

Cultures of Knowledge : Prosopographical Data

Author: Tanya Gray Jones

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[Introduction](#)

[People](#)

[Prosopography data model](#)

[Points of discussion](#)

[Use of geonames](#)

[Basis for conceptual data model](#)

[Introduction of PROV-O](#)

[Textual source abbreviations](#)

[Event-based model, and uncertainty](#)

[Person-centred model](#)

[Categories for prosopographical events](#)

[Prosopography conceptual data model](#)

[People-centred data model](#)

[Qualified Relationships - Roles in Context and the use of PROV](#)

[Categories of prosopographical activity types](#)

[Definitions](#)

[Activity types](#)

[Basic Data](#)

[Birth](#)

[Death](#)

[Family Relationships](#)

[Ecclesiastic Activity](#)

[Baptism](#)

[Confession](#)

[Confirmation](#)

[Conversion](#)

[Deliver Sermon](#)

[Disqualified From Ecclesiastical Office](#)

[Establishment Of Institution](#)

[Excommunication](#)

[Holding An Ecclesiastical Office](#)

[Membership Of Ecclesiastical Body](#)

[Ordination](#)

[Vision](#)

Education

- [Administrative Activity](#)
- [Deliver Speech](#)
- [Disputation](#)
- [Establishment Of Institution](#)
- [Inclusion Class List](#)
- [Personal Testimony](#)
- [Promotion To Degree](#)
- [Study](#)
- [Teaching Activity](#)
- [University Matriculation](#)

Learned Activity

- [Creation Of Work Activity](#)
- [Dedication Activity](#)
- [Deliver Speech](#)
- [Establishment Of Institution](#)
- [Exchange Occasional Verse](#)
- [Holding Office In A Learned Organisation](#)
- [Membership Of A Learned Organisation](#)
- [PrintingActivity](#)
- [PublishingActivity](#)
- [Research](#)
- [Salon](#)

Location History

- [Displacement](#)
- [Emmigration](#)
- [Exile](#)
- [Habitation](#)
- [Immigration](#)
- [Imprisonment](#)
- [Relocation](#)
- [Residence](#)
- [Social Visit](#)
- [Travel](#)
- [Visit](#)

Hierarchical Relationship

- [Medical Treatment](#)
- [Patronage](#)
- [Reign](#)
- [Tenancy](#)

Political Activity

- [Deliver Speech](#)
- [Establishment Of Institution](#)

[Hold Political Office](#)
[Membership Of Political Group](#)
[Presided Over](#)
[Representative Assembly](#)

[Professional Activity](#)

[Apprenticeship](#)
[Deliver Speech](#)
[Disqualification From Office](#)
[Employment](#)
[Employment Legal Profession](#)
[Employment Medical Profession](#)
[Establishment Of Institution](#)
[Hold Office](#)
[Membership Professional Body](#)

[Social Contacts](#)

[Acquaintanceship](#)
[Collaboration](#)
[Contract](#)
[Controversy](#)
[Correspondence](#)
[Exchange Occasional Verse](#)
[First Contact](#)
[Friendship](#)
[Gift](#)
[Inclusion Album Amicorum](#)
[Introduction](#)
[Meeting](#)
[Social Contact](#)
[Social Visit](#)
[Trade](#)
[Travel](#)

[Social Status Change](#)

[Acquisition Of Citizenship](#)
[Banishment](#)
[Ennoblement](#)
[Gain Of Social Status](#)
[Loss Of Citizenship](#)
[Loss Of Social Status](#)
[Loss Of Title](#)

[Uncertainty type](#)

[Participant type](#)

[Date type](#)

[Prosopography semantic data model](#)

[Prosopography data capture](#)

[Prosopography spreadsheet](#)

[Prosopography database](#)

[pro_activity](#)

[pro_activity_relation](#)

[pro_assertion](#)

[pro_location](#)

[pro_primary_person](#)

[pro_relationship](#)

[pro_role_in_activity](#)

[pro_textual_source](#)

[Spreadsheet ingest tables](#)

[pro_people_check](#)

[pro_ingest_map_v2](#)

[pro_ingest_v8](#)

[pro_ingest_v8_toreview](#)

[Prosopography input form and record browser](#)

