

**Medieval manuscripts and their migrations:  
Using SPARQL to investigate the research potential of an aggregated Knowledge Graph**

**SPARQL Queries**

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## **INTRODUCTION**

This file contains the SPARQL queries presented and discussed in our article published in *Digital Medievalist* 2022. The query and step numbering follows that given in the article.

The queries can be run against the SPARQL endpoint for the Mapping Manuscript Migrations project: <http://ldf.fi/mmm/sparql>

The full dataset can also be downloaded from the Zenodo repository and installed in your own triple store: <https://zenodo.org/record/4440464>

When copying and pasting these SPARQL queries into a SPARQL client like [YASGUI](#), please check that the line numbering has been copied over correctly. Copying from a PDF file can sometimes break a single long line into multiple separate lines, which will cause a SPARQL validation error.

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# QUERY 1

http://ldf.fi/mmm/sparql



```
1 PREFIX ecrm: <http://erlangen-crm.org/current/>
2 PREFIX efrbroo: <http://erlangen-crm.org/efrbroo/>
3 PREFIX dct: <http://purl.org/dc/terms/>
4 PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
5 prefix gvp: <http://vocab.getty.edu/ontology#>
6 prefix mmmp: <http://ldf.fi/mmm/place/>
7 PREFIX mmms: <http://ldf.fi/mmm/schema/>
8
9 SELECT DISTINCT ?manuscript
10 (GROUP_CONCAT(DISTINCT ?production_place; separator="; ") as ?production_places) (GROUP_CONCAT(DISTINCT ?production_timespan ;
11 separator="; ") as ?production_timespans)
12 WHERE {
13   # Northern Italy: http://ldf.fi/mmm/place/tgn_4005363 Lombardy: http://vocab.getty.edu/tgn/7003237
14   VALUES ?place { mmmp:tgn_4005363 mmmp:tgn_7003237 }
15   ?manuscript ^ecrm:P108_has_produced/ecrm:P7_took_place_at/gvp:broaderPreferred* ?place ;
16     a efrbroo:F4_Manifestation_Singleton .
17
18   OPTIONAL {
19     ?production ecrm:P108_has_produced ?manuscript ;
20       ecrm:P7_took_place_at/skos:prefLabel ?production_place .
21   }
22   OPTIONAL {
23     ?production ecrm:P4_has_time-span/skos:prefLabel ?production_timespan .
24   }
25 } GROUP BY ?manuscript
26 ORDER BY ?manuscript
27
```

## QUERY 2, STEP 1

http://ldf.fi/mmm/sparql



```
1 PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
2 PREFIX efrbroo: <http://erlangen-crm.org/efrbroo/>
3 PREFIX frbroo: <http://iflstandards.info/ns/fr/frbr/frbroo/>
4 PREFIX ecrm: <http://erlangen-crm.org/current/>
5 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
6 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
7 PREFIX mmm: <http://ldf.fi/schema/mmm/>
8
9 SELECT ?manuscript ?manuscript_label ?expression ?expression_label ?production ?place_label WHERE {
10   VALUES ?place {<http://ldf.fi/mmm/place/tgn_7002784> <http://ldf.fi/mmm/place/tgn_7002848>
11   <http://ldf.fi/mmm/place/tgn_7002847> <http://ldf.fi/mmm/place/tgn_7007510> <http://ldf.fi/mmm/place/tgn_7010420>
12   <http://ldf.fi/mmm/place/tgn_1061958> <http://ldf.fi/mmm/place/tgn_7007090> <http://ldf.fi/mmm/place/tgn_7002822>}
13   ?manuscript a efrbroo:F4_Manifestation_Singleton ;
14   ecrm:P128_carries ?expression ;
15   skos:prefLabel ?manuscript_label .
16
17   ?expression skos:prefLabel ?expression_label ;
18   ecrm:P72_has_language <http://ldf.fi/mmm/language/sdbm_8> .
19
20   ?production ecrm:P108_has_produced ?manuscript ;
21   ecrm:P7_took_place_at ?place .
22
23   ?place skos:prefLabel ?place_label .
24 }
```

