

# Modelling sequential relationships beyond MARC 21

Mapping preceding and succeeding entity relationships for Continuing Resources

Bibliographic Conceptual Models Interest Group, March 10th, 2022

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## CONTEXT

### **Share-VDE (Virtual Discovery Environment) & the Sapientia Cluster Knowledgebase**

- ▶ “Share-VDE pulls together MARC authority and bibliographic data from 26 member libraries, enriches it with authoritative entities and clusters data into BIBFRAME entities”, the result is the **Sapientia Cluster Knowledgebase**<sup>1</sup>

### **Sapientia Entity Identification Working Group (SEIWG)**

- ▶ Review use of entities, identifiers, and associated modelling in Sapientia
- ▶ Review and refine processes for Sapientia entity clustering
- ▶ Review MARC to BIBFRAME and BIBFRAME to MARC conversion of elements related to Sapientia entities<sup>2</sup>

## CONTEXT

The Share-VDE 2.0 roadmap for late 2021 and early 2022 included:

- ▶ Discovery: Search Interface and Search APIs
- ▶ **Cluster Knowledge Base 2.0 refactoring**
- ▶ J.Cricket Cluster Knowledge Base editor release
- ▶ Testing of authority services
- ▶ Ongoing updates of the PCC data pool
- ▶ Ongoing work on Sinopia/QA interaction

**SEIWG Project:** As part of a wider review of entity identification in advance of the CKB 2.0 refactoring, defining BIBFRAME entity creation and relationship management rules for the MARC 21 Bibliographic linking fields (76X-78X)

Search Stored Queries ...

Share-VDE\_C...



```

1 select *
2 { graph ?g
3   <http://share-vde.org/sharevde/rdFBibframe/Work/14460501> ?p ?o .
4   ?o rdfs:label ?t
5 }
6 }
    
```

