Performed Music & BIBFRAME

ENRICHING THE ONTOLOGY

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What we’ll cover

- Performed Music in MARC vs Linked Data
- Why BIBFRAME?
- The Performed Music Ontology (PMO)
  - User requirements/Use cases for Performed Music
    - Events
    - Medium of performance
    - Contribution
    - Works
- Current & Future work
Music in MARC21

- Piano music
- Piano quintets, Arranged
  - Piano quintet, Arranged. #2 fast #0 (OCoLC)fas1063471
  - Piano music, #2 fast #0 (OCoLC)fas1063403
  - Art music, #2 fast #1
  - Concert studies, #2 fast #0
  - Chamber music, #2 fast #0
  - Arrangements (Music) #2 fast #0 (OCoLC)fas19203435
  - Art music, #2 fast #0 (OCoLC)fas1920007
  - Chamber music, #2 fast #0 (OCoLC)fas1726651
  - Concert studies, #2 fast #0 (OCoLC)fas1920075

- Vikingur Ólafsson, #4 1984; #4 instrumentalist.
- Sigrún Bjarki Gunnarsdóttir, #4 instrumentalist.
- Bozruz, Christian, #4 composer (expression)

- Glass, Philip, #4 Selections
  - Piano works / to Philip Glass.
  - Berlin : Deutsche Grammophon, 6c (2017)
  - 4 audio discs : 4 3/4 in.
  - 4 audio discs : 4 3/4 in.
  - 4 audio discs : 4 3/4 in.
  - 4 audio discs : 4 3/4 in.

- Violin in 2 ; viola in 1 ; cello in 1 ; piano in 1 ; s 6 k2 locmp

- The second performances of the 1st, 2nd, and 3rd Pieces are recomposed versions by Christian Badzura for piano quintet.

- “Opening” from Glassworks (1991) (7.4.91) ; ”Etudes” (1991-2012) ; No. 9 (3.2.2) ; No. 2 (6.0.0) ; No. 6 (4.4.2) ; No. 5 (8.8.5) ; No. 14 (4.3.7) ; No. 15 (7.4.0) ; No. 3 (4.0.1) ; No. 18 (8.0.2) ; No. 22 (4.4.1) ; ”Opening” from Glassworks / reworked by Christian Badzura.

- No. 2 (reworked by Christian Badzura) (6.0.2)

- View cover art at http://www.westpage.com/cover/m/P000000000001793832.jpg
Music in MARC21

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<td>Piano works / to Philip Glass.</td>
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<td>Gávörn Ólafsson, piano: Sogn String Quartet (Line Svartberg and others: Helga Íhra Börnivíkur), violins: Börnun Óskar Marstald, viola: Sigurður Ólafur Gunnarsson, cello:</td>
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<td>518</td>
<td>To Recorded at 2016 October 24-26, at Reykjavík, Harpa Concert House.</td>
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<td>500</td>
<td>Program notes by Gávörn Ólafsson in English with German translation (17 pages: Illustrations) inserted in container.</td>
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**Notes:**
- Gávörn Ólafsson, piano.
- Sogn String Quartet (Line Svartberg and others: Helga Íhra Börnivíkur), violins: Börnun Óskar Marstald, viola: Sigurður Ólafur Gunnarsson, cello.

**Additional Information:**
- To Recorded at 2016 October 24-26, at Reykjavík, Harpa Concert House.
- Program notes by Gávörn Ólafsson in English with German translation (17 pages: Illustrations) inserted in container.
- “Opening” from Glassworks (1991) (7:45) — Etudes (1991-2012). No. 9 (2:32); No. 2 (6:00); No. 6 (4:26); No. 5 (8:56); No. 14 (4:37); No. 2 (rewritten by Christian Badzura) (6:02); No. 13 (3:28); No. 15 (7:40); No. 3 (4:01); No. 18 (8:02); No. 20 (11:24) — “Opening” from Glassworks / reworked by Christian Badzura.
MARC vs Linked data

**MARC**
- Data elements are linked together by the context of the database record
- Identifiers are text strings
- Relationships are expressed in free text notes, or controlled text strings & require human interpretation
- Not machine-readable or actionable

**Linked Data**
- Data elements are linked together as independent statements and not tied to a record format
- Identifiers are URIs
- Relationships are expressed as triples in the form of URIs
- Triples are machine-actionable
Why BIBFRAME?

