created with FRBR in mind. Some of the data in bibliographic records (e.g,. information in note fields) is understandable to a human but is not structured (or structured enough) for computer manipulation. Even without that problem, the mapping between MARC (sub)fields and FRBR entities may not always be clear. In some cases, the cataloguing rules and practices, for various reasons, do not support the entry of data that would enable correct automatic identification of all of the FRBR entities and relationships. For example, volumes containing multiple works have for a long time been catalogued with mostly the identification of manifestation in mind. In short, frbrisation will never be perfect, as we are dealing with data that is flawed in various ways. However, frbrisation can help libraries present legacy bibliographic data in line with the born-FRBR data. There is a growing number of systems which present data which is »frbrised«, although usually not completely. For instance, much of the focus has been on identification of works, while expressions are not always seen as important. Sometimes only groups or expressions by language are presented, as seen in the screenshot from catalogue of Acadamie Louvain (Figure 3) and sometimes expressions are even completely disregarded.



Figure 3: Display of FRBR-based data in the catalogue of Academie Louvain

While the currently used MARC format can, to a certain extent, encode FRBR entities and relationships (Aalberg et al., 2011, Aalberg & Žumer, 2013), the format has been designed more than 50 years ago. It was primarily intended for the exchange and display of records and the data was, to a large degree, structured for human interpretation and not for automated processing and retrieval as it is required today (Lee & Jacob, 2011). Furthermore, MARC is also not able to efficiently support FRBR-born data that introduces an approach different from the traditional manifestation-based bibliographic record.

As an answer, which also takes into consideration the potential of Semantic Web, Library of Congress has initiated new Bibliographic Framework Initiative (BIBFRAME), which is intended to serve as a replacement for MARC (Library of Congress, 2014), but is also a data model. However, it provides a different view of the bibliographic universe compared to FRBR.

## VISUALIZATION

Even if working with perfect data in a relationship friendly format, there is still a problem of how to present the data to the end-user. Current interfaces are mainly oriented towards presenting linear lists of search results and rarely support exploration. As much of the benefit of FRBR comes from making explicit the relationships between various instances of entities, which are not easily presented in a linear manner, there is a need for different displays. In cooperation with researchers from NTNU in Trondheim, Norway, we have developed a FRBR-based visualization prototype called FrbrVis (http://dijon.idi.ntnu.no/exist/rest/db/frbrvis/index.html ), which is being used towards identifying and solving problems in presentation of complex bibliographic data (as seen in Figures 4 and 5).
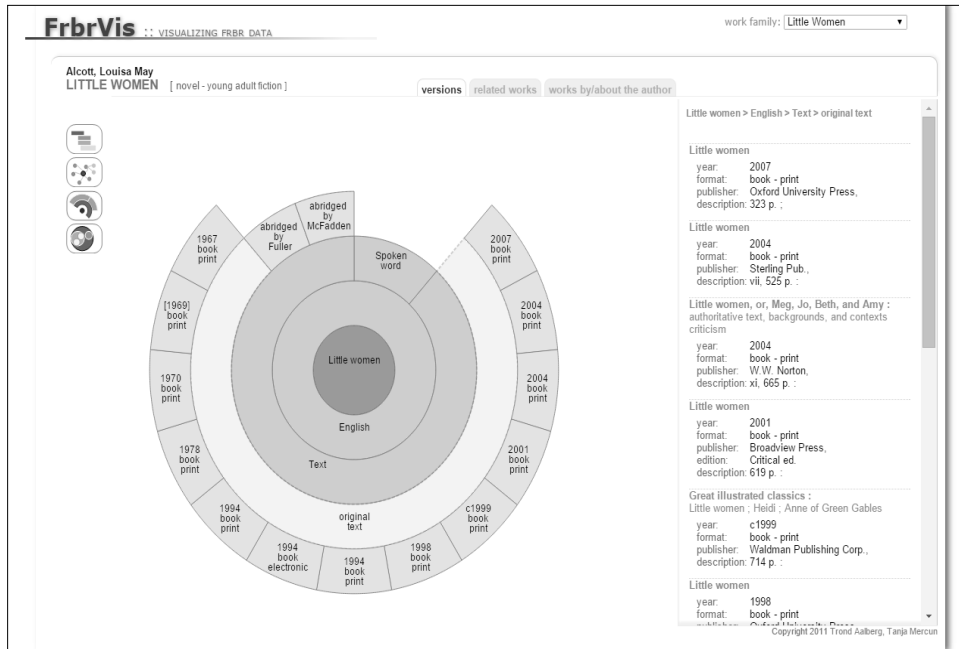


