The reprint of my article in your handout – I hope you will find it useful.
Agenda

- Conceptual models
  - FRBR

Diagram:

- Work
- Expression
- Manifestation
- Item
From 1992-1995 the IFLA Study Group on Functional Requirements for Bibliographic Records developed an entity-relationship model. We described a conceptual model and functional requirements known as FRBR, or sometimes pronounced as “ferber.” You can get FRBR online, and it’s also available in print from the publisher, K.G. Saur (1998). The URL for the FRBR final report of this Study Group is shown on this slide.

What is the FRBR model? It is a generalized view of the bibliographic universe and is intended to be independent of any cataloging code or implementation. It’s a conceptual model and is not an application or an implementation, which makes it difficult for some of us to understand how it might really be applied to our real world. It’s not a data model, it’s not a metadata scheme, it’s not a system design, but rather a conceptual model that can be used as the foundation for development of systems.

The FRBR report itself includes a description of the conceptual model of the bibliographic universe: that is, the entities, relationships, and attributes (or as we’d call them today, the metadata or data elements) associated with each of the entities and relationships, and it proposes a national level bibliographic record for all of the various types of materials. It also reminds us of user tasks associated with the bibliographic resources described in catalogs, bibliographies, and other bibliographic tools.
IFLA continues to monitor the application of FRBR and promotes its use and evolution. At the start of May there was an FRBR workshop in Dublin, Ohio with participants from around the world to discuss further evolution of the FRBR model and concepts.

Here is the Web site of the FRBR Review Group under the leadership of Patrick LeBoeuf of BnF. It has lots of information including presentations, a hot-linked bibliography, training tools, and a lot more.

There are several Working Groups within IFLA looking at FRBR with respect to continuing resources, expressions, and library applications. In particular the library applications working group should help make FRBR more real to librarians by demonstrating several models of how FRBR may be applied to online catalogs and systems now and in the future. At the end of my presentation I’ll show you a few examples of systems that have implemented their applications of FRBR.
FRBR describes the bibliographic universe, but what is the bibliographic universe? It’s all of the things that libraries include in our collections or things we want to make known to our users. All types of materials, including the digital.

Most cataloging rules today provide for all types of materials, regardless of format or form. Certainly in the Anglo-American Cataloguing Rules (AACR), the basic rules are intended to apply to past, present, and future materials. Yet even the Joint Steering Committee for Revision of AACR (known as the JSC) is now looking at FRBR for a new model.

FRBR also reinforces some of the basic objectives of library catalogs, looking at them in the new light of “user tasks.” This is especially important now as libraries are talking with creators of digital libraries and computer science people, archives, museums, rights management communities, and the Internet folks. During a time of change like this, as we interact with new communities, we need to share our concepts and vocabulary so we all “speak the same language” and then the next generation will find it normal.
An entity-relationship model was chosen, as it was a well accepted modeling technique at the time. (E-R models were developed by Paul Chen several decades ago.) It could just as well be an object oriented model today or a network model based on graph theory. In fact, the IFLA FRBR Review Group is exploring an object oriented model of FRBR.

I’m going to focus on the concepts that are presented in the FRBR report – the entities, the relationships, the attributes, and the user tasks.

The convention of entity-relationship notation was used in the FRBR diagrams, but it was intentionally kept simple. For example the recursive nature of works was not diagrammed, although the consultants recognized that fact that “works” are recursive - you can have a work that consists of other works. Also the complex works and components were not developed in any detail, but are mentioned – you can have something you wish to describe, or a component of that thing or an aggregate of various things that you want to describe together in one bibliographic description.
FRBR Entities

**Group 1**: Products of intellectual & artistic endeavor

- Work
- Expression
- Manifestation
- Item

In the FRBR conceptual model, the bibliographic universe consists of several entities that are related to each other and can be described through data elements (or attributes). The entities themselves are sorted into 3 groups.

Group 1 - products of intellectual and artistic endeavor that are named or described in bibliographic records: work, expression, manifestation, and item.
The vocabulary is really very important. Let me give you an analogy from Patrick LeBoeuf.

• When we say ‘book,’ what we have in mind may be a distinct, physical object that consists of paper and a binding and can sometimes serve to prop open a door or hold up a table leg – FRBR calls this an item.

• When we say ‘book’ we also may mean “publication” as when we go to a bookstore to ask for a book identified by an ISBN – the particular copy does not usually matter to us, provided it belongs to the general class of copies we require and no pages are missing – FRBR calls this manifestation.
When we say ‘book’ as in “who translated that book?” – we may have a specific text in mind in a specific language or a translation – FRBR calls this expression.

When we say ‘book’ as in “who wrote that book?” - we could also mean a higher level of abstraction, the conceptual (intellectual or artistic) content that underlies all of the linguistic versions, the basic story being told in the book, the ideas in a person’s head for a book – FRBR calls this work.

We want our language to be more precise to help with future system design and future cataloging rules.
FRBR Entities

**Group 2**: Those responsible for the intellectual & artistic content

- **Person**
- **Corporate body**

Group 2 - are the entities responsible for the intellectual or artistic content, the physical production and dissemination or the custodianship of such products: person and corporate body

We could also add family here – especially when applying FRBR to archival materials- but we could also consider families as a special kind of corporate body.
<table>
<thead>
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<th>FRBR Entities</th>
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<td><strong>Group 3</strong>: Subjects of works</td>
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<td>- Concept</td>
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Group 3 - are the entities that serve as the subjects of intellectual or artistic endeavor: concept, object, event, place, and any of the Group 1 or Group 2 entities – you can have a work about another work or about a person, etc.

Let’s look at each group a bit more.
Group 1 are the entities that are the product of intellectual or artistic endeavor. The entities form a hierarchy with work at the top of the model.

**Work**, according to FRBR, is a distinct intellectual or artistic creation. It is an abstract entity. The boundaries of a work are sometimes dependent on the cultural or national view, but FRBR suggested some boundaries - we’ll look at this more in a moment. I like to think of it as the ideas that a person has.

A work is realized through an **expression** - another abstract entity. An expression is the intellectual or artistic realization of a work in the form of alpha-numeric notation, musical notation, choreographic notation, sound, image, object, movement, etc., or any combination.

