Will you be my bf: forever?

Analysis Techniques for Conversion to BIBFRAME at the University of Alberta

Ian Bigelow, Sharon Farnel and Danoosh Davoodi
Setting the stage:

Assessing bf: with intent to implement

● How well does bf: transition our data?
● Which flavor of bf: will serve us best?
● How much should be invested in MARC enrichment/development?
● How can we make bf: data discoverable?
● What could workflow look like for bf: pilot/implementation?
Overview of the LC BIBFRAME Converter

- initiative of LC and the community to provide an option for future bibliographic description on and of the web
- Bibframe.org
- Bf:2.0 XSLT conversion tool released in March 2017
- Available on GitHub: https://github.com/lcnetdev/marc2bibframe2

http://bibframe.org/
Lots of data in BIBFRAME 2

.marc → Pymarc (setting 245a as filenames) → 245a.xml → marc2bibframe2.xsl → 245a.xml (Bibframe)

LC-OR-process.json/ VIAF-OR-process.json

Similarity function + API calls

OpenRefine → .tsv (extracted names + example.org URIs) → names.xsl → merged-file.xml

.tsv (LC/VIAF URIs + example.org URIs)

Bibframe_VIAF_URI/ Bibframe_LC_URI

enhanced-file.xml

https://github.com/ualbertalib/metadata/tree/master/metadata-wrangling/BIBFRAME
<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maseda Cinzakai, Erige Hakubutsukan.</td>
<td>Organization</td>
<td><a href="http://example/0107604/Agent10-1-2">http://example/0107604/Agent10-1-2</a></td>
</tr>
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<td>Japan Cultural Institute in Rome</td>
<td>Organization</td>
<td><a href="http://example/0107604/Agent10-2-2">http://example/0107604/Agent10-2-2</a></td>
</tr>
<tr>
<td>Biennale di Venezia (36th; 1972)</td>
<td>Meeting</td>
<td><a href="http://example/0107664/Agent10-5-1">http://example/0107664/Agent10-5-1</a></td>
</tr>
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<td>Metropolitan Museum of Art (New York, N.Y.)</td>
<td>Organization</td>
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</tr>
<tr>
<td>Bean, Jacob</td>
<td>Person</td>
<td><a href="http://example/01064147/Agent11-1-1">http://example/01064147/Agent11-1-1</a></td>
</tr>
<tr>
<td>National Gallery of Art (U.S.)</td>
<td>Organization</td>
<td><a href="http://example/1078338/Agent11-1-1">http://example/1078338/Agent11-1-1</a></td>
</tr>
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<td>Organization</td>
<td><a href="http://example/1078338/Agent11-1-2">http://example/1078338/Agent11-1-2</a></td>
</tr>
<tr>
<td>Block, Leigh E., Mrs., 1904-1987</td>
<td>Organization</td>
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</tr>
<tr>
<td>Los Angeles County Museum of Art</td>
<td>Organization</td>
<td><a href="http://example/1078338/Agent11-1-4">http://example/1078338/Agent11-1-4</a></td>
</tr>
<tr>
<td>National Science Film Library (Canada)</td>
<td>Organization</td>
<td><a href="http://example/1078338/Agent11-1-5">http://example/1078338/Agent11-1-5</a></td>
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<td>Davis, Judith A.</td>
<td>Person</td>
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</tr>
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<td>Organization</td>
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<td>Colnet, Louis-Jean, 1942</td>
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<td>Person</td>
<td><a href="http://example/1074866/Agent10-1-3">http://example/1074866/Agent10-1-3</a></td>
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<tr>
<td>Jacob, Andre</td>
<td>Person</td>
<td><a href="http://example/1074866/Agent10-1-4">http://example/1074866/Agent10-1-4</a></td>
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<td>Germany, Auswärtiges Amt.</td>
<td>Jurisdiction</td>
<td><a href="http://example/1074866/Agent10-1-5">http://example/1074866/Agent10-1-5</a></td>
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<td>Jurisdiction</td>
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<td>Sasse, Heinz Gunther, 1936-1956</td>
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<td>Eichhorst, Eckhard, 1943-1967</td>
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<td>Person</td>
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<td>Decker, Isabelle M.</td>
<td>Person</td>
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<td>Sack, Alan</td>
<td>Person</td>
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<td>Lochhead, Douglas, 1921-1963</td>