- Other ontologies:
  - RDA registry ([http://www.rdaregistry.info](http://www.rdaregistry.info))
  - Music Ontology ([http://musicontology.com](http://musicontology.com))
  - DOREMUS ([http://www.doremus.org](http://www.doremus.org))

- BIBFRAME is:
  - for all types of library materials, not just music
  - compatible with a variety of cataloging content standards (or no standard)
  - customizable, while still providing a common framework
PMO
THE PERFORMED MUSIC ONTOLOGY

Hosted by ALCTS, Association for Library Collections and Technical Services
Project description

- Develop a BIBFRAME-based ontology for performed music in all formats
  - Domain-specific enhancements and/or extensions of BIBFRAME for use by the library community as a common standard
  - Establish a model by which these standards can be created, endorsed, and maintained by the community
- Do this through partnering with domain communities and the PCC
PMO Team members

- Kirk-Evan Billet (MLA)
- Chiat Naun Chew (PCC)
- Greta de Groat (Stanford)
- Arcadia Falcone (Stanford)
- Caitlin Hunter (ARSC)
- Kevin Kishimoto (Stanford)
- Nancy Lorimer (Lead-Stanford)
- Wendy Sistrunk (ARSC)
- Jim Soe Nyun (MLA)
- Hilary Thorsen (Stanford)
- Valerie Weinberg (LC)

... and with many thanks as well to Michelle Futornick, LD4P Program Manager
Use Cases/Requirements

- examples of questions users ask of data
  - sample: What is the music played at the final wedding in the movie “Four Weddings and a Funeral. I want to use it at my wedding…”

- Why use cases?
  - validate the need to extend an ontology with new relationships
  - informs decisions about what needs to be extended by listing requirements for data & relationship encoding
Use cases/Requirements—Persons

- as an agent associated with a particular work or event
- as performer on a particular instrument or with a particular voice
- as a member of a group (particularly a musical group)
  - as a group member of a particular type of ensemble
Use cases/Requirements—Works

- Relationships between instances/expressions/works
- Works within works (musical or non-musical)
- Medleys
- Computer-generated works
- Granularity of Works
- Removals, substitutions, reorderings, suppressions of works or parts of works
- Incipits
- Publishing/sales history
Use cases/Requirements—Events

- Types of events
- Descriptions of events
- Events within events
  - musical or non-musical
- Relationship of an event to a recording of an event
- Relationship of an event to a pre-existing work
Use cases/Requirements—Medium of Performance

- anything already available in the 382
- separate out “declared” vs “actual” medium of performance
- represent alternate representations (e.g., string trio vs 2 violins, cello)
- define specific roles for instruments (e.g., solo, offstage, obbligato)
- indicate parts for each instrument (e.g., Bassoon 1, Violin 2)
- give counts for actual vs required number of performers
- connect performers to the instruments they play/voices they sing/dramatic roles
Use cases/Requirements—Sequence

- Order of discs in multiple disc sets
- Order of tracks, when multiple tracks for one work (and keeping them together)
- Order of works on an album
- Order of events within an event (e.g., performances in a concert)
BIBFRAME 2.0

A very quick re-introduction...
Extending bf:Event

Subclasses of bf:Event
- pmo:Audition
- pmo:Ceremony
- pmo:Concert
  - pmo:BenefitConcert
  - pmo:CommandPerformance
- pmo:ConcertSeries
- pmo:ConcertTour
- pmo:MasterClass
- pmo:Performance (SC of frbr:Performance)
  - pmo:FirstPerformance
  - pmo:LivePerformance
  - pmo:OpenMicPerformance
- pmo:RecordingSession
- pmo:Rehearsal

Added properties for bf:Event
- bf:eventContent
  - pmo:hasRecording
  - pmo:performanceOf
- bf:eventContentOf
  - pmo:hasPerformance
  - pmo:recordingOf
- pmo:hasEventName
- pmo:associatedWith
- pmo:createdFor
- pmo:hasInspiration
- pmo:inspirationFor

associated with bf:Work
Modelling a Recording Session
Modelling Medium of Performance (MOP)

Classes (BIBFRAME)
- :MusicMedium
- :MusicInstrument
- :MusicVoice
- :MusicEnsemble