Using this model, one could even collapse both “work” and “expression” into something called an “abstraction” (or “Workspression” as Patrick Le Boeuf says) when that was found to be useful for a particular application. It should be noted however, that FRBR kept them separate.
The JSC is re-examining the General Material Designators (GMDs), and the FRBR “modes of expression” may be useful for this analysis. We are even exploring the possibility of using icons to represent these modes of expression in collocated displays in the online catalog.

Expressions in FRBR are identified by the mode in which they have expressed the ideas or content of a work, and this can also include the language or a date to identify the expression. These attributes are the metadata that identify the expression.
In 2001, the JSC commissioned a Task Force to explore the issues of Format Variation, specifically with respect to FRBR entities. In their report to the JSC, they discussed the use of work-level citations and expression-level citations (that we now call uniform titles) and the possibility of removing the main entry/added entry terminology (using instead things like headings and access points and bibliographic records). We are exploring this for the new cataloging code, that is to be called RDA – Resource Description and Access.

The JSC is also seeking to update the language throughout the new cataloging code to reflect FRBR terminology. In addition we are using the FRBR user tasks (find, identify, select, and obtain, as criteria for determining what elements are needed for bibliographic description and access.

A couple of years ago we started a FRBR Implementer’s Group of the bibliographic utilities and vendors of integrated library systems to meet with representatives from the JSC to talk about FRBR implementation. We meet at the OCLC suite on the Friday morning of the ALA conference. It’s hoped more vendors will join us and implement the FRBR model in their own applications. I’ll show you a few at the end of my presentation.
So we have works and expressions – abstract entities of intellectual and artistic content. They are useful to identify because we can use them to collocate the things we collect and organize in libraries.

When we **record** the intellectual or artistic content, we move from the abstract “work/expression” to a physical entity. As FRBR puts it, a **manifestation** is the physical embodiment of an expression of a work. In order to record something you have to put it **on** or **in** some container or carrier. So, manifestations appear in various “carriers,” such as books, periodicals, maps, sound recordings, films, CD-ROMs, DVDs, multimedia games, Web pages, etc. A manifestation represents all the physical objects that bear the same characteristics of intellectual content and physical form. {click} In actuality, a manifestation is itself an abstract entity, but describes and represents physical entities, that is all the items that have the same content and carrier. When we create a bibliographic record, it typically represents a manifestation – that is, it can serve to represent any copy of that manifestation held in any library anywhere.

One example or exemplar of a manifestation is called an **item**. Usually it is a single object, but sometimes it consists of more than one physical object, e.g., a monograph issued in 2 separately bound volumes or a sound recording on 3 separate CD’s. With an item entity, we are able to identify an individual copy of a manifestation and to describe its unique attributes - this may be information relevant to its circulation or preservation.
Let me show you an example

Starting with the work of *Gone with the Wind*, it was created by Margaret Mitchell and expressed in many ways including an original text, translations, a critical edition and editions with illustrations, and many more. There was also the work of a motion picture based on the work, *Gone with the Wind*.

Once the expressions are recorded in some physical form, we have a manifestation - shown here for the original text as a paper book and two electronic editions - one in PDF format and the other in HTML. Those manifestations are related to the expression they are based on.
At the item level – we would see the specific copies held in a library.

An item would have attributes like its call number and the location where it is stored and any item specific notes, for example, that it is an autographed copy of the paper text of the critical edition – on our diagram, we would have a box linked to the paper manifestation.
The FRBR model was intentionally kept to the four levels of entities in Group 1 to try to keep it simple. One can easily add many more levels to further categorize –as catalogers love to do, but conceptually three or four seems to work quite well to meet the user tasks and objectives of a catalog.

You can have works that can be thought of as in a family of works where there may even be a “super work” as Rahmat Fattahi and Martha Yee called it, but that would be one of the family of works. We might find this helpful for the more complex works as a way of thinking about how to display them in meaningful ways to users of a catalog or bibliographic listing – to group them together.

You might even consider another level for performances under expressions, but the FRBR model would not add another level. We also need to keep in mind the use of this model and how it might be applied to improve the catalog displays we offer today.
Let’s now move on to relationships for the Group 1 entities. Relationships are naturally a big part of the FRBR entity-relationship model.

There are also several types of relationships that we can consider.

Within FRBR there are relationships that are inherent among the entities - as we’ve already seen in the model.

A work “is realized by” by an expression – that’s a relationship, and an expression “is embodied in” a manifestation – that’s a relationship.

A manifestation “is exemplified by” an item – that’s a relationship.

But how do we know about these relationships? We rely on information that we pick up from examining item and transcribing information we feel is useful to bibliographic description and access from the item we are examining.

A characteristic of a work is carried to all the entities below it in the hierarchy through a transitive relationship.
Relationships -Work/Expression

\[ \text{w}_1 \text{ Charles Dickens’ } A \text{ Christmas carol} \]
\[ \text{e}_1 \text{ the author’s original English text} \]
\[ \text{e}_2 \text{ a Tamil translation by V.A. Venkatachari} \]

FRBR

“is realized by”

FRBR, p. 59

We link expressions to the work they “realize” or express.

Implicitly the expressions of the same work have a sibling relationship to each other.

FRBR itself provides several examples. Let’s look at this one:
work 1, Charles Dickens’ A Christmas Carol, is realized by (that is the relationship) two expressions
expression 1 - the author’s original English text and
expression 2, a translation in the Tamil language - and there are, of course, many more.
An expression then “is embodied in” a manifestation. Notice that we are showing here a musical performance.

Music can be performed, but only when it is recorded do we have a manifestation.

Work 1 - J.S. Bach’s Goldberg variations… is realized by the expression - that is, the performance by Glenn Gould, which in turn “is embodied in” at least these 3 manifestations:

m1 - the recording on a phonograph record
m2 - a re-release on a compact disc and
m3 - a digitization on an MP3 file.

Implicitly the manifestations of the same expression have a sibling relationship to each other - that may be an equivalent content.
An item is then a single exemplar of a manifestation – an individual copy.

Work 1, *Lost treasures of the world*, is realized by the expression (conceived as an interactive electronic resource that is embodied in the manifestation of a CD), that “is exemplified” by two items in the Calgary Public Library - that is two physical copies.