[Code and libraries](#)

[JQuery](#)

[Foundation 5](#)

[Select2](#)

[File location](#)

[Authentication](#)

[Functionality](#)

[Input form](#)

[Browse records](#)

[Web location](#)

[Input form](#)

[Browse records](#)

[Prosopography spreadsheet ingest](#)

[Prosopography RDF export](#)

[Requirements](#)

[URIs for people, organisations, locations and events](#)

[Representation of time](#)

[Representation using W3C Time ontology](#)

[Event - Instant - Before](#)

[Event - Instant - After](#)

[Event - Instant - At](#)

[Event - Instant - Duration](#)

[Event - Instant - Between](#)

[Provenance of assertions](#)

[Assertion](#)

[Provenance of an Assertion](#)

[Assertions in RDF](#)
[Provenance Statements in RDF](#)
 [Example provenance statement using PAV](#)
 [Example provenance statement using PAV \(event-based description\)](#)
[Associating the Provenance Statement with the Assertion](#)
 [Nanopublication to qualify assertions with provenance](#)
[Further Reading](#)
[Prosopography RDF representation](#)
 [RDF Representation \(without provenance\)](#)
 [RDF Export](#)
 [People](#)
 [Organisations](#)
 [Locations](#)
 [Documents](#)
 [Event](#)
 [Nanopublication assertions](#)
 [Nanopublication provenance](#)

Introduction

This document describes various technical aspects of an endeavour concerned with prosopographical data capture, part of the Cultures of the Knowledge project.

The project outputs include:

- a conceptual data model for prosopographical data
- a spreadsheet for the capture of data conforming to the prosopographical data model
- a semantic data model for prosopographical data, based on the conceptual data model
- a database and input form for the capture of data that conform to the semantic data model
- an ingest process for the ingest of spreadsheets into the prosopographical database
- a database containing records that have been uploaded using the ingest process
- an RDF representation of the data, based on the semantic data model
- an RDF export from the database
- this document

People

This section lists the people who were involved in the prosopographical data project.

Yvonne Aburrow, ex-Bodleian Libraries

Dr Robin Buning, Hartlib Fellow, Cultures of Knowledge, robin.buning@history.ox.ac.uk

Renhart Gittens, ex-Bodleian Libraries

Tanya Gray Jones, Data Engineer, Bodleian Libraries, tanya.gray@bodleian.ox.ac.uk

Professor Howard Hotson, Project Director, Cultures of Knowledge,
howard.hotson@history.ox.ac.uk

Neil Jefferies, R&D Project Manager, Bodleian Libraries, neil.jefferies@bodleian.ox.ac.uk

Dr Iva Lelková, Comenius Fellow, Cultures of Knowledge, lelkova.iva@gmail.com

Miranda Lewis, Digital Editor, Cultures of Knowledge, miranda.lewis@history.ox.ac.uk

Dr Vladimír Urbánek, Institute of World History, Charles University, Prague,
urbanek@lorien.site.cas.cz

Dr Elizabeth Williamson, Digital Project Manager, Cultures of Knowledge,
elizabeth.williamson@history.ox.ac.uk

Prosopography data model

One of the initial outputs of the project was a conceptual data model.

In August 2013, Dr James Brown, an earlier Digital Project Manager for the Cultures of Knowledge project, wrote to request that a new data model be devised, in preparation for the next phase of development:

As you might be aware, one of the major enhancements we are planning for our BDLSS union catalogue of early modern correspondence, Early Modern Letters Online (EMLO), is an improvement of its prosopographical toolset, i.e. its ability to digitally capture and represent a wide range of information on people and organisations. Some further details on our development plans can be found at http://www.culturesofknowledge.org/?page_id=88.

A necessary first step is the enhancement of our currently very basic data model for people and collective bodies. We held a digital prosopographies workshop at the end of last month (podcasts and slides now at http://www.culturesofknowledge.org/?page_id=187#2013-Workshop), attended by both Neil and Renhart (our lead developer), during which a range of approaches were canvassed. However, we now need to firm up our new model in earnest – in preparation for the programming of the new entities and relationships by Renhart starting in early September –

and in the interests of joined-up-ness across BDLSS projects Neil has suggested we all get together for a meeting to finalise our plans.