<td>Person</td>
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<td>Person</td>
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<tr>
<td>Coon, Herbert L.</td>
<td>Person</td>
<td><a href="http://example/1074866/Agent10-1-18">http://example/1074866/Agent10-1-18</a></td>
</tr>
<tr>
<td>Tyson, Geoffrey, 1898-1971</td>
<td>Person</td>
<td><a href="http://example/1024866/Agent11-1-2">http://example/1024866/Agent11-1-2</a></td>
</tr>
<tr>
<td>National and Grindlays Bank Limited.</td>
<td>Organization</td>
<td><a href="http://example/1024866/Agent11-1-3">http://example/1024866/Agent11-1-3</a></td>
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<tr>
<td>Hitler, Erich, 1940-1953</td>
<td>Person</td>
<td><a href="http://example/1024866/Agent11-1-4">http://example/1024866/Agent11-1-4</a></td>
</tr>
<tr>
<td>Fittgen, Marlene Schreiber.</td>
<td>Person</td>
<td><a href="http://example/1024866/Agent11-1-5">http://example/1024866/Agent11-1-5</a></td>
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<td>Tese, Leo J. (Leo John) , 1902-1970</td>
<td>Person</td>
<td><a href="http://example/1024866/Agent11-1-6">http://example/1024866/Agent11-1-6</a></td>
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<td>#</td>
<td>Names</td>
<td>LCP</td>
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<tr>
<td>---</td>
<td>----------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>11</td>
<td>Conservatorio Superior de Música</td>
<td>n482680807</td>
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<tr>
<td>12</td>
<td>Piaget, Rodolfo, 1906-1980</td>
<td>n88253712</td>
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<tr>
<td>13</td>
<td>Silva Neto, Serén da, 1917-1969</td>
<td>n89153925</td>
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<tr>
<td>14</td>
<td>Font y Bagué, Narcís, 1873-1930</td>
<td>n90093079</td>
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<td>15</td>
<td>Eyzaguirre, Jaime</td>
<td>n90030270</td>
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<td>16</td>
<td>Valdés, Luis G. de (Luis García de), 1904-1951</td>
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<td>17</td>
<td>Tulué, Petrus, active 1906-1100</td>
<td>n90232364</td>
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<td>18</td>
<td>Patán, Félix Fulgencio, 1881-</td>
<td>n90232364</td>
</tr>
<tr>
<td>19</td>
<td>México, Congreso Constituyente (1910-1917)</td>
<td>n31302024</td>
</tr>
<tr>
<td>20</td>
<td>México</td>
<td>n81013005</td>
</tr>
<tr>
<td>21</td>
<td>Menéndez, María de, 1882-</td>
<td>n81013005</td>
</tr>
<tr>
<td>22</td>
<td>Bacardí, Jen</td>
<td>n81099113</td>
</tr>
<tr>
<td>Process</td>
<td>Time</td>
<td>Tool</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-----------------------------------</td>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>Converting .marc to MARC/XML</td>
<td>7 - 8 mins</td>
<td>pymarc</td>
</tr>
<tr>
<td>Converting MARC/XML to BIBFRAME (and merging)</td>
<td>40 - 50 mins</td>
<td>Oxygen / bash</td>
</tr>
<tr>
<td>Extracting names (or subjects) from the bibframe file</td>
<td>Less than 2 mins</td>
<td>Oxygen</td>
</tr>
<tr>
<td>OpenRefine process</td>
<td>Few seconds</td>
<td>OpenRefine - GREL</td>
</tr>
<tr>
<td>Enriching names with URIs (from VIAF)</td>
<td>30 - 35 mins</td>
<td>OpenRefine + VIAF recon java client</td>
</tr>
<tr>
<td>Enriching names with URIs (from LC)</td>
<td>90 - 120 mins</td>
<td>OpenRefine + LC recon client</td>
</tr>
<tr>
<td>Enriching subjects with URIs (from LC)</td>
<td>70 - 90 mins</td>
<td>OpenRefine + LC recon client</td>
</tr>
<tr>
<td>OpenRefine process</td>
<td>Few seconds</td>
<td>OpenRefine - GREL</td>
</tr>
<tr>
<td>Ingesting (replacing example.org URIs)</td>
<td>60 - 70 mins (using Saxon EE on Oxygen) 100 - 120 mins (using Saxon HE on command-line)</td>
<td>Oxygen / Saxon command-line</td>
</tr>
</tbody>
</table>
Parallel Processing

Compute Canada Cloud instance

Local machine
## Entity Matching

<table>
<thead>
<tr>
<th>Source</th>
<th>Names</th>
<th>Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LC</td>
<td>VIAF</td>
</tr>
<tr>
<td>1985 Imprints</td>
<td>92.41%</td>
<td>87.22%</td>
</tr>
<tr>
<td>2015 Imprints</td>
<td>96.06%</td>
<td>86.33%</td>
</tr>
<tr>
<td>UA</td>
<td>83.92%</td>
<td>79.84%</td>
</tr>
</tbody>
</table>
Overview of the Casalini SHARE VDE Project