All copies that are linked to the same manifestation have a sibling relationship to each other.
So, there are inherent relationships among the entities, like saying “a work is realized through an expression or “an expression is embodied in a manifestation”.

Another way to look at this is through the **content relationships** among works, that are then inherited by their expressions, manifestations, and items.

Some of these are described in FRBR, such as equivalent, derivative, and descriptive relationships of the content. There are also whole-part relationships with aggregates and their components.

Any of these content relationships at the work level are also inherited by the hierarchically related expressions, manifestations, and items – again through a transitive relationship.
This picture is from my latest update of the taxonomy of bibliographic relationships that was published by Kluwer\(^1\) in 2001. It shows a continuum of the relationships of a family of works moving from left to right from equivalent content at the left to descriptions of other works at the right. If we look at the types of works and expressions in terms of the FRBR model, this entire picture can be seen as the family of works. On the left are those that are equivalent, that are from the same expression of the work. Once we introduce a change to the content, like a translation, we have a new expression of the same work and further changes move us to the right, farther away from the original.

Once that derivation crosses the magic line of becoming more of the work of another person or corporate body, we consider it a new work, but in this recursive relationship, it, too, is part of the family of related works, even when the work moves on to be only describing a work in the family at the right end of this continuum. The entities in descriptive relationships at the right side of this picture, can even be considered to be in subject relationships in FRBR terminology and the conceptual model.

The ability to inform the user of these related works ties back to the collocating and finding functions of a catalog again.

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A particularly important relationship for the digital world is whole-part. Components and aggregates - think of a Web site as a whole, and its parts as the components.

Or a serial as the whole aggregate work with the issues as component works. Even the articles within the issues are further component works.
Whole-part relationships are particularly interesting with electronic materials where images and text and/or sound become components of the whole and need to be addressed and brought together (aggregated) for displays, yet often are stored as separate components (that’s what I’m trying to show in the figure at the top left in orange).

Another whole-part example is an anthology or a finite set (which is the whole) with its distinctive, separate works (or parts) (as shown in the triangle green figure on the right). Finite integrating resources - loose-leafs with an end, or a multivolume set, or multipart series are other examples.

Other parts may continuously add to the corpus of content, like the separate issues of print or electronic serials and integrating resources, or articles in an integrating online serial or a web site (as shown in the figure at the bottom) with the connected circles.

With an e-journal the web site may be the whole but it consists of component articles, and as new articles are posted on the site, the site continues to grow as a continuing or integrating resource.
Part-to-Part Relationships

- Component to component
  - Sequential Relationship
  - Accompanying Relationship (or Companion Relationship)
    - Dependent
    - Independent

Also particularly interesting in digital materials is the relationship among parts… FRBR recognized these as did I in my dissertation, as sequential and accompanying or companion relationships.

We can carry it further by describing those companion relationships where the components are either dependent or independent. This usually translates into bibliographic records again. The cataloger can decide to make a note for the dependent component or to make a linked separate bibliographic record for the independent component.
The part-to-part relationships between the individual components of a serial or between a prequel and a sequel are sequential relationships (on the right) – these are important for putting things in order and assisting the user in determining the sequence of parts for finding information.

Accompanying or companion relationships (on the left) are those between things intended to be used together or where one augments another. Examples are supplementary maps intended as companions to a video, a computer disk of images and sounds that accompanies a textbook, accompanying plates intended to illustrate a main text, a score that accompanies a sound recording, or a booklet of words to songs that accompany a CD music recording.

The pieces can be viewed either as dependent parts of a whole or as separate entities in their own right that can exist independently of each other, but are packaged together.
Moving on, the attributes in FRBR (or “metadata”) were based on what now exists in bibliographic records and may need updating as more thinking is given to this topic, but here are some of the essential attributes or elements that we associate with each of the primary entities. For a **work**, the main elements are a title, date, possibly its identifier (if it has one, e.g. for rights management), etc. (see FRBR p. 32+ for others). What’s missing? You notice we don’t have “author” as an attribute for work or expression, because such information is treated in this model as a relationships between the work or expression and a person or corporate body.

Yet you see at manifestation, we have the statement of responsibility as found on the item being cataloged - that is information unique to the manifestation and is description. Remember, for our purposes the activity of **recording** an expression, turns an entity into something of interest to a library - something we would add to library collections and catalog - for which we would provide bibliographic control - description and access. A manifestation. In the digital world we can envision the basic bibliographic description being an integral part of a digital object - the software that helps create the digital object or digitizes an analog object, could automatically provide a basic set of metadata, that is attributes or data elements. Think of how the software for word processing, like Microsoft’s Word, suggests a name for your document based on the first words you type - ironically the “titles” for early manuscripts were the first line of text. Software now also automatically provides the date you created it. There is already a camera that has built in the MPEG-7 standards for creating basic metadata for the digital images it captures. So we can envision the automatic creation of some of the attributes we’d need for bibliographic control for description and access. The draft of AACR3 builds on this to emphasize transcribing what you see for the basic elements of bibliographic description – principle of accurate representation.
The decision in conceptual modelling of whether to make something an attribute or a separate entity depends on the future use – in this FRBR case we saw major advantages in declaring persons and corporate bodies as separate entities that would be related to the Group 1 and Group 3 entities. We have traditionally thought of controlling the names for persons and corporate bodies through authority records. Declaring persons and corporate bodies as entities enables a lot more flexibility in the controlled naming and eliminates redundancies that would occur if we made them attributes. In an application of FRBR, we could make a single authority record for a person or corporate body and link it to other authority records or to bibliographic records or holdings records as needed.
Let me now move on to relationships for the Group 2 entities: person and corporate body.

You see the relationships with the Group 1 entities in this picture:
- work is created by a person or corporate body
- expression is realized by a person or corporate body
- manifestation is produced by a person or corporate body
- item is owned by a person or corporate body.

These are entities, as well as the Group 3 entities we will soon see that are of interest in authority work – the names of these entities are controlled when they are used as access points in bibliographic records.
There are also specific relationships that we can see between the person and the works created by that person.

A “Created by” relationship connects a work to a person or corporate body responsible for the creation of the intellectual or artistic content of the work.

This link serves to collocate all the works of a single person or corporate body.