Run to File Text Charts Visualize 40 Results, 1085 ms

g	p	o	t
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/HARVA...">http://share-vde.org/sharevde/rdFBibframe/Provenance/HARVA...</a>	<a href="http://id.loc.gov/ontologies/bibframe/title">http://id.loc.gov/ontologies/bibframe/title</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Title_996/56ca47ef-1...">http://share-vde.org/sharevde/rdFBibframe/Title_996/56ca47ef-1...</a>	"Woman citizen"
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/HARVA...">http://share-vde.org/sharevde/rdFBibframe/Provenance/HARVA...</a>	<a href="http://id.loc.gov/ontologies/bibframe/title">http://id.loc.gov/ontologies/bibframe/title</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Title_996/56ca47ef-1...">http://share-vde.org/sharevde/rdFBibframe/Title_996/56ca47ef-1...</a>	"Woman citizen"
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/PRINCE...">http://share-vde.org/sharevde/rdFBibframe/Provenance/PRINCE...</a>	<a href="http://id.loc.gov/ontologies/bibframe/title">http://id.loc.gov/ontologies/bibframe/title</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Title_996/56ca47ef-1...">http://share-vde.org/sharevde/rdFBibframe/Title_996/56ca47ef-1...</a>	"Woman citizen"
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/UMICH...">http://share-vde.org/sharevde/rdFBibframe/Provenance/UMICH...</a>	<a href="http://id.loc.gov/ontologies/bibframe/title">http://id.loc.gov/ontologies/bibframe/title</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Title_996/56ca47ef-1...">http://share-vde.org/sharevde/rdFBibframe/Title_996/56ca47ef-1...</a>	"Woman citizen"
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/DUKE00...">http://share-vde.org/sharevde/rdFBibframe/Provenance/DUKE00...</a>	<a href="http://id.loc.gov/ontologies/bibframe/title">http://id.loc.gov/ontologies/bibframe/title</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Title_996/56ca47ef-1...">http://share-vde.org/sharevde/rdFBibframe/Title_996/56ca47ef-1...</a>	"Woman citizen"
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/DUKE00...">http://share-vde.org/sharevde/rdFBibframe/Provenance/DUKE00...</a>	<a href="http://id.loc.gov/ontologies/bibframe/title">http://id.loc.gov/ontologies/bibframe/title</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Title_996/56ca47ef-1...">http://share-vde.org/sharevde/rdFBibframe/Title_996/56ca47ef-1...</a>	"Woman citizen"
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/UALBER...">http://share-vde.org/sharevde/rdFBibframe/Provenance/UALBER...</a>	<a href="http://id.loc.gov/ontologies/bibframe/title">http://id.loc.gov/ontologies/bibframe/title</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Title_996/56ca47ef-1...">http://share-vde.org/sharevde/rdFBibframe/Title_996/56ca47ef-1...</a>	"Woman citizen"
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/COLOR...">http://share-vde.org/sharevde/rdFBibframe/Provenance/COLOR...</a>	<a href="http://id.loc.gov/ontologies/bibframe/title">http://id.loc.gov/ontologies/bibframe/title</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Title_996/56ca47ef-1...">http://share-vde.org/sharevde/rdFBibframe/Title_996/56ca47ef-1...</a>	"Woman citizen"
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/UALBER...">http://share-vde.org/sharevde/rdFBibframe/Provenance/UALBER...</a>	<a href="http://id.loc.gov/ontologies/bibframe/title">http://id.loc.gov/ontologies/bibframe/title</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Title_996/56ca47ef-1...">http://share-vde.org/sharevde/rdFBibframe/Title_996/56ca47ef-1...</a>	"Woman citizen"
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/STANFO...">http://share-vde.org/sharevde/rdFBibframe/Provenance/STANFO...</a>	<a href="http://id.loc.gov/ontologies/bibframe/title">http://id.loc.gov/ontologies/bibframe/title</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Title_996/56ca47ef-1...">http://share-vde.org/sharevde/rdFBibframe/Title_996/56ca47ef-1...</a>	"Woman citizen"
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/TAMU4...">http://share-vde.org/sharevde/rdFBibframe/Provenance/TAMU4...</a>	<a href="http://id.loc.gov/ontologies/bibframe/title">http://id.loc.gov/ontologies/bibframe/title</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Title_996/56ca47ef-1...">http://share-vde.org/sharevde/rdFBibframe/Title_996/56ca47ef-1...</a>	"Woman citizen"
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/DUKE00...">http://share-vde.org/sharevde/rdFBibframe/Provenance/DUKE00...</a>	<a href="http://id.loc.gov/ontologies/bibframe/subject">http://id.loc.gov/ontologies/bibframe/subject</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Topic_650/2eb5a070...">http://share-vde.org/sharevde/rdFBibframe/Topic_650/2eb5a070...</a>	"Women--Periodicals."
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/DUKE00...">http://share-vde.org/sharevde/rdFBibframe/Provenance/DUKE00...</a>	<a href="http://id.loc.gov/ontologies/bibframe/subject">http://id.loc.gov/ontologies/bibframe/subject</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Topic_650/3bbbc848...">http://share-vde.org/sharevde/rdFBibframe/Topic_650/3bbbc848...</a>	"Women--Suffrage--Periodicals."
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/DUKE00...">http://share-vde.org/sharevde/rdFBibframe/Provenance/DUKE00...</a>	<a href="http://id.loc.gov/ontologies/bibframe/note">http://id.loc.gov/ontologies/bibframe/note</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Note/8d2c3aa6-27f...">http://share-vde.org/sharevde/rdFBibframe/Note/8d2c3aa6-27f...</a>	"Formed by the union of: Woman voter (New York, N.Y. : 1910), a