Further information and documentation – including our proposed update to our existing model – will be circulated in due course

Points of discussion

Use of geonames

In October 2013, Miranda Lewis wrote about the use of Geonames in EMLO:

... just wonder, ..., whether any of the other projects you've worked with have given thought to place name history (e.g. in our period, Holland was first the Spanish Netherlands, then the Republic of the United Netherlands from 1581-1795, then the Batavian Republic, etc.). It's something we'll be turning our attention to in the course of this phase, but for the moment we have chosen to use the modern day place name, with - in some instances where we have had time to insert it - the historical place name in brackets, or in the synonym box. And sometimes, as a temporary measure, we're jotting notes on the place history in a back end notes box.

Any thoughts re. standards or what other projects might be doing, etc. gratefully received.

and, also

We've elected to reference Geonames because it's open source and we've linked the EMLO place names throughout. Getty Names has a little freetext note on the history, but it's far from comprehensive.

Basis for conceptual data model

On 30 October 2013, Prof Howard Hotson shared documentation and mentioned the following in an email:

[Zip file containing email file attachments](#)

I also attach a more mature version of my **pilot prosopography of Alsted**, which now includes the first draft of an indication of how the data collected in this system should be presented to users.

Perhaps the largest subsequent task will be to **model all the other relationships** we need to capture. **Lizzy's spreadsheet provides one set of suggestions, Leigh Penman's document another.** Here too we should try to adopt standard solutions and build on the work of others. We should ask Stanford for the data model underlying Palladio. We should also request data models from the participants in the prosopographical workshop.

Introduction of PROV-O

In November 2013, Tanya Gray Jones introduced the W3C Provenance Ontology, PROV-O, and suggested its use to model events, to allow relationships to be described in context.

Textual source abbreviations

In November 2013, Prof Howard Hotson described the abbreviations of the sources that he had used for prosopographical work to date.

Here are abbreviations of the sources which I have used for prosopographical work to date. Many of them are pretty standard, but not all.

The most useful list of abbreviations in this field that I am aware of is the Abkürzungsverzeichnis of the Theologische Realenzyklopädie. I believe that there is an electronic edition, hopefully in the Bodleian. It's also at Google Books:

http://books.google.de/books/walterdegruyter?id=9o_D9FZ3WhoC&printsec=frontcover&dq=theologische%2Brealenzyklop%C3%A4die%2Babk%C3%BCrzungsverzeichnis#v=onepage&q=theologische%2Brealenzyklop%C3%A4die%2Babk%C3%BCrzungsverzeichnis&f=false

Yvonne Aburrow wrote:

Just had a look on SOLO – we have the print edition but I can't see an electronic one

[Theologische Realenzyklopädie : Abkürzungsverzeichnis](#)

and in reply, Prof Howard Hotson:

If at some point we wanted to adopt their conventions, I imagine that they would be keen to make their list available to us in electronic form. But 495 pages is a lot to swallow at this early stage. So let's start with the Hartlibian list and take things from there. Howard

Event-based model, and uncertainty

On 14th November 2013, Iva Leiková wrote:

Vladimír and I had a minute to look at
a) prosopographical template and
b) prof. Hotson's and Leigh's notes.

Here is a brief summary of our questions and notes above this material.

Ad b) Do we have an idea what should be done with these notes? Are these going to be polished in a Word document or formatted into the prosopographical template or both? Or are they going to be used only as a background for the prosopographical work in template? What is the general idea the prosopographical outcome should be? Will that be the template or Word document or both?

Ad a) Prosopographical template: The template seems to be built around an event as a main category as this should be prosopographical database shouldn't it be a person? What is the idea behind this decision?

I have added some of the events and roles to the template. However this seems to be an endless task! We should decide what should be the bottom line of a prosopographical entry (it is probably not a gift event). Which events do we want to really cover by every person if possible?

Some of the events are difficult to capture or assess (enmity, friendship, acquaintanceship) Where to put confession category by baptism?

How will the question of uncertainty be captured?

I have added Yvonne to this discussion, so she can get a feedback she asked for.

We can Skype about these issues.

With best wishes,
Iva.