For example, person, Edmund Spenser is in a “created by” relationship to his works.
A “Realized by” relationship links an expression with a person or corporate body responsible for the realization of a work. Here’s where we see the difference between the work and expression.

A person or corporate body responsible for the expression of a work is responsible for the specifics of the intellectual or artistic realization or execution of the expression. The idea of the content of the work may have been created by someone else.

This link serves to collocate all the expressions of a single person or corporate body.
A “Produced by” relationship links a manifestation with a person or corporate body responsible for the publication, distribution, manufacture, or fabrication of the manifestation.

This “produced by” link serves to collocate all the manifestations produced or disseminated by a single person or corporate body.

In the current AACR cataloging rules, we take the form of name for the producer as it is transcribed from the chief source of information and do not try to control that form. However, the French in their rules do control the names of publishers… this may need re-examining – especially as we find users keyword searching the publishers’ names in the 260 fields.
An “Owned by” relationship links an item with a person or corporate body that is the owner or custodian of the item.

This link serves to collocate all the items held by a single person or corporate body.
The IFLA Working Group on Functional Requirements and Numbering for Authority Records (FRANAR) that I mentioned earlier is now chaired by Glenn Patton. As I mentioned before, the Working Group finished a draft of the conceptual model extension to the realm of authority entities. We talked to archivists and museum curators and rights management communities. I'm not showing the specific relationships or any of the attributes, but this picture is meant to give you an idea of the direction we are taking.

The arrows represent the relationships:

An FRBR entity is “known by” a name and is “assigned” an identifier.

An access point is “based on” a name or identifier.

Access points are “governed by” rules that are in turn “applied by” an agency, and the access points are also “created by” or “modified by” an agency.

There is a new IFLA Working Group that just started this year to look at Group 3 entities and Subject authority records. That group is being led by Marcia Zeng of Kent State University and Maja Žumer from the National Library of Slovenia.
Group 3 entities, introduce all the entities that can be the subject of works:
concept
object
event
place
and all of the Group 1 and Group 2 entities.
Any of the entities in the conceptual model including ‘work’ itself, may be the subject of a work. That is a work may be about a concept, an object, an event, a place, a person, a corporate body, or an expression, a manifestation, an item, or another work.

Here we have the concept, Romanticism, that is the subject of the two works we show here…and there are of course many more.

This link serves to collocate all the works relevant to that subject.
Remember the FRBR hierarchy started from the creation of a work, then to an expression, a manifestation, and an item. When we catalog, we start the other way around, cataloging an item we have at hand. From it we construct a bibliographic record that is intended to describe the manifestation, that is any copy held anywhere, so the record can be re-used by others in a shared cataloging environment.

We also make authority records to control the way we identify works and expressions that are embodied in the manifestation we are describing, and that in turn may be linked to a name authority record for the person or corporate body that is responsible for creating the work or expression. In some integrated library systems this link between the bib and authority records is real, which also makes database maintenance and global update changes easier than when these links are not present.

We also can link to controlled forms of names for any series – which are related works (whole/part relationship – the one we are describing is a part of the broader work of the whole series).

We may also link to the authority records for subject headings for concepts expressed by that work – now we put subject headings and class numbers in bib records.
LC uses the Voyager ILS. If we take a look at the display for Shakespeare’s Hamlet, you can see that our OPAC displays include all of the FRBR Group 1 entities – in a sense they are already FRBR-ized.” For other systems they have gone even further and use FRBR-ize to mean the collocation of manifestations and expressions under the works or working from multiple manifestations to show the related works.
When we browse under Shakespeare in the online catalog, we could group the various works and let the user select which work they want. Then we could group the various expressions we have of that work – or do it all at once – sort of like what we already do with uniform titles.

For AACR3 we are considering changing uniform titles to be more citations of works and expressions. Part of the expression level citation would be the work-level citation and we’d add on to that
For the expression-level citation. The OPAC display also shows us the specific
Manifestation in terms of the body of the bibliographic description and also the individual
Items that we hold in our collections – with location information.

You see, FRBR is not so very different from what we do now. The point of using this FRBR model is to help clarify concepts that have been very muddy in our rules in the past and to clarify things we typically ended up learning through experience. Using the FRBR language in the rules should make concepts clearer to the next generation of catalogers. At least we hope so.
FRBR and MARC

- MARC bibliographic, authority, and holdings records
- FRBR and MARC crosswalk and analysis: http://www.loc.gov/marc/marc-functional-analysis/frbr.html

So you’ve seen that we can use the existing MARC 21 structures to express the FRBR entities and even relationships, but we also might be able to use them in creative ways to further the adaptability of bibliographic information to future systems and to help reduce the costs of cataloging.

Right now we have bibliographic, authority, and holdings records in MARC 21 – There is a crosswalk that Tom Delsey prepared on contract to LC’s Network Development and MARC Standards Office – the URL is shown here.
FRBR-ize MARC records

OCLC’s algorithm
http://www.oclc.org/research/software/frbr/

LC’s display tool
http://www.loc.gov/marc

Both OCLC and the Library of Congress have created different algorithms to FRBR-ize MARC records. Those algorithms and tools are freely available for experimentation. OCLC’s is available at http://www.oclc.org/research/software/frbr/

LC’s is under FRBR on the MARC page at
http://www.loc.gov/marc
Taking a more FRBR approach to our records, here’s another scenario for the future, where we would make more use of authority records for works and expressions and do more linking directly at the authority record level of the classification and subject headings that are appropriate to the work, so that information would be included for each linked bib record, and we could save cataloger’s time by not needing to classify and provide subject headings for all the manifestations of that same work/expression combination.

I really like this model as it would save a lot of cataloger’s time and I’m working with our Network Development and MARC Standards Office to develop a discussion paper for MARBI to consider various models for FRBR implementation – one of which would add 65X’s to authority record format to enable the scenario you see here – putting subject headings in authority records once rather than redundantly in all the linked manifestation bib records. We already have a place for the class number in the authority format. We’d still need to cutter for the individual item or copy we were adding – if we felt we still needed such information for shelving purposes, but that would be a lot simpler than all the other subject cataloging work that is now done.
Objectives of Catalogs

- Cutter’s objectives for the catalog
  - Finding - description and access standards
  - Collocating - controlled “vocabularies” for precision of searching

In 1876 Charles Ammi Cutter published the first edition of his cataloging rules and identified several objectives for a library catalog, including finding and collocating. These were later reinforced by Seymour Lubetzky in his Principles of cataloging in the 1960’s and became the foundation of the 1961 Paris Principles that are the underlying principles behind nearly every cataloging code used in the world today.