## QUERY 2, STEP 2

http://ldf.fi/mmm/sparql



```
1 PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
2 PREFIX efrbroo: <http://erlangen-crm.org/efrbroo/>
3 PREFIX frbroo: <http://iflastandards.info/ns/fr/frbr/frbroo/>
4 PREFIX ecrm: <http://erlangen-crm.org/current/>
5 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
6 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
7 PREFIX mms: <http://ldf.fi/schema/mmm/>
8
9 SELECT ?manuscript ?manuscript_label ?expression ?expression_label ?production ?place_label ?commissioner_label WHERE {
10
11   VALUES ?place {<http://ldf.fi/mmm/place/tgn_7002784> <http://ldf.fi/mmm/place/tgn_7002848>
<http://ldf.fi/mmm/place/tgn_7002847> <http://ldf.fi/mmm/place/tgn_7007510> <http://ldf.fi/mmm/place/tgn_7010420>
<http://ldf.fi/mmm/place/tgn_1061958> <http://ldf.fi/mmm/place/tgn_7007090> <http://ldf.fi/mmm/place/tgn_7002822>}
12   ?manuscript a efrbroo:F4_Manifestation_Singleton ;
13   ecrm:P128_carries ?expression ;
14   skos:prefLabel ?manuscript_label .
15
16   ?expression skos:prefLabel ?expression_label ;
17   ecrm:P72_has_language <http://ldf.fi/mmm/language/sdbm_8> .
18
19   ?production ecrm:P108_has_produced ?manuscript ;
20   ecrm:P7_took_place_at ?place ;
21   mms:carried_out_by_as_commissioner ?commissioner .
22
23   ?commissioner skos:prefLabel ?commissioner_label .
24
25   ?place skos:prefLabel ?place_label .
26 }
27
```

## QUERY 3, STEP 1

http://ldf.fi/mmm/sparql

```
1 PREFIX owl: <http://www.w3.org/2002/07/owl#>
2 PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
3 PREFIX ecrm: <http://erlangen-crm.org/current/>
4 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
5 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
6 PREFIX gvp: <http://vocab.getty.edu/ontology#>
7
8 SELECT ?event_uri ?event_type_label ?date ?place_uri ?place_label WHERE {
9   VALUES ?event_type_uri {ecrm:E10_Transfer_of_Custody}
10
11   ?place_uri gvp:broaderPreferred* <http://ldf.fi/mmm/place/tgn_1000070> .
12   ?place_uri skos:prefLabel ?place_label .
13
14   ?event_uri ecrm:P7_took_place_at ?place_uri .
15
16   ?event_uri a ?event_type_uri .
17   ?event_type_uri rdfs:label|skos:prefLabel ?event_type_label .
18   OPTIONAL { ?event_uri ecrm:P4_has_time-span/skos:prefLabel ?date }
19 }
```



## QUERY 3, STEP 2



http://ldf.fi/mmm/sparql



```
1 PREFIX efrbroo: <http://erlangen-crm.org/efrbroo/>
2 PREFIX frbroo: <http://iflastandards.info/ns/fr/frbr/frbroo/>
3 PREFIX owl: <http://www.w3.org/2002/07/owl#>
4 PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
5 PREFIX ecrm: <http://erlangen-crm.org/current/>
6 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
7 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
8 PREFIX gvp: <http://vocab.getty.edu/ontology#>
9 PREFIX mmms: <http://ldf.fi/schema/mmm/>
10
11 SELECT ?manuscript ?event_uri ?event_type_label ?date ?place_uri ?place_label WHERE {
12
13     ?place_uri gvp:broaderPreferred* <http://ldf.fi/mmm/place/tgn_1000070> .
14     ?place_uri gvp:placeTypePreferred ?place_type .
15     ?place_uri owl:sameAs ?place_getty_uri .
16     ?place_uri skos:prefLabel ?place_label .
17
18     ?event_uri ecrm:P7_took_place_at ?place_uri .
19     ?event_uri ecrm:P30_transferred_custody_of|mmms:observed_manuscript ?manuscript.
20     ?manuscript a efrbroo:F4_Manifestation_Singleton.
21
22     ?event_uri a ?event_type_uri .
23     ?event_type_uri rdfs:label|skos:prefLabel ?event_type_label .
24     OPTIONAL { ?event_uri ecrm:P4_has_time-span/skos:prefLabel ?date }
25 }
```