Classes (PMO)
- :DeclaredMedium
- :PerformedMedium
- :MediumPart
- :MediumOfPerformance
  - :IndividualMediumOfPerformance
  - :EnsembleMediumOfPerformance
- :MediumPartType
- :MusicPart
Modelling Medium of Performance

Properties (BIBFRAME)
- :musicMedium
- :instrument
- :voice
- :instrumentalType (literal)
- :voiceType (literal)
- :count (literal)

Properties (PMO)
- :hasMedium
- :hasMediumPart
- :hasMediumOfPerformance
- :hasDoublingMediumOfPerformance
- :hasMediumPartType
- :hasMusicPart
- :hasDistinctPartCount (literal)
- :hasEnsembleCount (literal)
- :hasNumberOfHands (literal)
- :hasPerformerCount (literal)
- :hasRequiredPerformerCount (literal)
Modeling a performance for solo bassoon & orchestra
Extending bf:Contribution

BIBFRAME classes

- bf:Agent
  (Person/Organization/Family)
- bf:Role

PMO classes

- pmo:MediumOfPerformance
  - pmo:IndividualMediumOfPerformance
  - pmo:EnsembleMediumOfPerformance
- pmo:MediumPartType
- pmo:MusicPart
- pmo:DramaticRole
Connecting a performer to MOP
When it all comes together...

Modeling of the violin 1 & 2 parts/performers in a string quartet
Works in PMO: Goals

- provide a provisional solution for bringing together multiple expressions of a work
- provide a provisional solution for expressing compilations
- present these solutions as a step toward a broader discussion of these issues for all formats
Work:
Title: Amour de loin
AKA: Love from afar
Composer: Saariaho, Kaija
Librettist: Maalouf, Armin

First Performance:
Name: World premiere
Date: 2000 August 15

Performance:
Name: Performance
Date: 2004 September

Recording session:
Name: Recording session
Date: 2008 October

Recording session:
Name: Recording session
Date: 2006 March

Video work:
Title: Amour de loin

Notated Music work:
Title: Amour de loin

Notated Music work:
Title: Reflets sur L'Amour de loin

Text work:
Libretto

Text work:
Libretto in Turkish

Audio work:
Title: Amour de loin

Notated Music work:
Title: Vocal score
Works in PMO: Using bf:Work to connect
Compilations in PMO

IFLA-LRM model

PMO model 1
Compilations in PMO

PMO MODEL 1

PMO MODEL 2

Hosted by ALCTS, Association for Library Collections and Technical Services
Metadata Creation in PMO

TEMPLATES FOR CATALOGING

Hosted by ALCTS, Association for Library Collections and Technical Services
Metadata creation

**LC Editor**

Template for a performance and an audio work (partial)
CEDAR Editor

template for medium of performance
Sample output (in Turtle)

@prefix bf: <http://id.loc.gov/ontologies/bf.rdf#>.
@prefix bfi: <http://id.loc.gov/ontologies/bfi.rdf#>.
@prefix nmds: <http://www.loc.gov/nmds.rdf#>.
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>.
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#>.
@prefix xsd: <http://www.w3.org/2001/XMLSchema#>.

<http://id.loc.gov/vocabulary/contentTypes/pno> rdfs:label "performed music"@en.
<http://id.loc.gov/vocabulary/languages/zxx> rdfs:label "no linguistic content"@en.
<http://library.stanford.edu/AtP1516664687> a http://performancedocumentontology.org/ontology/IndividualMediumOfPerformance;
  rdfs:label <http://id.loc.gov/authorities/performingMedium/mp2013015580>.
<http://library.stanford.edu/3b21516664662> rdfs:label "Cologne (Germany)"@en;
  a bfi:Place;
  <http://www.w3.org/2003/05/namespace> a bfi:Title;
  bf:mainTitle "Concert at Cologne".
<http://library.stanford.edu/3b21516664660> a bf:Content;
  rdfs:label <http://id.loc.gov/authorities/performingMedium/mp2013015580>.
<http://library.stanford.edu/3c11516664680> a bf:Title;
  bf:mainTitle "Concert at Cologne.";
<http://library.stanford.edu/3d81516664678> a bfi:Content;
  rdfs:label <http://id.loc.gov/authorities/performingMedium/mp2013015580>.
<http://library.stanford.edu/3e01516664663> a <http://performancedocumentontology.org/ontology/PerformanceMedium>;
  rdfs:label <http://id.loc.gov/authorities/performingMedium/mp2013015580>.
<http://library.stanford.edu/3f41516664669> a <http://performancedocumentontology.org/ontology/PerformanceMedium>;
  rdfs:label <http://id.loc.gov/authorities/performingMedium/mp2013015580>.
<http://library.stanford.edu/3g61516664665> a bfi:Date;
  bf:date "1975 January 24";
<http://library.stanford.edu/3h31516664662> a bfi:Language;
<http://library.stanford.edu/3i01516664666> a bfi:Copyright;
  bf:copyright "1975";
PMO Resources
WHERE TO FIND THE ONTOLOGY & MODELING PAPERS