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/UMICH...">http://share-vde.org/sharevde/rdFBibframe/Provenance/UMICH...</a>	<a href="http://id.loc.gov/ontologies/bibframe/subject">http://id.loc.gov/ontologies/bibframe/subject</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Topic_650/4be120e4...">http://share-vde.org/sharevde/rdFBibframe/Topic_650/4be120e4...</a>	"Women--Periodicals."
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/UMICH...">http://share-vde.org/sharevde/rdFBibframe/Provenance/UMICH...</a>	<a href="http://id.loc.gov/ontologies/bibframe/subject">http://id.loc.gov/ontologies/bibframe/subject</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Topic_650/652c3b0a...">http://share-vde.org/sharevde/rdFBibframe/Topic_650/652c3b0a...</a>	"Women--Suffrage--Periodicals."
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/UMICH...">http://share-vde.org/sharevde/rdFBibframe/Provenance/UMICH...</a>	<a href="http://id.loc.gov/ontologies/bibframe/note">http://id.loc.gov/ontologies/bibframe/note</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Note/c24e7643-cd9...">http://share-vde.org/sharevde/rdFBibframe/Note/c24e7643-cd9...</a>	"Formed by the union of: Woman voter, National suffrage news, .
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/DUKE00...">http://share-vde.org/sharevde/rdFBibframe/Provenance/DUKE00...</a>	<a href="http://id.loc.gov/ontologies/bibframe/subject">http://id.loc.gov/ontologies/bibframe/subject</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Topic_650/03a1830...">http://share-vde.org/sharevde/rdFBibframe/Topic_650/03a1830...</a>	"Women--Periodicals."
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/DUKE00...">http://share-vde.org/sharevde/rdFBibframe/Provenance/DUKE00...</a>	<a href="http://id.loc.gov/ontologies/bibframe/subject">http://id.loc.gov/ontologies/bibframe/subject</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Topic_650/ac119a93...">http://share-vde.org/sharevde/rdFBibframe/Topic_650/ac119a93...</a>	"Women--Suffrage--Periodicals."
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/DUKE00...">http://share-vde.org/sharevde/rdFBibframe/Provenance/DUKE00...</a>	<a href="http://id.loc.gov/ontologies/bibframe/note">http://id.loc.gov/ontologies/bibframe/note</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Topic_650/e1251a33-21e...">http://share-vde.org/sharevde/rdFBibframe/Topic_650/e1251a33-21e...</a>	"Formed by the union of: Woman voter (New York, N.Y. : 1910), a
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/HARVA...">http://share-vde.org/sharevde/rdFBibframe/Provenance/HARVA...</a>	<a href="http://id.loc.gov/ontologies/bibframe/subject">http://id.loc.gov/ontologies/bibframe/subject</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Topic_650/04241fa4...">http://share-vde.org/sharevde/rdFBibframe/Topic_650/04241fa4...</a>	"Women--Periodicals."
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/HARVA...">http://share-vde.org/sharevde/rdFBibframe/Provenance/HARVA...</a>	<a href="http://id.loc.gov/ontologies/bibframe/subject">http://id.loc.gov/ontologies/bibframe/subject</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Topic_650/14be5d14...">http://share-vde.org/sharevde/rdFBibframe/Topic_650/14be5d14...</a>	"Women--Suffrage--Periodicals."
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/HARVA...">http://share-vde.org/sharevde/rdFBibframe/Provenance/HARVA...</a>	<a href="http://id.loc.gov/ontologies/bibframe/note">http://id.loc.gov/ontologies/bibframe/note</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Topic_650/b2b80b85-837...">http://share-vde.org/sharevde/rdFBibframe/Topic_650/b2b80b85-837...</a>	"Formed by the union of: Woman voter, National suffrage news, .
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/HARVA...">http://share-vde.org/sharevde/rdFBibframe/Provenance/HARVA...</a>	<a href="http://id.loc.gov/ontologies/bibframe/relatedTo">http://id.loc.gov/ontologies/bibframe/relatedTo</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Note/8427016a-742...">http://share-vde.org/sharevde/rdFBibframe/Note/8427016a-742...</a>	"The woman's journal."
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/HARVA...">http://share-vde.org/sharevde/rdFBibframe/Provenance/HARVA...</a>	<a href="http://id.loc.gov/ontologies/bibframe/subject">http://id.loc.gov/ontologies/bibframe/subject</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Topic_650/b009d10f...">http://share-vde.org/sharevde/rdFBibframe/Topic_650/b009d10f...</a>	"Women--Suffrage--Periodicals."
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/HARVA...">http://share-vde.org/sharevde/rdFBibframe/Provenance/HARVA...</a>	<a href="http://id.loc.gov/ontologies/bibframe/subject">http://id.loc.gov/ontologies/bibframe/subject</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Topic_650/94a0297f...">http://share-vde.org/sharevde/rdFBibframe/Topic_650/94a0297f...</a>	"Women--Suffrage."
<a href="http://share-vde.org/sharevde/rdFBibframe/Provenance/HARVA...">http://share-vde.org/sharevde/rdFBibframe/Provenance/HARVA...</a>	<a href="http://id.loc.gov/ontologies/bibframe/note">http://id.loc.gov/ontologies/bibframe/note</a>	<a href="http://share-vde.org/sharevde/rdFBibframe/Note/f77067d2-2f53...">http://share-vde.org/sharevde/rdFBibframe/Note/f77067d2-2f53...</a>	"Formed by the union of: Woman's journal (Boston, Mass. : 1917,