### QUERY 3, STEP 3

http://ldf.fi/mmm/sparql



```
1 PREFIX efrbroo: <http://erlangen-crm.org/efrbroo/>
2 PREFIX frbroo: <http://iflastandards.info/ns/fr/frbr/frbroo/>
3 PREFIX owl: <http://www.w3.org/2002/07/owl#>
4 PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
5 PREFIX ecrm: <http://erlangen-crm.org/current/>
6 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
7 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
8 PREFIX gvp: <http://vocab.getty.edu/ontology#>
9 PREFIX mms: <http://ldf.fi/schema/mmm/>
10
11
12 SELECT ?manuscript ?title ?event_uri ?event_type_label ?date_label ?begin ?year ?place_uri ?place_label WHERE {
13
14   ?place_uri gvp:broaderPreferred* <http://ldf.fi/mmm/place/tgn_1000070> .
15   ?place_uri gvp:placeTypePreferred ?place_type .
16   ?place_uri owl:sameAs ?place_getty_uri .
17   ?place_uri skos:prefLabel ?place_label .
18
19   ?event_uri ecrm:P7_took_place_at ?place_uri .
20   ?event_uri ecrm:P30_transferred_custody_of|mmms:observed_manuscript ?manuscript.
21   ?event_uri ?relation ?manuscript.
22   ?manuscript a efrbroo:F4_Manifestation_Singleton.
23
24   OPTIONAL {?manuscript mms:manuscript_work ?work .
25   ?work skos:prefLabel ?title.}
26
27   ?event_uri a ?event_type_uri .
28   ?event_type_uri rdfs:label|skos:prefLabel ?event_type_label .
29   ?event_uri ecrm:P4_has_time-span ?timespan .
30     ?timespan ecrm:P82a_begin_of_the_begin ?begin ;
31     skos:prefLabel ?date_label .
32   BIND ( YEAR (?begin) AS ?year)
33   FILTER ( ?year < 1700 && ?year > 1599 )
34 }
```



## QUERY 3, STEP 4

http://ldf.fi/mmm/sparql



```
1 PREFIX efrbroo: <http://erlangen-crm.org/efrbroo/>
2 PREFIX frbroo: <http://iflastandards.info/ns/fr/frbr/frbroo/>
3 PREFIX owl: <http://www.w3.org/2002/07/owl#>
4 PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
5 PREFIX ecrm: <http://erlangen-crm.org/current/>
6 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
7 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
8 PREFIX gvp: <http://vocab.getty.edu/ontology#>
9 PREFIX mms: <http://ldf.fi/schema/mmm/>
10
11
12 SELECT DISTINCT ?manuscript ?author_label ?title ?date_label ?begin ?year ?place_uri ?place_label WHERE {
13
14     ?place_uri gvp:broaderPreferred* <http://ldf.fi/mmm/place/tgn_1000070> .
15     ?place_uri gvp:placeTypePreferred ?place_type .
16     ?place_uri owl:sameAs ?place_getty_uri .
17     ?place_uri skos:prefLabel ?place_label .
18
19     ?event_uri ecrm:P7_took_place_at ?place_uri .
20     ?event_uri ecrm:P30_transferred_custody_of|mmms:observed_manuscript ?manuscript.
21     ?manuscript a efrbroo:F4_Manifestation_Singleton.
22
23     ?event_uri a ?event_type_uri .
24     ?event_type_uri rdfs:label|skos:prefLabel ?event_type_label .
25     ?event_uri ecrm:P4_has_time-span ?timespan .
26     ?timespan ecrm:P82a_begin_of_the_begin ?begin ;
27         skos:prefLabel ?date_label .
28 BIND ( YEAR (?begin) AS ?year)
29 FILTER ( ?year < 1700 && ?year > 1599 )
30
```



http://ldf.fi/mmm/sparql



```
31 ?manuscript mmm:manuscript_work ?work .
32 ?work skos:prefLabel ?title.
33 ?work_conception efrbroo:R16_initiated ?work;
34     mmm:carried_out_by_as_possible_author ?author.
35 ?author ecrm:P98i_was_born ?author_birth .
36 ?author_birth ecrm:P4_has_time-span ?author_birth_timespan .
37 ?author_birth_timespan ecrm:P82a_begin_of_the_begin ?author_birth_begin .
38 BIND ( YEAR (?author_birth_begin) AS ?y)
39 FILTER ( ?y < 1500 && ?y > 450 )
40
41 ?author ecrm:P100i_died_in ?author_death .
42 ?author_death ecrm:P4_has_time-span ?author_death_timespan .
43 ?author_death_timespan ecrm:P82b_end_of_the_end ?author_death_end .
44 BIND ( YEAR (?author_death_end) AS ?x)
45 FILTER ( ?x < 1550 && ?x > 500 )
46
47 ?author skos:prefLabel ?author_label .
48 }
49
50 GROUP BY ?manuscript ?author_label ?title ?date_label ?begin ?year ?place_uri ?place_label
--
```