We assume the library has a target group of users with particular needs and that the catalog of the library should enable users to find what they need. This finding objective is accomplished through standards for description and access in our rules. The catalog should also collocate the works of an author, and that requires the use of controlled vocabularies and leads to greater precision of searching. A catalog may also collocate bibliographic records for entities on a particular topic – subject access.

The FRBR entities are very useful to meet the collocation or gathering objective, but it takes a new perspective on these objectives, looking at “user tasks.”
In the *Functional Requirements for Bibliographic Records*, “user tasks” are the things we feel a user wants to do relative to the bibliographic universe:

*Find* an entity or entities in a database using attributes or relationships - Elaine Svenonius has suggested this should actually be in two parts - to locate and to collocate entities. The user does this by searching the catalog

*Identify* - to confirm that the entity found corresponds to the entity sought

*Select* - to choose an entity meeting the user requirements for content, physical format, etc.

*Obtain* - to acquire an entity or to access an item (even online)

and we could add a task to *relate* - that is relate the materials a users finds to others that may be in the collection. FRBR describes individual elements or attributes, indicating how each contributes to achieving each task.

Today we might expand the use of FRBR to the rights management or preservation domains and add other tasks, like *attributing royalties to* or *preserving*.

FRBR is an evolving model and will be extended in the future.

We may find this conceptual model enables us to meet the objectives of a catalog in new ways.
**Objectives of Catalogs**

- **Finding**
  - A single specific resource
  - All the works and expressions of a person, corporate body, or family
  - All resources on a given subject
  - All resources sharing some specific characteristic
    - Language, country of publication, date, physical format, etc.

- **Collocating**
  - All resources belonging to the same work
  - All resources belonging to the same expression
  - All resources belonging to the same manifestation

The recently approved IFLA Statement of International Cataloguing Principles reaffirmed the Paris Principles objectives for a catalogue and rewrote them in FRBR terminology where the traditional finding and collocating functions include

Finding, that is,

**3.1.1. to locate** a single resource

**3.1.2. to locate** sets of resources representing

all resources belonging to the same work

all resources belonging to the same expression – note that we may not be able to afford this level of cataloging, but it remains as our objective!

all resources belonging to the same manifestation

all works and expressions of a given person, family, or corporate body

all resources on a given subject

all resources defined by other criteria (such as language, country of publication, publication date, physical format, etc.) usually as a secondary limiting of a search result.

FRBR was seen as a way to reaffirm the traditional objectives.
Collocation by Works

- Shakespeare, William, 1564-1616.
  - All's well that ends well
  - As you like it
  - Hamlet
  - Macbeth
  - Midsummer night's dream

One possible way to use FRBR is for collocation in displays.

Let’s say we used it to group displays first by works, then the family of works and then expressions and finally manifestations – when that was relevant. – that is, to use this information to collocate bibliographic records in an online catalog display, would be to provide a uniform title for the works written by Shakespeare, William, 1564-1616.

A user could then click on that work level plus sign to see the expressions.
Collocation by Family of Works and Expressions

  - + Texts
  - + Motion Pictures
  - + Sound Recordings

Or we may find it helpful to collocate by other groupings of the family of works based on the same stories and the ways it has been expressed and then – when there are many expressions

move on to show the user the various modes of expression available and…
Collocation by Expressions

  - + Texts – Danish
  - + Texts – Dutch
  - + Texts – English
  - + Texts – French
  - + Texts – Spanish
  - + Motion Pictures – English
  - + Sound Recordings - English

the languages of the expressions under that citation. Here we see an example showing all the books arranged by language, all the motion pictures, and all the sound recordings.

A user could then click on that expression level icon to see the bibliographic records for the manifestations.

The displays in the VTLS experimentations with FRBR in their prototype of the Virtua system are similar to this approach.
When we have lots of expressions and manifestations for a work, we could arrange the various expressions by the attribute most important to the user, like the name of the director of the motion pictures. Or we could display the cast and find the one that starred Richard Burton (the 1964 film).

Or we could jump to attributes of the manifestation, such as the date of publication (as shown here), or place of publication, publisher, or format – grouping together the films on reels, videocassettes, DVDs, digitized copies, and so on.

A user could then click on that expression level icon to see the bibliographic records for the manifestations.
We may find that FRBR is most useful to apply for certain types of materials or for certain subject areas – for example we know that publishing practice in literature tends to create many editions and translations of works and many manifestations of those editions over time. This contrasts with the scientific or engineering fields where a work tends to appear in only one edition and one manifestation.

OCLC has done some initial research to see how many of their records are involved in relationships with works, expressions, and manifestations. They have found that less than 20% of all their records represent works with more than a single manifestation. This slide shows you some examples.

In their WorldCat with over 54 million records, they found only 1% have 8 or more manifestations.

So we will probably find that the single manifestation-level bibliographic record is all that we need for the vast majority of records that we create. But we will want to provide the additional work/expression-level information when we have multiple manifestations so we can collocate these records in our catalog displays.
Questions?

Break
FRBR Applications

■ Related models:
  - <indecs>
  - ABC model in Project Harmony (US, UK, Australia)
  - Indiana Univ.: Variations2 digital music

■ Applications:
  - Denmark: VisualCat
  - Australia: AustLit
  - VTLS and Innovative Interfaces Inc.
    - Virtua’s “FRBR-ized” catalog
    - Innopac
  - OCLC’s WorldCat, Fiction Finder; xISBN, Curiouser
  - RLG’s Web union catalog plans and RedLightGreen

FRBR is a conceptual model, not a data model, not a metadata schema, not a system design, but it could be used as a foundation for all of these and FRBR has already been applied as the basis for several systems.