*Leverage linked data's ability to clearly express relationships between entities and to encode these relationships more explicitly for machines, users, and catalogers*



# Approach

- ▷ Map to bf relationships where possible and appropriate
- ▷ Where gaps exist
  - ▶ Utilize relationships from RDA/RDF where suitable and available in order to enrich the data
  - ▶ Where no suitable alternative exists, decide whether the loss of information is acceptable, or whether a new bf relationship should be established
- ▷ Where complexity exists in the source (MARC data), apply logic that can support additional code development to identify the appropriate relationship where possible

# Successes

Many 780/785 relationships can currently be mapped to BIBFRAME without a loss of information

# SUCCESSFULLY MAPPED 780/785 RELATIONSHIPS

Tag	1-2 Indicator	MARC tag/indicator	BIBFRAME conversion specs
780		<b>PRECEDING ENTRY</b>	If no valid value in ind2 then W - precededBy
780	2° = 0	Preceding Entry / Continues	W - continues
780	2° = 1	Preceding Entry / Continues in part	W - continuesInPart
780	2° = 5	Preceding Entry / Absorbed	W - absorbed
780	2° = 7	Preceding Entry / Separated from	W - separatedFrom
785		<b>SUCCEEDING ENTRY</b>	If no valid value in Ind2 then W - succeededBy
785	2° = 0	Succeeding Entry / Continued by	W - continuedBy
785	2° = 1	Succeeding Entry / Continued in part by	W - continuedInPartBy
785	2° = 4	Succeeding Entry / Absorbed by	W - absorbedBy