## QUERY 4, STEP 1

http://ldf.fi/mmm/sparql



```
1 PREFIX ecrm: <http://erlangen-crm.org/current/>
2 PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
3 PREFIX efrbroo: <http://erlangen-crm.org/efrbroo/>
4 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
5 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
6 PREFIX mms: <http://ldf.fi/schema/mmm/>
7
8 SELECT
9   ?production_year_average
10  (?height_mm_average / ?width_mm_average AS ?ratio)
11
12 WHERE {
13   {
14     SELECT ?manuscript (AVG(?height_mm) AS ?height_mm_average) (AVG(?width_mm) AS ?width_mm_average) (AVG(?production_year) AS
15     ?production_year_average)
16     WHERE {
17       ?manuscript a efrbroo:F4_Manifestation_Singleton ;
```

```

17         mmms:height ?height ;
18         mmms:width ?width ;
19         mmms:manuscript_work ?work .
20
21     ?height ecrm:P90_has_value ?height_mm ;
22         ecrm:P91_has_unit mmms:Millimetre .
23     ?width ecrm:P90_has_value ?width_mm ;
24         ecrm:P91_has_unit mmms:Millimetre .
25     ?work skos:prefLabel ?work_label .
26     FILTER (CONTAINS (LCASE (?work_label), "missal") || CONTAINS (LCASE (?work_label), "gradual") || CONTAINS (LCASE (?
work_label), "breviar") || CONTAINS (LCASE (?work_label), "antiphon"))
27
28     ?production ecrm:P108_has_produced ?manuscript ;
29         ecrm:P4_has_time-span ?production_time_span .
30     ?production_time_span ecrm:P82a_begin_of_the_begin ?production_date .
31     BIND (YEAR(?production_date) AS ?production_year)
32 }
33 GROUP BY ?manuscript
34 }
35 }

```

## QUERY 4, STEP 2



http://ldf.fi/mmm/sparql

```
1 PREFIX ecrm: <http://erlangen-crm.org/current/>
2 PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
3 PREFIX efrbroo: <http://erlangen-crm.org/efrbroo/>
4 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
5 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
6 PREFIX mms: <http://ldf.fi/schema/mmm/>
7
8 # What is the ratio between height and width over time in a group of liturgical
9 manuscripts?
10
11 SELECT
12 ?production_year_average
13 (?height_mm_average / ?width_mm_average AS ?ratio)
14
```



```

15 ▾ WHERE {
16 ▾   {
17     SELECT ?manuscript (AVG(?height_mm) AS ?height_mm_average) (AVG(?width_mm) AS ?
width_mm_average) (AVG(?production_year) AS ?production_year_average)
18 ▾     WHERE {
19         ?manuscript a efrbroo:F4_Manifestation_Singleton ;
20             mmms:height ?height ;
21             mmms:width ?width ;
22             mmms:manuscript_work ?work .
23
24         ?height ecrm:P90_has_value ?height_mm ;
25             ecrm:P91_has_unit mmms:Millimetre .
26         ?width ecrm:P90_has_value ?width_mm ;
27             ecrm:P91_has_unit mmms:Millimetre .
28         ?work skos:prefLabel ?work_label .
29     FILTER (CONTAINS (LCASE (?work_label), "missal") || CONTAINS (LCASE (?work_label),
"gradual") || CONTAINS (LCASE (?work_label), "breviar") || CONTAINS (LCASE (?
work_label), "antiphon"))
30     FILTER (?height_mm > 39 && ?height_mm < 500)

```

```
31     FILTER (?width_mm > 39 && ?width_mm < 500)
32
33     ?production ecrm:P108_has_produced ?manuscript ;
34             ecrm:P4_has_time-span ?production_time_span .
35     ?production_time_span ecrm:P82a_begin_of_the_begin ?production_date .
36     BIND (YEAR(?production_date) AS ?production_year)
37     FILTER (?production_year >= 700)
38 }
39     GROUP BY ?manuscript
40 }
41     BIND (IF (?width_mm_average < ?height_mm_average, ?width_mm_average, ?
height_mm_average) AS ?smaller)
42     BIND (IF (?width_mm_average > ?height_mm_average, ?width_mm_average, ?
height_mm_average) AS ?larger)
43 }
44
45
46
```

## QUERY 4 - ALTERNATIVE VERSION

http://ldf.fi/mmm/sparql

```
1 PREFIX ecrm: <http://erlangen-crm.org/current/>
2 PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
3 PREFIX efrbroo: <http://erlangen-crm.org/efrbroo/>
4 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
5 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
6 PREFIX mms: <http://ldf.fi/schema/mmm/>
7
8 # What is the ratio between height and width over time in a group of liturgical
9 manuscripts?
10 SELECT
11 ?production_year_average
12 (?height_mm_average / ?width_mm_average AS ?missal_ratio)
13 (?b_height_mm_average / ?b_width_mm_average AS ?breviary_ratio)
14
15 WHERE {
16 {
```





```

17     SELECT ?manuscript (AVG(?height_mm) AS ?height_mm_average) (AVG(?width_mm) AS ?
width_mm_average) (AVG(?production_year) AS ?production_year_average)
18     WHERE {
19         ?manuscript a efrbroo:F4_Manifestation_Singleton ;
20             mmms:height ?height ;
21             mmms:width ?width ;
22             mmms:manuscript_work ?work .
23
24     ?height ecrm:P90_has_value ?height_mm ;
25             ecrm:P91_has_unit mmms:Millimetre .
26     ?width ecrm:P90_has_value ?width_mm ;
27             ecrm:P91_has_unit mmms:Millimetre .
28     ?work skos:prefLabel ?work_label .
29     FILTER (CONTAINS (LCASE (?work_label), "missal"))
30     FILTER (?height_mm > 39 && ?height_mm < 500)
31     FILTER (?width_mm > 39 && ?width_mm < 500)
32
33     ?production ecrm:P108_has_produced ?manuscript ;
34             ecrm:P4_has_time-span ?production_time_span .
35     ?production_time_span ecrm:P82a_begin_of_the_begin ?production_date .