Hosted by ALCTS, Association for Library Collections and Technical Services
An extension of the BIBFRAME ontology for describing performed music, both for mainstream and archival performed music collections.
# Performed Music Ontology

**Summary**

- **Acronym**: PMO
- **Visibility**: Public
- **Description**: An extension to the Library of Congress BIBFRAME ontology for performed music.
- **Status**: Beta
- **Format**: OWL
- **Contact**: Nancy Lorimer, nlorimer@stanford.edu
- **Home Page**: [https://wiki.duraspace.org/display/LD4P/Performed+Music+Ontology](https://wiki.duraspace.org/display/LD4P/Performed+Music+Ontology)
- **Publications Page**: [https://wiki.duraspace.org/display/LD4P/Performed+Music+Ontology](https://wiki.duraspace.org/display/LD4P/Performed+Music+Ontology)
- **Documentation Page**: [https://wiki.duraspace.org/display/LD4P/Performed+Music+Ontology](https://wiki.duraspace.org/display/LD4P/Performed+Music+Ontology)

**Metrics**

- **Number of Classes**: 53
- **Number of Individuals**: 51
- **Number of Properties**: 36
- **Maximum Depth**: 2
- **Maximum Number of Children**: 25
- **Average Number of Children**: 6
- **Classes with a Single Child**: 3
- **Classes with More Than 25 Children**: 1
- **Classes with No Definition**: 13
### BiblioPortal contd

#### Submissions

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<th>UPLOAD DATE</th>
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#### Views

Create new view

No views available.

#### Projects Using This Ontology

Create new project

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### Mappings to other ontologies in BiblioPortal

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<td>CIDOC Conceptual Reference Model</td>
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<tr>
<td>Custodial History</td>
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<td>Measurement</td>
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PMO in the LD4P wiki

Performed Music Ontology

Created by Michelle Futornick, last modified by Nancy Lorrimer on Feb 20, 2010

About the Performed Music Ontology

The Performed Music Ontology project aims to develop a BIBFRAME-based ontology for performed music in all formats, with a particular emphasis on clarifying and expanding on the modelling of works, events, and their contributors. The work is a collaborative effort of Stanford University, the Music Library Association (MLA), the Association for Recorded Sound Collections (ARSC), the Library of Congress, and the PCC, with participation of LD4P partner institutions.

Stanford Project Proposal
Timeline (initial)

Deliverables

- Written evaluation of the BIBFRAME ontology in describing performed music, including a set of use cases to justify extending and/or expanding the ontology.
- Linked data ontology with a BIBFRAME core with for describing performed music.
- RDA profile to complement the ontology for shared use by the library community, including list of preferred vocabularies.
- Representative selection of resource descriptions created using the Performed Music Ontology.
- Best practices for augmenting and/or manipulating performed music MARC bibliographic records to improve conversion to the Performed Music Ontology.
- Evaluation of the project findings with a set of recommendations for future research and development.
- Presentation of project findings to appropriate library and linked data communities.
### Current Activities

#### Analysis/Modeling
- Finalizing modeling of performers, medium of performance, and events in relation to works; basic model for dealing with aggregate works.

#### Community Engagement
- Presentations and community engagement at the Association for Recorded Sound Collections (ARSC) conference (San Antonio, May 10-13).