Denmark’s VisualCat is an implementation built on the FRBR model. Here in Australia, the AustLit project uses FRBR in its displays. The Indiana University has a music digital library project that embodies some of the concepts found in FRBR. VTLS has also designed a prototype system using the FRBR model – you may want to check it out in the exhibits. Innovative Interfaces Incorporated is also developing a FRBR-ized version of its catalog. OCLC and RLG are developing their future systems using a FRBR foundation and OCLC has its Fiction Finder, and its Research Office has xISBN and Curiouser that use FRBR concepts. RLG has its RedLightGreen application—targeting undergraduate students and using FRBR concepts to enable collocation of related expressions and manifestations. There are also other systems implementations in Australia, Europe, and others springing up in the United States.
VTLS was the first commercial integrated library system to offer an application of FRBR – not just in its OPAC but throughout its Virtua product.

We'll take a look at a few of the areas.
Here’s a summary of the basic implementation features of FRBR in VTLS:

You can have a single database with a mixture of FRBR and non-FRBR records.

The system is aware of whether the record to be displayed is FRBR or Non-FRBR.

FRBRized records have a tree structure that displays the logical linkages between Works, Expressions, and Manifestations.

Non-FRBR records do not have the tree display.

The individual records has a local value of W, or E, or M that indicates that the record is FRBRized and what kind of FRBR record it is.

And lastly, they use the 001 and 004 as linking fields to maintain the linkages between Expressions to Works, and Manifestations to Expressions.
Here’s how VTLS views the benefits of applying FRBR to their system:

The principle of collocation is articulated in a much better way with FRBR in that you have a better and more easily understood organization to the catalog.

Cataloging is easier with FRBR because the system can take advantage of the FRBR structure to inherit identifying information – metadata from the highest levels of linked descriptions.

FRBR Work and Expression records need only to be cataloged once. Right now, under traditional cataloging, catalogers have to repeat the Work and Expression elements every time they cataloged a new edition of a work. Remember the scenario I showed you earlier of using the authority records for work and expression records with linked subject information…. 
VTLS also states the user benefits as you see here. A single search can retrieve all related materials. An additional benefit for users is that FRBR gives a better big picture and helps with navigating to the specific manifestations a user may want.
FRBR Benefits

- Circulation: Place holds at “Work” or “Expression” level rather than only at manifestation level

In the area of circulation, the VTLS system uses FRBR to make it easier to find all of the manifestations. A user can place holds and requests at the Work or Expression level when they do not really care which edition of a particular title they get; they may just want any copy of the work.

With a traditional system when you had multiple editions of a particular title (Work) you had to place individual requests on each edition (Manifestation).

With a FRBR system, you only have to place a request at the Work or Expression level, and ANY item of ANY Manifestation will satisfy the request.
There are two Expressions: one for books and one for sound recordings

Here’s a VTLS screen that gives presents a work record for the Amelia Peabody series. Notice at the bottom the two icons or two expressions – one the books or texts and another a sound recording of someone reading the text.
If we click on the expressions of the text in English, we get a list, and by highlighting the title, we can see the manifestation record – here it’s for the specific work Lord of the silent within the Amelia Peabody series.
Art Example

Notice at the top of the VTDLA Virtua screen the hierarchy with icons that can open up the hierarchy to show the modes of expression for the Monet work of art and under each one we are shown the available manifestations. The highlighted and fully displayed manifestation at the bottom is for a poster produced by Metropolitan Museum of Art.
Serial Example

Each of the five basic titles in the “family” of Atlantic Monthly is a “sub-work” under the Super Work.

Here’s another example for a serial – which is a work of works within works – going from individual articles within an issue or special volume to the entire serial title and its history over time. This is where Virtua uses records for “superworks” as collocating devices to show the user the history of this serial and to offer paths for whatever time period the user needs.
This the Manifestation level record which has information like the title page, imprint, LCCN, and ISSN.

For example, the user may want the paper/print version for an issue in the late 1990's – they can also see a microform version is available. And they can view the full manifestation record.
Innovative Interfaces Inc.
Innovative Interfaces is experimenting with FRBR to give context to the displays – when a user is looking for John Grisham’s *time to kill*, they are also informed there is another work by that time by Alexander Adams and there are other expressions of John Grisham’s work available. The two texts are displayed here – two manifestations – by different publishers – the one at the bottom is large print. If we select the top one...
We have holdings information – where items can be obtained – and we still have the window of context to remind us there are other manifestations – namely sound recordings also available of someone reading the text.
Variations2 Web site

- http://variations2.indiana.edu/
Variations2 Data Model: Example

From Variations2 presentation to ECDL 2004
Search: Name Disambiguation

2 creators matching Bach were found where the Work Title matched sonata

1. Name: Bach, Carl Philipp Emanuel 1714-1788
   Role: Composer

2. Name: Bach, Johann Sebastian 1685-1760
   Role: Composer, Arranger, Writer of Accompanying Material

Variations 2

Group 2 entities
Work Disambiguation

Variations 2

Group 1 work entities – works of Bach – in particular his sonatas.
Once we record the expressions of a work in some container, we have the manifestation – here we have two containers of different performances of the sonatas
This is how Variations 2 displays the manifestations level records – that describe some of the expression and work attributes, just as we do with bibliographic records in our library catalogs.

If we click on “Listen” we can actually hear the digitized recording.
Variations 2 has an audio player included in the software and the user can select the desired track.

Each track is considered a work – a work within the work of the collection of works that make up the sound recording and the system is able to do this by linking to the work records for each individual work and performance (expression) on the various tracks.
<table>
<thead>
<tr>
<th>Work Title</th>
<th>Composer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sonatas, violin, piano, no. 1, op. 78, G major</strong> (Edit)</td>
<td>Brahms, Johannes (1833–1897)</td>
</tr>
<tr>
<td><strong>Sonatas, violin, piano, no. 2, op. 100, A major</strong> (Edit)</td>
<td>Brahms, Johannes (1833–1897)</td>
</tr>
<tr>
<td><strong>Sonatas, violin, piano, no. 3, op. 108, G minor</strong> (Edit)</td>
<td>Brahms, Johannes (1833–1897)</td>
</tr>
</tbody>
</table>
The score viewer displays the pages in the score of Beethoven's piano sonatas. Score pages can also be bookmarked.
Users can annotate scores. Annotations

- zoom/resize with the score
- can be saved in a data file
- can be printed
Timeline Editor Window

Audio-based analysis and annotation. Users create bubbles by clicking to make time points. Bubbles can be grouped, annotated, or clicked on for easy navigation.
Playlists

- combine tracks from different albums
- can create excerpt of a track
- useful for listening lists

Users can create their own manifestations, combining tracks from different albums or a part of a track
OCLC WorldCat from Google
Now let's take a look at an example from the Open WorldCat pilot test with Google

Searching on Greece Temples (a real search performed by a user during the pilot test)

CLICK
The second item in the search results is a link to WorldCat libraries.
If the user follows this link… CLICK
I used a local zip code for this example which shows the library holdings for this item around the Lansing, Michigan area.