```

```

36     BIND (YEAR(?production_date) AS ?production_year)
37     FILTER (?production_year >= 700)
38 }
39 GROUP BY ?manuscript
40 } UNION {
41     SELECT ?manuscript (AVG(?height_mm) AS ?b_height_mm_average) (AVG(?width_mm) AS
?b_width_mm_average) (AVG(?production_year) AS ?production_year_average)
42 WHERE {
43     ?manuscript a efrbroo:F4_Manifestation_Singleton ;
44                 mmms:height ?height ;
45                 mmms:width ?width ;
46                 mmms:manuscript_work ?work .
47
48     ?height ecrm:P90_has_value ?height_mm ;
49             ecrm:P91_has_unit mmms:Millimetre .
50     ?width ecrm:P90_has_value ?width_mm ;
51           ecrm:P91_has_unit mmms:Millimetre .
52     ?work skos:prefLabel ?work_label .
53     FILTER (CONTAINS (LCASE (?work_label), "breviar"))
54     FILTER (?height_mm > 39 && ?height_mm < 500)

```

```

55     FILTER (?width_mm > 39 && ?width_mm < 500)
56
57     ?production ecrm:P108_has_produced ?manuscript ;
58         ecrm:P4_has_time-span ?production_time_span .
59     ?production_time_span ecrm:P82a_begin_of_the_begin ?production_date .
60     BIND (YEAR(?production_date) AS ?production_year)
61     FILTER (?production_year >= 700)
62 }
63     GROUP BY ?manuscript
64 } UNION {
65     SELECT ?manuscript (AVG(?height_mm) AS ?h_height_mm_average) (AVG(?width_mm) AS
?h_width_mm_average) (AVG(?production_year) AS ?production_year_average)
66 WHERE {
67     ?manuscript a efrbroo:F4_Manifestation_Singleton ;
68         mmms:height ?height ;
69         mmms:width ?width ;
70         mmms:manuscript_work ?work .
71
72     ?height ecrm:P90_has_value ?height_mm ;
73         ecrm:P91_has_unit mmms:Millimetre .

```

```

74     ?width ecrm:P90_has_value ?width_mm ;
75         ecrm:P91_has_unit mmms:Millimetre .
76     ?work skos:prefLabel ?work_label .
77     # books of hours
78     FILTER (CONTAINS (LCASE (?work_label), "hours") || CONTAINS (LCASE (?work_label),
"horae") || CONTAINS (LCASE (?work_label), "heures") )
79     FILTER (?height_mm > 39 && ?height_mm < 500)
80     FILTER (?width_mm > 39 && ?width_mm < 500)
81
82     ?production ecrm:P108_has_produced ?manuscript ;
83         ecrm:P4_has_time-span ?production_time_span .
84     ?production_time_span ecrm:P82a_begin_of_the_begin ?production_date .
85     BIND (YEAR(?production_date) AS ?production_year)
86     FILTER (?production_year >= 700)
87 }
88     GROUP BY ?manuscript
89 }
90 }

```



12169 results in 19.108 seconds



## QUERY 5, STEP 1

http://ldf.fi/mmm/sparql



```
1 PREFIX http: <http://www.w3.org/2011/http#>
2 PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
3 PREFIX ecrm: <http://erlangen-crm.org/current/>
4 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
5 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
6 PREFIX efrbroo: <http://erlangen-crm.org/efrbroo/>
7 PREFIX mmmms: <http://ldf.fi/schema/mmm/>
8
9 SELECT ?manuscript ?manuscript_name (MIN(?timespan_datetime) AS ?earliest_date) (MAX(?timespan_datetime) AS ?last_date) (COUNT(*) AS ?
transfer_count) (DAY(?last_date - ?earliest_date) AS ?duration)
10 WHERE {
11   ?transfer
12     ecrm:P28_custody_surrendered_by | mmmms:carried_out_by_as_selling_agent <http://ldf.fi/mmm/actor/bibale_43130> ;
13     ecrm:P30_transferred_custody_of | mmmms:observed_manuscript ?manuscript .
14
15   ?manuscript a efrbroo:F4_Manifestation_Singleton ;
16   skos:prefLabel ?manuscript_name .
17
18   ?transfer ecrm:P4_has_time-span ?transfer_timespan.
19     ?transfer_timespan skos:prefLabel ?timespan_label ;
20     ecrm:P82a_begin_of_the_begin ?timespan_datetime .
21
22
23 } GROUP BY ?manuscript ?manuscript_name
24 HAVING (?transfer_count > 1)
25 ORDER BY ?duration
```