#### Tool Exploration / Requirements Definition
- PMO in Protégé

#### Collaboration
- Gathering of use cases from members of MLA and ARSC
- Exploration of event models by Linked Data Working Group of MLA (LuDWig)
- Medium of performance modeling shared with RSC Music Working Group
- Sharing of data models for events and medium of performance with Library of Congress

### Completed Work

#### Analysis/Modeling
- Gathered existing use cases for performed music metadata and developed further use cases.
- Surveyed existing linked data efforts related to performed music.
- Preliminary position paper on titles (submitted to all ontology group)
- Analyzed BIBFRAME and added classes and properties relevant to performed music.
- Submitted added classes of bf:Identifier, definition changes to music-related bf:Identifier subclasses, and bf:Identifier subclass changes to LC
- Modeled performed-music-specific concepts including thematic catalog and opus numbers and musical key and mode.
- List of all classes, properties, individuals in PMO (2017-12-05)

#### Analysis and modelling papers:
- Use cases
- Events
- Medium of performance. Part 1 (updated 2017-09-10)
- Medium of performance. Part 2 (updated 2017-09-10)
- Medium of performance. Part 3 (updated 2017-09-27)
- Works. Part 1 (Draft—added 2017-12-05; corrected)
### Team

Nancy Lorimer (lead) (Stanford)  
Kirk-Evan Billet (MLA, Peabody Institute Johns Hopkins)  
Chew Chiat Naun (PCC, Cornell)  
Greta de Groat (Stanford)  
Arcadia Falcone (Stanford)  
Caitlin Hunter (ARSC, LC)  
Kevin Kishimoto (Stanford)  
Wendy Sistrunk (ARSC, U Missouri, Kansas City)  
Jim Soe-Nyun (MLA, UC San Diego)  
Hilary Thorsen (Stanford)  
Valerie Weinberg (LC)

### Presentations

- **Works, Part 1** *(Draft – added 2017-12-05; corrected 2017-12-09)*
  - Mappings:  
    - MARC 382 field to PMO *(Draft)*

**Presentations**

- **Love from Afar**: Modeling music audio & video recordings in BIBFRAME, the Performed Music Ontology, and Beyond.  
  *presentation by Nancy Lorimer, OLAC general meeting, ALA Annual, Chicago IL, June 2017*

- **Modeling Metadata for Sound Archives**: extending BIBFRAME 2.0 for archival sound resources  
  *presentation by Caitlin Hunter & Nancy Lorimer, ARSC, San Antonio, TX, May 2017*

- **Linked Data for Production**: Stanford Projects  
  *presentation by Nancy Lorimer, Bibliothèque Nationale de France, February 2017*

- **Linked Data for Performed Music**: a performed music ontology extension to BIBFRAME 2.0  
  *presentation by Kevin Kishimoto & Nancy Lorimer, Music Library Association Annual Meeting, Orlando, Fl., February 2017*

- **Linked Data for Performed Music**: an extension to BIBFRAME 2.0 for production & archival cataloging of sound recordings & music videos  
  *presentation by Nancy Lorimer, BIBFRAME Update Forum, ALA Midwinter, Atlanta, Ga., January 2017*

- **BIBFRAME beyond books**: explorations in extending
Lessons Learned

- It takes more time than you think
- It is intense work, not suited to very large groups at the start
- Doing it is the best way to learn
  - New skills:
    - Ontology design
    - Reading RDF (usually Turtle)
    - Conceptual understanding
    - Data modelling
Current & Future Work

Current
- working with the Music Library Association Linked Data Working Group (LuDWig) to teach & critique the ontology
- developing templates in the LC Editor & CEDAR editor for data entry
- completing modeling papers

Future
- work with MLA to find a way to do practical testing
- work with LC to introduce testing of PMO there
- publish the ontology, either temporarily at Stanford or with LC
- mapping projects with Doremus and Music Ontology
- creating an application profile for use with RDA
Resources

- Linked Data for Production public wiki
  https://wiki.duraspace.org/pages/viewpage.action?pageId=74515029

- Performed Music Ontology public wiki
  https://wiki.duraspace.org/display/LD4P/Performed+Music+Ontology

- Performed Music Ontology on github
  https://github.com/LD4P/PerformedMusicOntology

- Performed Music Ontology in BiblioPortal
  http://biblio.onetoportal.org/ontologies/PMO

- Performed Music Ontology in WebProtégé
  http://webprotege.stanford.edu/#projects/4e27c39e-d4eb-41bd-839c-17cf01f5ae01/edit/Classes
Thank you!!

Questions?

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