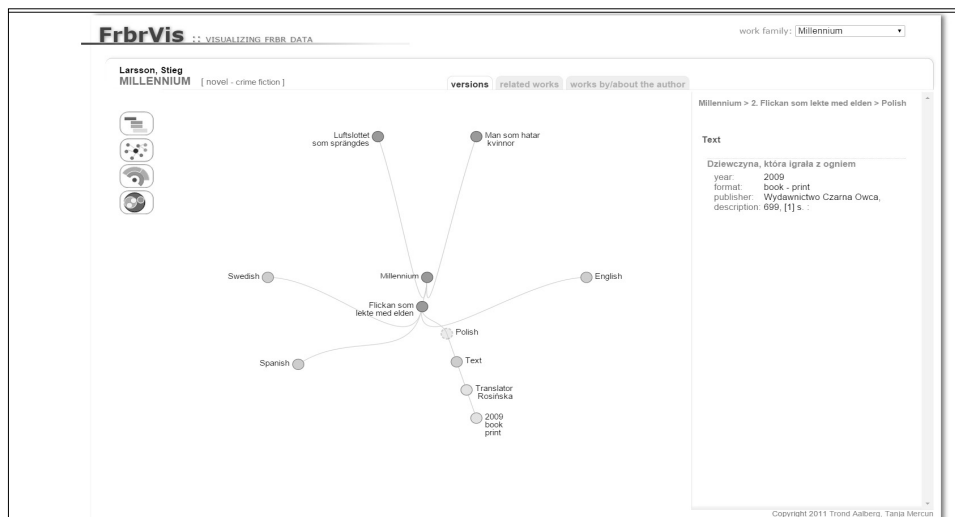Figure 4: An example of FRBR data visualization

Figure 5: Another example of FRBR data visualization

Merčun et al. (2013) present a list of questions that still need to be answered when displaying data: How should entities be collocated? How should we deal with the discrepancy between complex work families or very prolific authors on the one hand and works with only one expression and one manifestation or authors with only one creation on the other? How should we present relationships between related works, between derivative expressions or between manifestations? How can we create the best overview of the bibliographic family and enable the user to explore the network of relationships that exist in the bibliographic universe? How should we form results list for keyword searches? How can we best bring together similar materials which are interchangeable for most users, but at the same time retain the detailed information that will allow users with specific needs to determine the differences between these similar materials? What kind of presentation method will enable us to show and interactively explore the hierarchical top-down, bottom-up as well as horizontal relationships between entities?

HARMONISATION

While first of its kind, FRBR is not an isolated model anymore, as it was later joined in the »FRBR family« of models by FRAD (Functional Requirements for Authority Data) and FRSAD (Functional Requirements for Subject Authority Data), both also developed under IFLA. As their names suggest, these two models were developed to focus on the often overlooked parts

of the bibliographic universe, agents and subjects, which are respectively the focus of FRBR's Groups 2 and 3.

When looking at the whole family of FRBR-based models, it is clear that the authors of each model, although striving for the same goals, took different approaches, which led to discrepancies. The process of harmonisation is now taking place with the goal of a unified view of the bibliographic universe and its component parts.

As noted in the beginning, while FRBR is library oriented, it has potential beyond the traditional cultural heritage communities. It should help in representing bibliographic universe on the Semantic Web and thus form the basis for provision of trustworthy information to the outside world. The FRBR conceptual model can serve as the basis for the ontology, but more elaborate for that purpose is the FRBRoo (International Working Group, 2012), which was developed in collaboration with the museum community. However, ontologies cannot bring advantages without consistent and global identification of entities and relationships. An interesting development towards global authority URIs is the VIAF project (http://www.viaf.org), which is not only concerned with the traditional authorities, but also takes into account authority for works and expressions.

CONCLUSION

The period between the publication and widespread adoption of FRBR has been rather long. This is partly due to realization that adopting FRBR is a major step away from existing cataloguing practice and should not be taken lightly. As FRBR can only be expressed through other developments in cataloguing, certain time is necessary to establish a FRBR-based environment. On the other hand, the long wait also indicates doubts regarding validity and applicability of FRBR, partly owing to its abstract nature. Our research shows that, generally speaking, FRBR Group 1 entities are intuitive. As such, FRBR has the potential to enable libraries to use their data in more innovative ways and to create bibliographic information systems that would better support users' needs and information seeking process. However, even when accepting FRBR as the basis of cataloguing, as the international community has done, there are still unresolved issues on many different levels that have hindered the full adoption of FRBR. While identification of these is important, much of the success of the whole »FRBR family« of models depends on relatively quickly finding appropriate solutions and integrating them with other new developments in cataloguing at a very practical level.

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# FRBR: KOLEJNE KROKI


SŁOWA KLUCZOWE: FRBR. Modele konceptualne. Katalogowanie – rozwój.

ABSTRAKT: **Teza/cel artykułu** – W artykule przedstawiono szereg zagadnień – m.in. dane uzyskane od użytkowników na temat relacji i atrybutów, eferberyzację, harmonizację wielu modeli oraz prezentację danych bibliograficznych – które utrudniają pełne zastosowanie konceptualnego modelu FRBR (Functional Requirements for Bibliographic Records) jako podstawy katalogowania. Artykuł stanowi także wprowadzenie do zagadnienia kompleksowości danych bibliograficznych, często ignorowanego w publikacjach dotyczących FRBR. **Metoda badań** – Do potwierdzenia tez przedstawionych w niniejszym artykule użyto wyników szeregu badań przeprowadzonych przy użyciu wielu metod. **Wyniki i wnioski** – W artykule zawarto sugestie rozwiązania zaprezentowanych problemów i wskazano na możliwe skutki uboczne ich zastosowania.