## QUERY 5, STEP 2

http://ldf.fi/mmm/sparql



```
1 PREFIX http: <http://www.w3.org/2011/http#>
2 PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
3 PREFIX ecrm: <http://erlangen-crm.org/current/>
4 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
5 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
6 PREFIX efrbroo: <http://erlangen-crm.org/efrbroo/>
7 PREFIX mmms: <http://ldf.fi/schema/mmm/>
8
9 SELECT (DAY(MAX(?timespan_datetime) - MIN(?timespan_datetime)) AS ?duration) (COUNT(*) AS ?transfer_count)
10 WHERE {
11   ?transfer
12     ecrm:P28_custody_surrendered_by | mmms:carried_out_by_as_selling_agent <http://ldf.fi/mmm/actor/bibale_30748> ; #quaritch
13     ecrm:P30_transferred_custody_of | mmms:observed_manuscript ?manuscript .
14
15   ?manuscript a efrbroo:F4_Manifestation_Singleton ; #excludes collections
16     skos:prefLabel ?manuscript_name .
17
18   ?transfer ecrm:P4_has_time-span ?transfer_timespan.
19     ?transfer_timespan skos:prefLabel ?timespan_label ;
20       ecrm:P82a_begin_of_the_begin ?timespan_datetime .
21
22 } GROUP BY ?manuscript_name
23 HAVING (?transfer_count > 1)
24 ORDER BY ?duration
```

## QUERY 5, STEP 3

http://ldf.fi/mmm/sparql



```
1 PREFIX http: <http://www.w3.org/2011/http#>
2 PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
3 PREFIX ecrm: <http://erlangen-crm.org/current/>
4 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
5 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
6 PREFIX efrbroo: <http://erlangen-crm.org/efrbroo/>
7 PREFIX mmms: <http://ldf.fi/schema/mmm/>
8
9 SELECT ?duration ?tregaskis_transfer_count ?quaritch_transfer_count
10 WHERE {
11   { SELECT (COUNT (?tregaskis_transfer) AS ?tregaskis_transfer_count) (DAY(MAX(?timespan_datetime) - MIN(?timespan_datetime)) AS ?
duration)
12     WHERE {
13       ?tregaskis_transfer
14         ecrm:P28_custody_surrendered_by | mmms:carried_out_by_as_selling_agent <http://ldf.fi/mmm/actor/bibale_43130> ; #tregaskis
15         ecrm:P30_transferred_custody_of | mmms:observed_manuscript ?manuscript .
16       ?manuscript a efrbroo:F4_Manifestation_Singleton ;
17         skos:prefLabel ?manuscript_name .
18
19       ?tregaskis_transfer ecrm:P4_has_time-span ?transfer_timespan.
20       ?transfer_timespan skos:prefLabel ?timespan_label ;
21         ecrm:P82a_begin_of_the_begin ?timespan_datetime .
22
23     } GROUP BY ?manuscript
24     HAVING (?tregaskis_transfer_count > 1)
25 }
```