Clicking on the Lansing Community College link …

CLICK
We see the OPAC record display and the availability of the item at this library.

Now that we can make library resources visible, what else do we need to do?

CLICK TO FRBR
2.6+ million fiction records from Worldcat, clustered by OCLC’s FRBR algorithm

Make greater use of data (genres, settings, imaginary characters, etc)
Work/expression display
Work/manifestation
**xISBN**

- **An experimental web service**
  - Leverages FRBRization work
  - Give it an ISBN, it returns all related ISBNs
  - Based on WorldCat
  - Designed for machine-to-machine data exchange

- **Examples:**
  - Check user ILL requests against all editions/versions in OPAC
  - Find library’s editions when user finds any edition/version of item on Amazon
  - Check OPAC for all editions during selection/acquisitions/gift book processing
  - …
On the left is a manifestation from the UK…but it was also given a different title when 1st published in the United States, so someone in Seattle Washington, who found the listing on Amazon on the Web, could have an icon that would enable OCLC’s xISBN capability that would respond to let them know there’s a copy at the Seattle Public Library – the one on the right…
Searching for the book on Amazon

Eucalyptus (Ponther S.)
Murray Hall

List Price: £8.99
Our Price: £6.59
You Save: £2.40 (20%)
93 New & Used from £4.61
FREE delivery on any order from Amazon
Availability: usually dispatched within 3 to 5 working days

Product Details:
- Paperback: 272 pages (20 May, 1999)
- Publisher: Thoemmes Press
- Category(s): Fiction
- Other Edition: Eucalyptus
- More Product Details
Get one match on a single ISBN, but OCLC goes one further step...
xISBN bookmarklet

http://www.amazon.co.uk/exec/obidos/A
ISBN/1860464955/gid=1075134526/ar=1/
/ref=sr_1_10_1/202-6426661-8213436

Eucalyptus (Panther S.)
Murray Hall

List Price: £4.99
Our Price: £4.39
You Save: 20% (20%)
In Used & New from £1.99
Free UK delivery on orders
over £20.
Availability: usually dispatched

Product Details:
- Paperback: 272 pages (20 May 1999)
- Publisher: The Harvill Press; 350th, 2004
- Category(s): Fiction
- Other Editions: Hardcover
- More Product Details

Is the book at my library?

xISBN brings in other expressions and manifestations
Moving on to some of the OCLC experiments with FRBR. They are using the FRBR model as a fundamental design principle behind their WorldCat database.
http://levan-r:8080/Curiouser/index.jsp?oclcNum=51848364
The lion, the witch and the wardrobe; a story for children.

There are texts, but we also see there are other formats (manifestations)
The lion, the witch and the wardrobe: a story for children.

Four English school children find their way through the back of a wardrobe into the magic land of Narnia and assist Aslan, the golden lion, to triumph over the white Witch, who has cursed the land with eternal winter.

<table>
<thead>
<tr>
<th>Find by Publisher</th>
<th>Find by Language</th>
<th>Find by Date</th>
<th>Find by Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>HarperCollins (755)</td>
<td>English (1,216)</td>
<td>2000 (706)</td>
<td>Sound (328)</td>
</tr>
<tr>
<td>Focus on the Family (146)</td>
<td>1979 (76)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardenon (110)</td>
<td>1992 (13)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harper Children’s Audio (53)</td>
<td>1998 (14)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Random Audio (27)</td>
<td>1992 (101)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There are 1,216 copies of 20 editions for The lion, the witch and the wardrobe: a story for children.

8. The lion, the witch and the wardrobe
   Lewis, C. S.C. Lewis.
   Date: 2000.
   Type: sound recording
   Held by: 353

10. The lion, the witch and the wardrobe
    Lewis, C. S.C. Lewis.
    Date: 2000.
    Type: sound recording
    Held by: 352

Subjects
- Children
- Classic Novel
- Popular Fiction
- Fairy Tales
- Fantasy
- Fantasy fiction, English
- Fantasy fiction
- Fantasy fiction, English
- Sound and video
- Hawaiian language
- Fairy tale places
- Imaginary places
- Literature

http://levan-r:8080/Curiouser/index.jsp?type=%22Sound%22&oclcNum=50028252&language=English&
Harry Potter and the chamber of secrets
Young wizard Harry and his friend Ron and Hermione face new challenges during their second year at Hogwarts School of Witchcraft and Wizardry as they try to uncover a dark force that is terrorizing the school.

<table>
<thead>
<tr>
<th>Find by Publisher</th>
<th>Find by Language</th>
<th>Find by Date</th>
<th>Find by Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warner Home Video (1)</td>
<td>English (1)</td>
<td>2002 (2)</td>
<td>Image (1)</td>
</tr>
<tr>
<td>Warner Home Video (1)</td>
<td>Spanish (1)</td>
<td>2002 (2)</td>
<td>Image (1)</td>
</tr>
</tbody>
</table>

There are 2,746 copies of 8 editions for *Harry Potter and the chamber of secrets*.