Yvonne Aburrow's reply, on 14th November 2013:

The spreadsheet would allow us to capture the events in a person's life, so Sheet1 would be renamed Samuel Hartlib (for example) and then you would put all the events in Hartlib's life in

that sheet. You could also include events where he is not the main actor but which affected him, of course.

Thanks for the extra events and roles that you suggested.

- I would group experiment, observation and dissection together under something like “scientific activity” (you can specify the precise nature of the activity in the name column).
- I would group purchase and sale together as “financial transaction” (as if I sell something to you, it’s a sale from my perspective, but a purchase from your perspective).
- I would group “ordination”, “holy orders”, “conversion”, “fellowship”, and “vows” under “membership of organisation” (you can specify the precise nature of the membership in the name column).
- For “moving/stay” we have “habitation” which covers temporary and long-term periods of residence at a place.
- I don’t understand why you need “non-student” as a role in matriculation; or Brother-in-law, Father-in-law, Sister-in-law, Mother-in-law as roles in a Marriage?
- We have assumed “teacher” to include all such roles as tutor and preceptor
- Sailing would be travelling, and then you could if you wished specify the means of transport

Reply from Iva:

From: Iva Leiková [mailto:leikova.iva@gmail.com]

Sent: 14 November 2013 16:30

To: Yvonne Aburrow

Cc: Elizabeth Williamson; Howard Hotson; Miranda Lewis; Vladimír Urbánek

Subject: Re: Notes to the Prosopographical template and Word document (Leigh/Hotson)

Dear Yvonne,

perfect, that sounds good. I think that the name category would save us in many cases.

I would group experiment, observation and dissection together under something like “scientific activity” (you can specify the precise nature of the activity in the name column). OK

· I would group purchase and sale together as “financial transaction” (as if I sell something to you, it’s a sale from my perspective, but a purchase from your perspective).OK

· I would group “ordination”, “holy orders”, “conversion”, “fellowship”, and “vows” under “membership of organisation” (you can specify the precise nature of the membership in the name

column). Not sure here.

- For “moving/stay” we have “habitation” which covers temporary and long-term periods of residence at a place. OK

- I don’t understand why you need “non-student” as a role in matriculation; or Brother-in-law, Father-in-law, Sister-in-law, Mother-in-law as roles in a Marriage?

Vladimír pointed out that some people matriculated themselves but didn’t become students. They mostly did it to receive a protection from university.

To the family relationships I didn’t find a category to cover them all so I divided these relationship to relationships by blood (related to birth) and by law (related to marriage). However this is very artificial I have to admit and not quite smart. It would be much better to have a general category covering all family relationships.

- We have assumed “teacher” to include all such roles as tutor and preceptor. OK

- Sailing would be travelling, and then you could if you wished specify the means of transport OK

Thanks a lot Yvonne! I am sure we would find much more events and roles but I am not sure, if we really want that.

These were just a few that just came to our minds.

With best wishes,

Iva

Person-centred model

Howard wrote on 14th November 2013:

To:

Iva Lelková [lolkova.iva@gmail.com]; Elizabeth Williamson; Miranda Lewis; Yvonne Aburrow; Vladimír Urbánek [urbánek.vl@seznam.cz]; Renhart Gittens; Neil Jefferies; Tanya Gray

Attachments:

 Prosopographical schema 14~1.doc (35 KB)[Open as Web Page]

14 November 2013 19:36

Dear Iva, Yvonne and all

Thanks for giving these issues thought, and for your questions and suggestions.

(a) Data model. People are at the centre of the prosopographical data model. Each person is described as an absolute minimum of attributes (e.g. gender) and a series of events between the first (birth) and the last (death) events of their life. Each event has spatial and temporal locations (even though we cannot always specify these precisely); most have multiple roles and other defining attributes.

I agree with you: we cannot hope to model and to capture everything that happens in a person's life! That's why we need to focus on location history and relationships (both of them treated as events, theoretically if not always practically locatable in time and space): these are the two things that we want to be able to search for, map and animate. We also need to concentrate on those events central to the life of an early modern intellectual, and especially those which are well documented.