An @Cult and Casalini Libri partnership

“ALIADA project, co-financed by the European Union in 2013-2015, originally applied the Linked Data paradigm using FRBRoo based ontologies.”¹

“A prototype of a virtual discovery environment with a three BIBFRAME layer architecture (Person/Work, Instance, Item) has been established through the individual processes of analysis, entity identification and reconciliation, conversion and publication of data from MARC21 to RDF, within the context of libraries with different systems, habits and cataloguing traditions.”²

Project participants:

- Stanford University
- University of California Berkeley
- Yale University
- Library of Congress
- University of Chicago
- University of Michigan Ann Arbor
- Harvard University
- Massachusetts Institute of Technology
- Duke University
- Cornell University
- Columbia University
- University of Pennsylvania
- Pennsylvanian State University
- Texas A&M University
- University of Alberta / NEOS Library Consortium
- University of Toronto

Phase 1:

- MARC for 1985 and 2015 imprint data returned with URI enrichment
- Imprint data returned in bf:2.0
- Entity identification
- Reconciliation of data clustering
- Release of SHARE VDE with searchable imprint data
- Access to data through Blazegraph

Phase 2:

- Creation of relationship database to support entity identification
- Improvements of processes from phase 1 for MARC and bf:2.0 data
- Basefile to be returned in bf:2.0 and enriched MARC
- Web discoverability through application of other ontologies such as schema.org

The SHARE-VDE processes overview

- OliSuite: manual process
  - Marc enriched/URIs
  - Database of relationships

- Similarity's score
  - Entity detection
    - Enrichment
    - Reconciliation/Cluster

- Authify
  - Dump db
  - APIs
  - External sources
  - RDF/Bibframe dataset

- SHARE-VDE Portal

MARCs, XMLs:
- Bibliographic
- Authority
- Scheme 1
- Scheme 2

Casalini Libri (2017). SHARE-Virtual Discovery Environment in linked data concise project update. SHARE-VDE use case design meeting, Washington, DC.
This person is a significant figure in English literature, known for his plays and sonnets. His works include approximately 38 plays, 154 sonnets, two long narrative poems, and a few other verses. His plays are widely regarded as some of the greatest in the English language and the world's pre-eminent dramaticus. He is often called England's national poet and the "Bard of Avon".
Use cases for phase 3 are still being developed, but may include:

- publish all participants data in the SHARE VDE platform
- incorporate ability to batch update the record set with library exports,
- develop ability to return enhanced data back to libraries in an automated way,
- develop ability to edit the information in ShareVDE through cataloging tools,
- develop capacity for reports of some type and
- develop original cataloging workflows for SHAREVDE
Data Through Conversion: Analysis based on BIBCO and CONSER Core

1. An examination of Casalini and LC bf:2.0 conversions bases on BIBCO and CONSER core elements
   a. Do conversions give adequate coverage/treatment of core elements and in what ways?
   b. How well are monographs and serials treated?

2. Comparing 1985 and 2015 imprint data
   a. How well does bf: convert current and legacy MARC and encoding standards?

3. Pre vs post MARC to LD conversion URI enrichment efficacy
   a. If URI enrichment of MARC data is to be done, what areas make the most sense?
BSR¹ / CSR² to BIBFRAME Mappings:

Provided helpful reference tools for analysis of RDA core elements through conversion.

As these will have seen scrutiny by PCC already and we were looking at RDA Core, perhaps it wasn’t surprising that all elements were represented fairly well. Still, a few interesting findings:

Monographs and/or some general points of interest:

1. **Production, Publication, Distribution, Manufacture statements:**
   - LC XSLT: Strips brackets and other marks of punctuation in mapping to place, agent and date
   - SHARE VDE: Maintains brackets and other punctuation but also clusters terms and mints associated URI
     - [http://share-vde.org/sharevde/rdfBibframe2/ProvisionActivity/79dcbc23-f113-3c01-9159-9e359f0e994c](http://share-vde.org/sharevde/rdfBibframe2/ProvisionActivity/79dcbc23-f113-3c01-9159-9e359f0e994c)
     - [http://id.loc.gov/ontologies/bibframe/date](http://id.loc.gov/ontologies/bibframe/date) "1958."
     - [http://share-vde.org/sharevde/rdfBibframe2/ProvisionActivity/79dcbc23-f113-3c01-9159-9e359f0e994c](http://share-vde.org/sharevde/rdfBibframe2/ProvisionActivity/79dcbc23-f113-3c01-9159-9e359f0e994c)
     - [http://id.loc.gov/ontologies/bibframe/date](http://id.loc.gov/ontologies/bibframe/date) "[1958]"
     - [http://share-vde.org/sharevde/rdfBibframe2/ProvisionActivity/79dcbc23-f113-3c01-9159-9e359f0e994c](http://share-vde.org/sharevde/rdfBibframe2/ProvisionActivity/79dcbc23-f113-3c01-9159-9e359f0e994c)
     - [http://id.loc.gov/ontologies/bibframe/date](http://id.loc.gov/ontologies/bibframe/date) "1958"]