1. Harry Potter and the chamber of secrets
   Warner Bros. Pictures presents a Harry Potter Films/4492 Pictures production of a Chris Columbus film; producer, David Heyman; screenplay, Steve Kloves; directed by Chris Columbus.
   Date: [2002], c2000.
   Type: videorecording
   Held by: 2025

2. Harry Potter and the chamber of secrets
   Warner Bros. Pictures presents a Harry Potter Films/4492 Pictures production of a Chris Columbus film; screenplay by Steve Kloves; produced by David Heyman; directed by Chris Columbus.
   Date: [2002], c2000.
   Type: videorecording
   Held by: 746

3. Harry Potter and the chamber of secrets
   a Warner Bros. Pictures presentation; a Harry Potter Films/4492 Pictures production; a Chris Columbus film; produced by David Heyman; screenplay by Steve Kloves; directed by Chris Columbus.
Harry Potter and the Chamber of Secrets /

When the Chamber of Secrets is opened again at the Hogwarts School for Witchcraft and Wizardry, second-year student Harry Potter finds himself in danger from a dark power that has once more been released on the school.

http://levan-r:8080/Curiouser/index.jsp?language=%22Spanish%22&oclcNum=51068048&
RLG
RedLightGreen
This is an example of how RLG merged various “manifestations” (in FRBR terms) into what they call a “title cluster” in their RedLightGreen service. It was developed with their original set of partner libraries at at Columbia University, New York University, Princeton University, Swarthmore College, and the University of Minnesota. (You can try it out yourself, at www.redlightgreen.com). The results are somewhat different from the FRBR model, because in this application they have collapsed all the various editions and translations. The bar at the left allows a user to refine searches by a specific subject, author, or language as represented in the title clusters. The results are “ranked” by a combination of relevance to the search term used and those “most widely held” — that is, the number of records in the RLG Union Catalog from all contributors for all the editions in the cluster. The idea is that the undergraduate and general public would want those ranked towards the top first, both because it’s more likely “core” to whatever subject they searching — from the perspective of premier research institutions — and if it’s widely held by research institutions, it’s more likely to be found at one’s own local library.

Note that the content still includes those same CJK records created these past two decades, but they’ve been “mined” to present them differently to a new audience.
RedLightGreen mines the various subject headings from the clustered manifestation records. RLG reports that students really appreciate the presentation of related subjects to pursue. It points them to the controlled vocabulary used by the library – gives them a clue about what subject terms they might try relevant to their search.

Especially nice is the added capability for a student to grab the citation for this mainfestation in whatever style they prefer – RLG offers MLA., Chicago Manual of Style, Turabian, and APA.
A user can limit the search to a particular language or to a publication date range.
Here we've retrieved the Japanese language version of Marco Polo and the user can select his or her own library to see if it has any edition of the work. Let's say the student is here at Harvard and uses RedLightGreen...and clicks on the icon to find it at Harvard...
RedLightGreen uses information from the title from the selected record to launch a search in the HOLLIS catalog, retrieving 121 titles. Not sure why it didn’t just search the Japanese one…but it’s still an experimental system.
RedLightGreen represents a “proof of concept” of using the RLG Union Catalog as a “locator” from which a user can find detailed holdings and circulation status in the OPAC. It makes use of some of the FRBR concepts to help the user navigate the RLG universe.
This is a RedLightGreen search on Islam.

Notice how different editions have been aggregated into one “title cluster”, (sort of like the expressions of the work) ranked by a combination of relevance to the search terms and “most widely held” – the titles that have the most catalog records for all editions and thus more likely to be considered “core works”.

The left side also gives related searches by subjects and authors that were mined from the retrieved records; it also offers the option to limit the results to the languages represented in my result set. This result set is after the user restricted the result set to those in Arabic language.
The user can click for more information about this specific edition – or could look at the list of all editions for this work. The “related subjects” pulls together all the subject headings catalogers have contributed for all the various editions. At the bottom of this screen are “related links” to online resources. Let’s see what editions are there..
In Eureka or RLIN21 each of these editions would be a separate cluster; in an OPAC each one would be a separate record, but they are all brought together in RedLightGreen under the title for the work. A user can click to see details about a specific edition.
Then a user can select his or her own library to see if it has any edition of the work he or she is interested in. Let’s see what editions are held at the Harvard...
RedLightGreen parses the information from the title of the work that the user was looking at to a search in the HOLLIS catalog, and retrieve 6 editions.
The user can now use the OPAC to request the item. Note that this OPAC currently does not support Arabic script – for that, the user can still refer to RedLightGreen.
Besides library applications, we are now at the stage of sharing internationally among libraries, as well as sharing globally with other information organizations - archives, museums, publishers, rights management and copyright organizations, the computer industry, and the Internet and Web communities. Is it now time to think of future international cataloging rules that make the best of existing rules and cataloging principles?

In July 2003 IFLA began the first in a series of regional meetings of cataloging experts and cataloging rule makers- held in Frankfurt for Europe the AACR2 countries to explore similarities and differences in our cataloging rules and to clarify where there need to be differences for language and cultural variations of our respective users. We approved a draft Statement of International Cataloguing Principles that eventually will replace the 1961 Paris Principles. Those principles are based themselves on the great cataloging traditions of the world as well as the more recent FRBR and FRAR (Functional Requirements for Authority Records). One goal is to facilitate collaborative use of bibliographic and authority information on a global scale that promotes consistency, trust, and gives authority to the information found.

We are also sharing the conceptual model of FRBR with other communities and find the new vocabulary helps us talk with the designers of the Internet and computer systems as well as archives (like the International Council of Archivists – ICA), museums, rights management agencies, and the publishing community. We also have been talking with the International Standards Organization (ISO) and the Dublin Core (DC) and World Wide Web Consortium (W3C) to discuss how FRBR and also the authority files created and maintained in libraries can serve as building blocks for the future Semantic Web.
The entities, relationships, and attributes in IFLA’s FRBR model enable us to fulfill objectives of the catalog and will help us better provide bibliographic control in a global environment. FRBR brings a new vocabulary, new terminology, and a conceptual model that seems more relevant to today’s Internet and digital world. And it will be incorporated into cataloging rules worldwide. We look forward to continued development of this model through the work in IFLA and applications around the world.

These are very exciting times with the advances in technology, and we have great opportunities working together worldwide. I look forward to continued experimentation and developments in the next few years as more vendors and system designers fine creative ways to apply the FRBR model.
Questions?
Thank you!

- Slides 15, 26, 28 and a modified version of 24 were published in Barbara B. Tillett, "Bibliographic Relationships." In Relationships in the Organization of Knowledge, edited by Carol A. Bean and Rebecca Green, 19-35. Dordrecht: Kluwer Academic Publishers, 2001. © 2001 All Rights Reserved. If these images are reused, please include the above citation.