For this purpose, a single alphabetically organised list is unhelpful. Instead, we need to think (in the best Ramist fashion!) in a more structured way. I've tried to do so in the attached document, which brings together most of the suggestions contributed so far by you, Lizzy, Yvonne, Tanya, and Leigh. If something like this structure looks right, we then need to **(1)** elaborate some of the subcategories, **(2)** check it against other prosopographical models, and then **(3)** circulate it to other projects for comment.

(b) Existing prosopographical material. In order to visualise, map and animate location history and contacts, we will need to populate the system (initially via the spreadsheet) with the relevant data. Unfortunately, Leigh did not always construct his prosopographical entries as event streams (that is, date and place are sometimes lacking). **(1)** I would suggest that we begin by populating the spreadsheet with data from those entries include temporal and geographical data for most events. This will allow us to develop the data model and the spreadsheet without at the same time doing a great deal of fresh research. **(2)** Then we can move on to those entries for which spatial and/or geographical data is lacking. **(3)** Only once we are reasonably happy with the data model and spreadsheet will we begin inputting fresh research into it.

Categories for prosopographical events

On 15th November 2013, Prof Howard Hotson wrote:

I hope that the document I circulated last night helps show the way forward. We really need to be Ramist here, and to proceed from the general to the particular. Here is an **agenda for discussion**

(I) Agree on set of basic categories

(1) What are the basic kinds of information we want to capture. My answer is (a) relationships and (b) locations, with a absolute minimum of (c) other life events and (d) basic personal attributes. Is there anything that must be added to (c) and (d)?

(2) Location history requires no further modelling, so far as I can see. So the key task is to model relationships. I break this down into institutional relationships (i.e. with collectivities) and personal relationships (between individuals). Does that make sense? If so, then we need to determine how to break these down further.

(3) Institutional relationships should be broken down into the basic types of institutions: (a) ecclesiastical, (b) educational, (c) professional, (d) learned organisations (separate from educational but also from professional because they are voluntary and not remunerated?), (e) social, and also (f) political. Are there other kinds of institutions which do not fit under these headings? If not, then the next task is to break each of these down further.

(3.a) Ecclesiastical relationships can be distinguished between those which all members of the organisation experience (sacraments / rites of passage), those offices which only professionals undertake, and the meetings in which either or both groups congregate.

(3.b) Similarly, educational relationships can be divided into those which a large group of young people experience and the stages of a professional career.

(3.c) Ditto for learned organisations: ordinary memberships are distinct from offices.

(3.d-f) Can we impose a similar logic on professional, social and political institutions?

(II) Elaborate subcategories

Once the basic categories have been mapped out, then the basic subcategories need to be added. For instance, (3.a) what are the basic ecclesiastical offices in the major churches of Europe? (3.b) What are the best documented stages of a student's educational career? This is not a job for today's meeting: the meeting can only decide whether this is the right procedure, and (if it is) who needs to do this by what date.

Could I ask for Yvonne and/or Tanya to source a ready-made model for **family relationships** by blood and marriage?

The modelling of **institutional relationships** is a job for historians: if Lizzy could have a stab at this, I could then tidy things up.

Individual relationships are less structured. Here the meeting could consider whether anything important has been left out or could be structured differently.

The obvious next steps would then be **(III) to check our draft list against other prosopographical models** and then **(IV) to circulate it to other projects** for comment.

In December 2013 Iva Lelková and Robin Buning began inputting into the prosopography spreadsheet data about people from the complementary networks of Samuel Hartlib and John Amos Comenius that were collected by Leigh Penman and Howard Hotson at an earlier stage.

The data model at that stage for about 90% met the needs of Iva and Robin, which large degree of compatibility is explained by the fact that the data model was based on the pilot prosopography of the contemporary intellectual Johann Heinrich Alsted, who lived in roughly the same time, place and society.

The problems Iva and Robin encountered while inputting data primarily concerned particular roles that were lacking rather than the structure of the data model or the available categories, although some adjustments were made to these in order to make the data model design more intuitive for people that are not familiar with it. In the course of 2014 the data model was modified to meet the needs of Iva and Robin, which resulted in a new version (3) of the spreadsheet in December 2014. In January 2015 a new version (4) with some minor adjustments was created.