2. **Preferred title:**
   - LC XSLT: Appropriately uses 130/240 or 245$a in absence of them to generate preferred title of work
   - SHARE VDE: Uses URI to pull together title data for works and instances
     - [http://share-vde.org/sharevde/rdfBibframe2/Title](http://share-vde.org/sharevde/rdfBibframe2/Title)

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3. Creators, contributors and relators:

LC XSLT: Agent and Role

SHARE VDE:

<http://share-vde.org/sharevde/rdfBibframe/Agent/78151> <http://www.w3.org/1999/02/22-rdf-syntax-ns#type>


<http://share-vde.org/sharevde/rdfBibframe/Agent/78151> <http://www.loc.gov/mads/rdf/v1#isIdentifiedByAuthority>


Serials:

As noted in the Final Report of the CONSER CSR to BIBFRAME Mapping Task Group¹, Numeric and/or alphabetic designation/Chronological designation of first issue or part of sequence (RDA 2.6.2/2.6.3) both map to firstIssue (similarly for lastIssue). The mapping works correctly in both conversions, but why would the data not be made more atomic?

The report by the CONSER CSR to BIBFRAME Mapping Task Group provides other information and is a good reference point.

1985 vs 2015 Imprint Data

Following the approach of the SHARE VDE to look at 1985 and imprint data to compare past and current standards through conversion found several interesting points.

Example:

1. LC XSLT: Earlier records lacking relationship designators only have “contributor” role assigned
   
   ```xml
   <bf:role>
     <bf:Role rdf:about="http://id.loc.gov/vocabulary/relators/ctb"/>
   </bf:role>
   ```

SHARE VDE:

Relator Term Detection: “Starting from a Marc21 record (whatever is the specific dialect) the system analyses all (configured) tags that contain a name and, for each of them, tries to figure out (using the statements of responsibility of the input record or other parts of the record) what is the corresponding role within the work represented by the given record.” (Casalini Libri, 2017)

```xml
```
URI Enrichment: Before or After?

Guidance from the PCC Task Group on URI in MARC

$0 - URIs that identify a ‘Record’ or ‘Authority’ entity describing a Thing (e.g. madsrdf:Authorities, SKOS Concepts for terms in controlled or standard vocabulary lists)

$1 - URIs that directly identify a Thing itself (sometimes referred to as a Real World Object or RWO, whether actual or conceptual)

$4 - Redefining Subfield $4 to Encompass URIs for Relationships in the MARC 21 Authority and Bibliographic Formats

758 - An identifier for a resource related to the resource described in the bibliographic record. Resources thus identified may include, but are not limited to, FRBR works, expressions, manifestations, and items. The field does not prescribe a particular content standard or data model.

https://www.loc.gov/marc/mac/list-p.html#2017
Bf:2.0 LC from Enriched MARC Data

<bf:contribution>
  <bf:Contribution>
    <bf:agent>
      <bf:Agent rdf:about="http://id.loc.gov/authorities/names/n2005058924">
        <rdf:type rdf:resource="http://id.loc.gov/ontologies/bibframe/Person"/>
        <bflc:name00MatchKey>Sengupta, Ashis,</bflc:name00MatchKey>
        <bflc:name00MarcKey>7001 $aSengupta, Ashis,$0http://id.loc.gov/authorities/names/n2005058924$0http://viaf.org/viaf/24010261</bflc:name00MarcKey>
        <rdfs:label>Sengupta, Ashis,</rdfs:label>
        <bf:identifiedBy>
          <bf:Identifier>
            <rdf:value rdf:resource="http://viaf.org/viaf/24010261"/>
          </bf:Identifier>
        </bf:identifiedBy>
      </bf:Agent>
    </bf:agent>
    <bf:role>
      <bf:Role>
        <rdfs:label>editor.</rdfs:label>
        <bflc:relatorMatchKey>editor</bflc:relatorMatchKey>
      </bf:Role>
    </bf:role>
  </bf:Contribution>
</bf:contribution>
Bf:2.0 LC Enriched Post Conversion