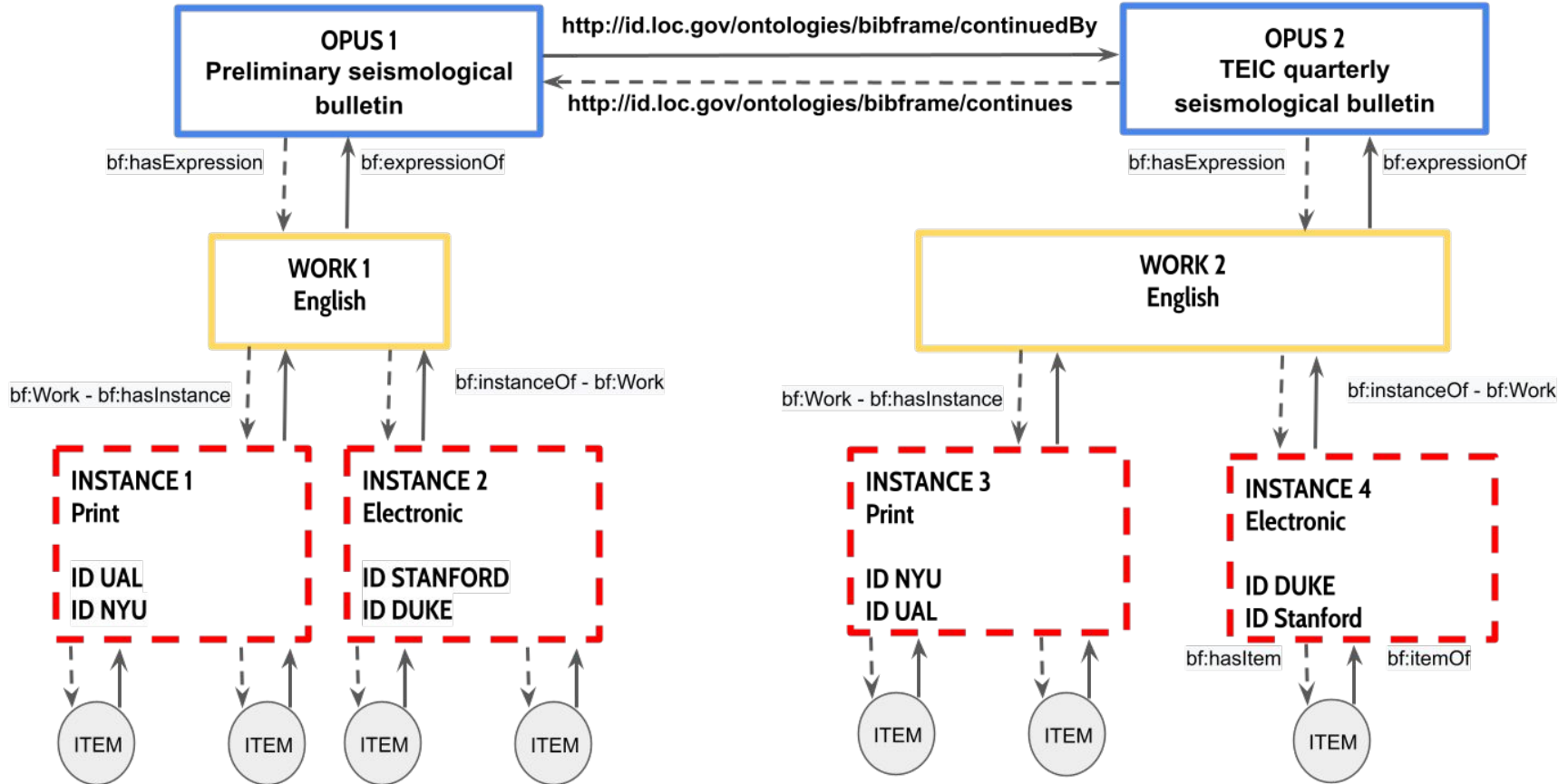
**Example: 785 00 (Continued by)**

022 0# \$a 0730-5567 \$l 0730-5567 \$2 1

245 00 \$a Preliminary seismological bulletin / \$c Tennessee Earthquake Information Center, Memphis State University.

260 ## \$a Memphis, Tenn. : \$b The Center, \$c -1982.

785 00 \$t **TEIC quarterly seismological bulletin** \$x 0741-1898



# Challenges

- ▷ Capturing complex relationships:
  - ▶ One-to-many relationships
  - ▶ Lateral relationships
- ▷ Capturing sequential relationship data beyond 780/785 (e.g., 247 field, 580 notes, etc.)

# CAPTURING COMPLEX RELATIONSHIPS

## One-to-many Relationships

### Example: 785 05 (Absorbed in part by)

022 0# \$a 2691-526X \$2 1

245 04 \$a The Metal worker, plumber, and steam fitter.