## QUERY 5, STEP 4

http://ldf.fi/mmm/sparql



```
1 PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
2 PREFIX http: <http://www.w3.org/2011/http#>
3 PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
4 PREFIX ecrm: <http://erlangen-crm.org/current/>
5 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
6 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
7 PREFIX efrbroo: <http://erlangen-crm.org/efrbroo/>
8 PREFIX mms: <http://ldf.fi/schema/mmm/>
9
10 SELECT ?duration ?tregaskis_transfer_count ?quaritch_transfer_count #?manuscript
11 WHERE {
12   { SELECT (COUNT (?tregaskis_transfer) AS ?tregaskis_transfer_count) (DAY(MAX(?timespan_datetime) - MIN(?timespan_datetime)) AS ?
duration)
13     WHERE {
14       ?tregaskis_transfer
15         ecrm:P28_custody_surrendered_by | mms:carried_out_by_as_selling_agent <http://ldf.fi/mmm/actor/bibale_43130> ; #tregaskis
16         #ecrm:P28_custody_surrendered_by | mms:carried_out_by_as_selling_agent <http://ldf.fi/mmm/actor/bibale_30748> ; #quaritch
17
18         ecrm:P30_transferred_custody_of | mms:observed_manuscript ?manuscript .
19       ?manuscript a efrbroo:F4_Manifestation_Singleton ;
20       skos:prefLabel ?manuscript_name .
21
22       ?tregaskis_transfer ecrm:P4_has_time-span ?transfer_timespan.
23       ?transfer_timespan skos:prefLabel ?timespan_label ;
24         ecrm:P82a_begin_of_the_begin ?timespan_datetime .
25       FILTER (?timespan_datetime > "1900-12-31"^^xsd:date && ?timespan_datetime < "1921-01-01"^^xsd:date)
26
27     } GROUP BY ?manuscript
28     HAVING (?tregaskis_transfer_count > 1)
29   }
```



```

30 UNION
31 { SELECT (COUNT (?quaritch_transfer) AS ?quaritch_transfer_count) (DAY(MAX(?timespan_datetime) - MIN(?timespan_datetime)) AS ?
duration)
32 WHERE {
33     ?quaritch_transfer
34     #ecrm:P28_custody_surrendered_by | mmms:carried_out_by_as_selling_agent <http://ldf.fi/mmm/actor/bibale_43130> ; #tregaskis
35     ecrm:P28_custody_surrendered_by | mmms:carried_out_by_as_selling_agent <http://ldf.fi/mmm/actor/bibale_30748> ; #quaritch
36     ecrm:P30_transferred_custody_of | mmms:observed_manuscript ?manuscript .
37     ?manuscript a efrbroo:F4_Manifestation_Singleton ;
38     skos:prefLabel ?manuscript_name .
39
40     ?quaritch_transfer ecrm:P4_has_time-span ?transfer_timespan.
41     ?transfer_timespan skos:prefLabel ?timespan_label ;
42         ecrm:P82a_begin_of_the_begin ?timespan_datetime .
43     FILTER (?timespan_datetime > "1900-12-31"^^xsd:date && ?timespan_datetime < "1921-01-01"^^xsd:date)
44 } GROUP BY ?manuscript
45 HAVING (?quaritch_transfer_count > 1 )
46 }
47
48 }
49 ORDER BY ?duration

```

## QUERY 5, STEP 5

http://ldf.fi/mmm/sparql

```
1 PREFIX http: <http://www.w3.org/2011/http#>
2 PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
3 PREFIX ecrm: <http://erlangen-crm.org/current/>
4 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
5 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
6 PREFIX efrbroo: <http://erlangen-crm.org/efrbroo/>
7 PREFIX mmms: <http://ldf.fi/schema/mmm/>
8
9 SELECT (" " AS ?manuscript_name_sample) ?duration ?transfer_count ?seller (COUNT(?
manuscript_name) AS ?manuscript_count)
10 WHERE {
11 {
12 SELECT ?manuscript_name (DAY(MAX(?timespan_datetime) - MIN(?timespan_datetime)) AS ?
duration) (COUNT(*) AS ?transfer_count) ?seller
13 WHERE {
14 { ?transfer
15 ecrm:P28_custody_surrendered_by | mmms:carried_out_by_as_selling_agent
<http://ldf.fi/mmm/actor/bibale_43130> ; #tregaskis
16 ecrm:P30_transferred_custody_of | mmms:observed_manuscript ?manuscript .
17 BIND ("tregaskis" AS ?seller)
18 }
```



```

19 UNION
20 { ?transfer
21     ecrm:P28_custody_surrendered_by | mmms:carried_out_by_as_selling_agent
22     <http://ldf.fi/mmm/actor/bibale_30748> ; #quaritch
23     ecrm:P30_transferred_custody_of | mmms:observed_manuscript ?manuscript .
24     BIND ("quaritch" AS ?seller)
25 }
26
27 ?manuscript a efrbroo:F4_Manifestation_Singleton ;
28 skos:prefLabel ?manuscript_name .
29
30 ?transfer ecrm:P4_has_time-span ?transfer_timespan.
31     ?transfer_timespan skos:prefLabel ?timespan_label ;
32     ecrm:P82a_begin_of_the_begin ?timespan_datetime .
33 } GROUP BY ?seller ?manuscript_name
34 HAVING (?transfer_count > 1) (?duration > 0)
35 }
36 } GROUP BY ?seller ?duration ?transfer_count