<bf:Contribution>
  <bf:agent>
    <bf:Agent rdf:about="http://id.loc.gov/authorities/names/n2005058924">
      <rdf:type rdf:resource="http://id.loc.gov/ontologies/bibframe/Person"/>
      <bflc:name00MatchKey>Sengupta, Ashis,</bflc:name00MatchKey>
      <bflc:name00MarcKey>7001 $aSengupta, Ashis,$eeditor.</bflc:name00MarcKey>
      <rdfs:label>Sengupta, Ashis,</rdfs:label>
      <bf:identifiedBy>
        <bf:Identifier>
          <rdf:value rdf:resource="http://viaf.org/viaf/24010261"/>
        </bf:Identifier>
      </bf:identifiedBy>
    </bf:Agent>
  </bf:agent>
  <bf:role>
    <bf:Role>
      <rdfs:label>editor.</rdfs:label>
      <bflc:relatorMatchKey>editor</bflc:relatorMatchKey>
    </bf:Role>
  </bf:role>
</bf:Contribution>
MARC from Casalini Enriched with URI

=100 1\$aTchaikovsky, Peter

=100 1\$aLeCompte, Margaret Diane,$eauthor.$1http://isni.org/isni/0000000116573223

=758 \$4http://rdaregistry.info/Elements/m/P30004$0http://www.worldcat.org/oclc/900194099
=758 \$4http://rdaregistry.info/Elements/m/P30139$1http://worldcat.org/entity/work/id/2267517995

=758 \$4http://rdaregistry.info/Elements/m/P30135$iHas work manifested:
$1http://worldcat.org/entity/work/id/2267517995
URI in Casalini bf:2.0 Data

<http://share-vde.org/sharevde/rdfBibframe/Agent/3354732>  
<http://www.loc.gov/mads/rdf/v1#isIdentifiedByAuthority> <http://id.loc.gov/authorities/names/n87114204>  

<http://share-vde.org/sharevde/rdfBibframe/Agent/3354732> <http://www.w3.org/2002/07/owl#sameAs>  

<http://share-vde.org/sharevde/rdfBibframe/Agent/3354732> <http://www.w3.org/2002/07/owl#sameAs>  

<http://share-vde.org/sharevde/rdfBibframe/Agent/3354732> <http://www.w3.org/2002/07/owl#sameAs>  
Determining Workflow

Transitioning to linked data was never going to be easy. Several reasons for this include:

- MARC has been around for a very long time and we have lots of it
- The ILS and discovery systems we use are built around MARC data
- Staff have also been using MARC for a very long time
- Currently our entire workflow for resource description, from LC, OCLC and other vendors through to copy and original cataloguing all depends on MARC
It has been 15 years since Roy Tennant wrote MARC Must Die¹. We now find ourselves in a position where non-MARC data alternatives exist.

Let us assume that either approach (Casalini SHARE VDE or In house processes through LC Converter) allows us to fully convert our data, establish updates and work through copy and original cataloguing workflows (There are plenty of challenges here, but success seems in sight).

We now have a more general infrastructure challenge:

- UAL and NEOS have a lot invested in our current ILS and support mechanisms
- While UAL utilized BlackLight, significant work is still being put into its development for use with our current systems. A shift for development to work with bf:2.0 data would be major
- Our MARC data does not represent our entire collection and these would all need to be connected

Strategic Planning

UAL (and other libraries) will need to develop clear strategic direction across units to tackle some of these issues.

Even so, experience from the Canadian Linked Data Initiative has highlighted that:

1. There are limited resources in any given institution for working towards implementation
2. Central planning for large scale projects across institutions is challenging

With this in mind, we wonder if libraries really could use an ally to bring about critical mass for change.
Possible Workflows

In house (LC bf:2.0 XSLT):

- Continue refining the balance of MARC vs. bf enrichment
- Automate processing to finish full collection
- Establish a process for ongoing updates
- Data into triplestore
- Discovery: BlackLight, Jupiter … something else?

Casalini SHARE VDE:

- Continue working with phase 3 use cases to develop
  - Full collection access and updates
  - Original and copy cataloguing workflows
- Discovery already in place as proof of concept and/or production environment
- Even if only for short/medium term use, this would give a lot of breathing room for infrastructure change and learning through process improvement
We’re going to need a lot of coffee!
Many thanks to all the magical individuals working with us!

From Bibliographic Services and those across UAL to everywhere else
THANK YOU!

QUESTIONS? COMMENTS?

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