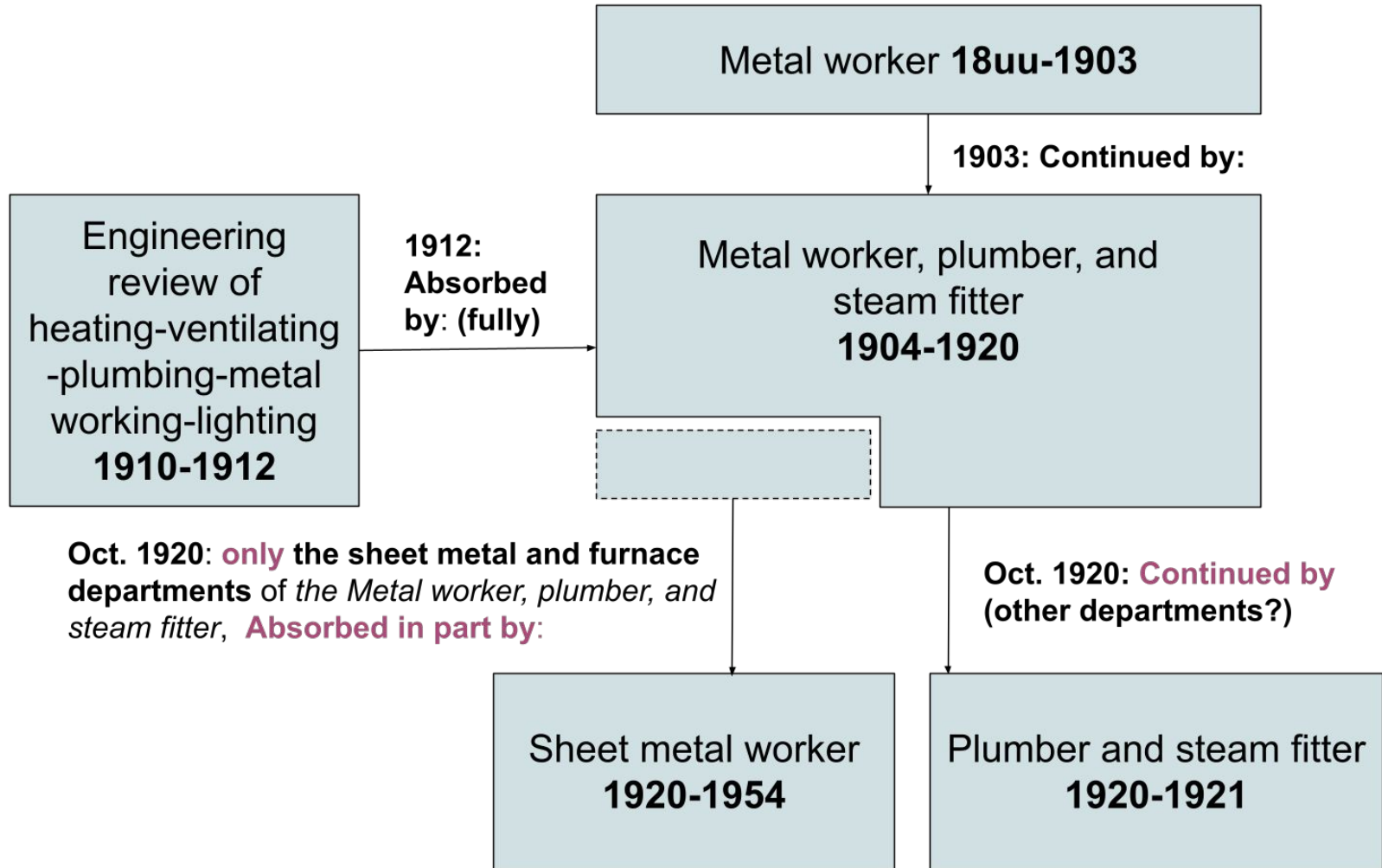
780 00 \$t Metal worker \$x 2691-5898

780 05 \$t Engineering review of heating-ventilating-plumbing-metal working-lighting \$g Oct.  
1912 \$x 2691-5235

785 00 \$t Plumber and steam fitter \$x 2691-5588

**785 05 \$t Sheet metal worker** \$x 0096-9249

**Note:** No 580 note in the Bib record; Sheet metal worker absorbed **the sheet metal and furnace departments** of the Metal worker, plumber, and steam fitter, Oct. 1920. ⇨ This is an “absorbed in part” relationship ; that is, both publications continued on following this Bib absorption event in Oct. 1920.



# CAPTURING COMPLEX RELATIONSHIPS

## Many-to-one Relationships

### ... 580 Notes & Lateral Relationships

#### Example: 785 17 (Merged with ... to form...):

022 0# \$a **0226-0883** \$l 0226-0883 \$2 4

110 1# \$a British Columbia. \$b Ministry of Provincial Secretary and Government Services.