```

## QUERY 6

http://ldf.fi/mmm/sparql



```
1 PREFIX owl: <http://www.w3.org/2002/07/owl#>
2 PREFIX ecrm: <http://erlangen-crm.org/current/>
3 PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
4 PREFIX efrbroo: <http://erlangen-crm.org/efrbroo/>
5 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
6 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
7 PREFIX mmm: <http://ldf.fi/schema/mmm/>
8 PREFIX gvp: <http://vocab.getty.edu/ontology#>
9 PREFIX wikibase: <http://wikiba.se/ontology#>
10 PREFIX bd: <http://www.bigdata.com/rdf#>
11
12 SELECT DISTINCT ?actor ?actor_name ?year ?identifier ?occupation ?occupation_label
13
14 WHERE {
15     ?place_uri gvp:broaderPreferred* <http://ldf.fi/mmm/place/tgn_7002445> . #England
16
17     ?actor_place ecrm:P11_had_participant ?actor ;
18                 ecrm:P7_took_place_at ?place_uri .
19     ?actor ecrm:P100i_died_in ?death_event ;
20           skos:prefLabel ?actor_name .
```

```
21
22 ?death_event ecrm:P4_has_time-span ?time_span .
23 ?time_span ecrm:P82a_begin_of_the_begin ?begin .
24 BIND (YEAR (?begin) AS ?year)
25 FILTER (?year < 1900 && ?year > 1800)
26
27 ?actor owl:sameAs ?identifier .
28 FILTER (CONTAINS (str (?identifier), "viaf"))
29
30 SERVICE <https://query.wikidata.org/sparql> {
31   ?subject <http://www.wikidata.org/prop/direct-normalized/P214> ?identifier ;
32     <http://www.wikidata.org/prop/direct/P106> ?occupation .
33   ?occupation rdfs:label ?occupation_label .
34   FILTER (lang(?occupation_label)="en")
35 }
36
37 }
```

## EVENTS BY CATEGORY



http://ldf.fi/mmm/sparql



```
1 PREFIX frbroo: <http://iflastandards.info/ns/fr/frbr/frbroo/>
2 PREFIX efrbroo: <http://erlangen-crm.org/efrbroo/>
3 PREFIX dct: <http://purl.org/dc/terms/>
4 PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
5 PREFIX mms: <http://ldf.fi/schema/mmm/>
6 PREFIX ecrm: <http://erlangen-crm.org/current/>
7 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
8 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
9
10 SELECT
11     ?decade
12     (COUNT(?event_prod) as ?production_events)
13     (COUNT(?event_trans) as ?manuscript_observations)
14     (COUNT(?other_event) as ?other_events)
15 WHERE {
16     {
17         #   VALUES ?actor_event_class { mms:ActorActivity ecrm:E66_Formation ecrm:E69_Death ecrm:E67_Birth ecrm:E68_Dissolution
18         ecrm:E63_Beginning_of_Existence ecrm:E64_End_of_Existence mms:PlaceNationality }
19
20         VALUES ?other_event_class { efrbroo:F27_Work_Conception efrbroo:F28_Expression_Creation ecrm:E7_Activity mms:ActorActivity
21         ecrm:E67_Birth ecrm:E69_Death
22         ecrm:E63_Beginning_of_Existence ecrm:E64_End_of_Existence ecrm:E66_Formation ecrm:E68_Dissolution
23         mms:PlaceNationality }
24         #   VALUES ?actor_class { ecrm:E21_Person ecrm:E74_Group ecrm:E39_Actor }
```

```

23     ?other_event a ?other_event_class .
24     ?other_event ecrm:P4_has_time-span ?e_timespan .
25 #     FILTER NOT EXISTS { ?actor_event ^ecrm:P92i_was_brought_into_existence_by/a ecrm:E78_Collection}
26 #     FILTER NOT EXISTS { ?actor_event ^ecrm:P93i_was_taken_out_of_existence_by/a ecrm:E78_Collection}
27 }
28 UNION
29 {
30     ?event_prod a ecrm:E12_Production .
31     ?event_prod ecrm:P4_has_time-span ?e_timespan .
32 }
33 UNION
34 {
35     VALUES ?t_class { mms:ManuscriptActivity ecrm:E10_Transfer_of_Custody }
36     ?event_trans a ?t_class ;
37         ecrm:P4_has_time-span ?e_timespan .
38 }
39 # {
40 #     VALUES ?intellectual_class { efrbroo:F27_Work_Conception efrbroo:F28_Expression_Creation }
41 #     ?event_int a ?intellectual_class .
42 #     ?event_int ecrm:P4_has_time-span ?e_timespan .
43 # }
44
45     ?e_timespan mms:decade ?decade .
46     FILTER(?decade >= 750)
47     FILTER(?decade <= 2010)
48 }
49 GROUP BY ?decade
50 ORDER BY ?decade

```