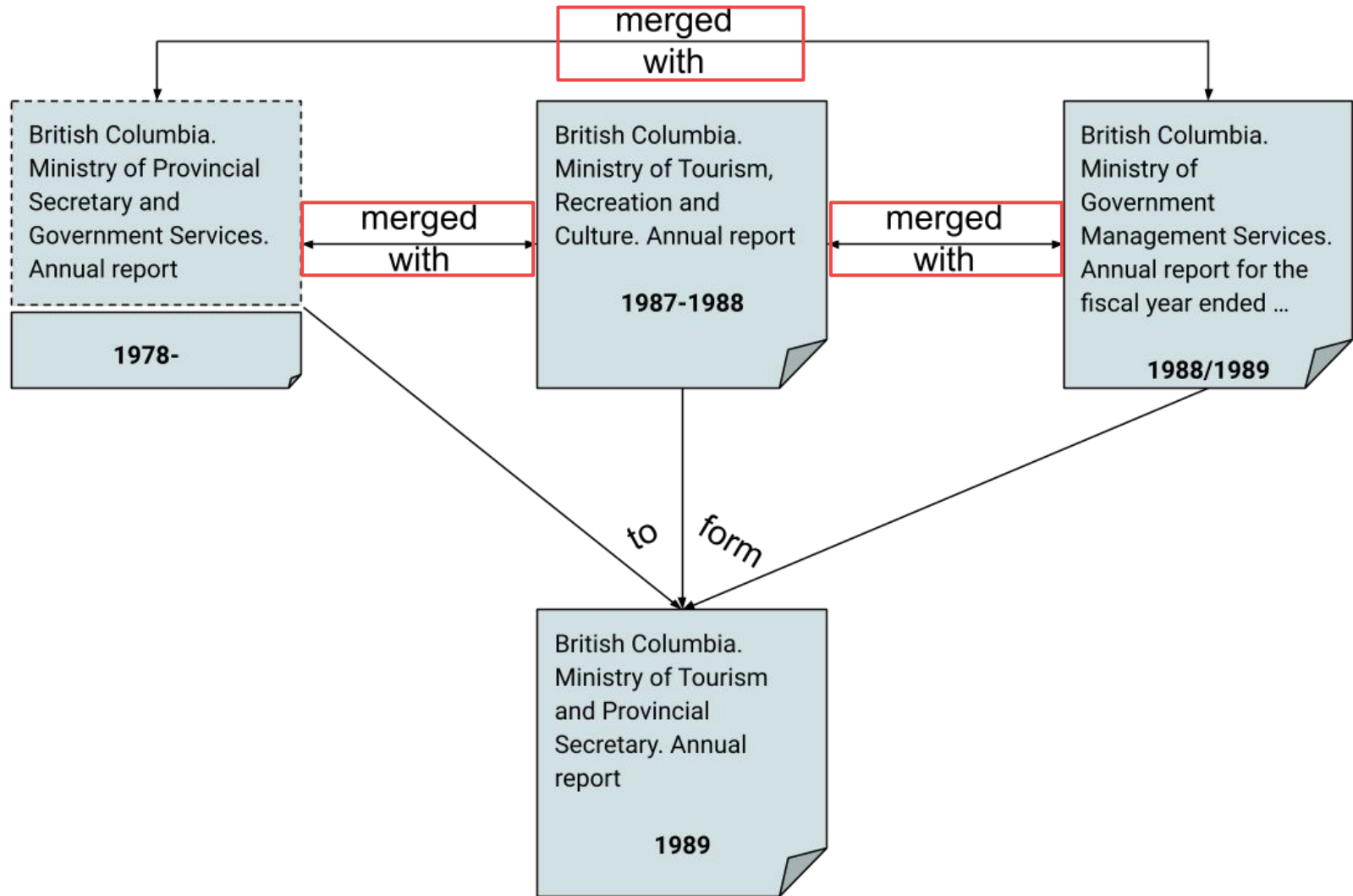
➔ **245** 10 \$a Annual report - Ministry of Provincial Secretary and Government Services.

**580** \$a Part of this title **merged with:** British Columbia. Ministry of Tourism, Recreation and Culture. Annual report, ISSN 0843-8080; and: British Columbia. Ministry of Government Management Services. Annual report for the fiscal year ended ... **to become:** British Columbia. Ministry of Tourism and Provincial Secretary. Annual report, ISSN 0847-4710.

➔ **785** 17 \$a British Columbia. Ministry of Government Management Services. \$t Annual report for the fiscal year ended ... \$x 0847-4281

➔ **785** 17 \$a British Columbia. Ministry of Tourism, Recreation, and Culture. \$t Annual report \$x 0843-8080

~~**785** 17 \$a British Columbia. Ministry of Tourism and Provincial Secretary. \$t Annual report \$x 0847-4710~~



# CAPTURING SEQUENTIAL RELATIONSHIP DATA BEYOND 780/785

## Legacy Data: Former titles

**Example: A hybrid record with both latest and successive entries (i.e., Previous title entities encoded in both 780 AND 247 fields)**

S/L = 1    BibLvl = s

245 04 \$a The Holston messenger.

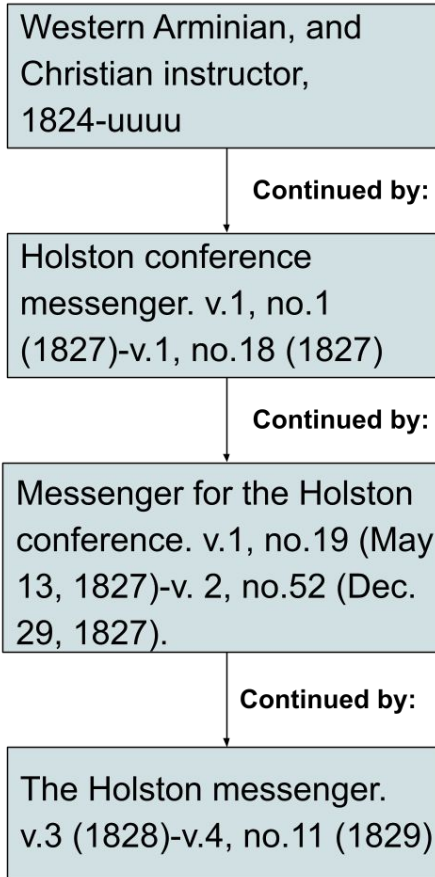
**247 00 \$a Holston conference messenger. #f Vol. 1, no. 1-no. 19? no**

**247 00 \$a Messenger for the Holston conference. #f Vol. 1, no. 20? - v.2,  
no. 47?**

260 00 \$a Knoxville, Tenn. : #b T. Springfield, #c 1827-29?

780 02 \$t Western Arminian, and Christian instructor.





## CAPTURING SEQUENTIAL RELATIONSHIP DATA BEYOND 780/785


### Legacy data: “Changed back to” A former *title* vs. a former *entity*

- ▶ BIBFRAME Specs mapped 785 08 (Changed back to) to *ContinuedBy*
  - ▶ We found some records *changed back to* multiple entities (former titles)
  - ▶ Recommendation:
    - ◆ Mapping includes *Continued in part by?*
- ▶ Legacy records with “Changed back to”: some converted into indicator 0 or 1 and some still using indicator 8
  - ▶ Fail to comply with the WEM-lock
  - ▶ Recommendation:
    - ◆ Stop using “Changed back to” for new descriptions

# Interoperability & context for next steps

The relationships we are able to extract programmatically from MARC are not necessarily the same as what we might hope to achieve with native BIBFRAME cataloguing

# Modelling choices and Interoperability: MARC2BF vs Sinopia







Related Work 

780 - PRECEDING ENTRY (R)	If no valid value in ind2 then W - precededBy
Indicators	
Second - Type of relationship	
0 - Continues	W - continues
1 - Continues in part	W - continuesInPart
2 - Supersedes	W - precededBy ★
3 - Supersedes in part	W - precededBy ★
4 - Formed by the union of ... and ...	W - mergerOf ★
5 - Absorbed	W - absorbed
6 - Absorbed in part	W - absorbed ★
7 - Separated from	W - separatedFrom

## Related Work (Serial)

Property: <http://id.loc.gov/ontologies/bflc/relationship>

Class: <http://id.loc.gov/ontologies/bflc/Relationship>

- + Add **Search related works**
- + Add **Relationship Designator**
- + Add **Absorbed (work):** 
- + Add **Continues (work):** 
- + Add **Continues in part (work):** 
- + Add **Merger of (work):** 
- + Add **Separated from (work):** 
- + Add **Continued by (work):** 
- + Add **Absorbed by (work):** 
- + Add **Continued in part by (work):** 
- + Add **Merged to form (work):** 
- + Add **Split into (work):** 
- + Add **Has supplement (work):**
- + Add **Supplement to (work):**
- + Add **Description of Related Work**

## NEXT STEPS

### **Define Specifications**

Work with Share-VDE developers to implement relationship assignments and define creation logic where 1-1 relationships aren't present

### **Iterative Improvements**

Review updated dataset, identifying new issues or areas requiring improvements; work with Share-VDE to implement improvements

### **Ontology Updates**

Advocate for ontology development for BIBFRAME along with updates to conversion specifications

### **Further Investigation**

Further analysis of the use of RDA Unconstrained properties along with BIBFRAME as needed

## THANK YOU!

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## CREDITS

- ▶ With many thanks to others working on this on the SEIWG!
- ▶ Presentation template by [SlidesCarnival](#)