With regard to the roles that were lacking in the data model or were not optimal suited for the use in the context of Hartlib and Comenius, the challenge was to find the right medium between the sometimes very specific roles that Iva and Robin came upon and a certain level of generality, which is needed to keep the data model generally applicable as well as workable. Therefore, roles were not only added, but also merged and roles that were too specific were replaced by more general ones. E.g., the role *Rector* became *AdministratorOfInstitution*. And the roles *Barrister*, *Lawyer*, *Legal advocate*, and *Solicitor* were merged into *Lawyer*.

The majority of newly added roles concerns occupations (including more general roles such as *Colleague*, *Employer*, *Employee*) in the category *ProfessionalActivity*. Other categories that were significantly expanded were *SocialStatusChange* (especially with roles indicating social downfall), and *LocationHistory* (with activities such as *Exile* and *Imprisonment*). The roles in the category *FamilyRelationships* were modified least, although the number of distant cousins was considerably reduced (e.g., *3rd cousin 3 removed*). Finally, several roles were slightly renamed to make their meaning clearer.

A recurring point of discussion were overlapping roles or names of roles that were open for more than one interpretation, which caused confusion among Iva and Robin as to which role to choose. E.g., is someone who visits a city abroad a *Visitor* or a *Traveller*? And are *Resident* and *Inhabitant* interchangeable? The prosopography spreadsheet provided a glossary, but experience showed that they rarely consulted this. These issues could not solved by other means than using the glossary, but the question remains if in these cases intuitive choices actually matter for further processing of the data.

Although the chosen main categories and subcategories generally function well, some changes were made. The categories *FamilyRelationships* and *MajorLifeEvents* were merged into the new category *BasicData*, because family relationships were felt to belong to the basic information of someone's life and to have a natural connection to the other subcategories *Birth* and *Death*. The subcategory *Habitation* was removed from *BasicData* and became a category of its own named *LocationHistory*. The name of the category *PeerRelationships* was changed into *SocialContacts*.

Furthermore, several event and relationship types were arranged under more than one subcategory to make them easy to find. E.g., *SocialVisit* is now arranged under both *LocationHistory* and *SocialContacts*.

In June 2015 the spreadsheet underwent some cosmetic changes to prepare it for use in the crowd-sourcing of prosopographical data of the remaining people from the networks of Hartlib and Comenius. This means that the data model will also be opened for user testing.

Prosopography conceptual data model

Further to discussion, the conceptual data model was represented as a spreadsheet template, containing lists of activity types, together with their corresponding roles. The lists were grouped together into categories, as described below.

The most recent version (5) of the prosopographical spreadsheet is available in [Google Docs](#) and also Dropbox.

People-centred data model

To quote Prof Howard Hotson,

“People are at the centre of the prosopographical data model. Each person is described as an absolute minimum of attributes (e.g. gender) and a series of events between the first (birth) and the last (death) events of their life.”

Event-based data model

Also, to quote Prof Howard Hotson,

“Each event has spatial and temporal locations (even though we cannot always specify these precisely); most have multiple roles and other defining attributes.”

The data model facilitates the description of events in a person's life. The events provide context to relationships that the person had to other people, documents, groups, organisations as well as the events and their locations.

For an event, the event is described as being an instance of a type of activity, and the participants of the event optionally have a role associated with them, where the role is relevant to the type of activity. The event has a time and location associated with it.

It is proposed that the direct relationships that exists between the participants of the event can be reconstructed from the event-based description, using the role types.

The transformation of an event description to a simple relationship between event participants, is more easily understood if we jump ahead to the the semantic data model representation, that makes use of the W3C Provenance ontology, PROV-O (<http://www.w3.org/TR/prov-o/>).

Qualified Relationships - Roles in Context and the use of PROV

Introduction

This section describes a proposal for how to represent in RDF (http://en.wikipedia.org/wiki/Resource_Description_Framework), the relationships between objects, both as a simple statement and also as a more complex representation that allows contextual information to be associated with the relationship. Additionally, a method for transforming RDF between the two types of representation will be described.

Role in Context

A role is defined as a function assumed or part played by a person or thing in a particular situation. Given that a role is assumed in a particular context for a limited time, there is value in being able to describe the context of the role being assumed, e.g. type of context, location of the agent assuming the role, and duration of the activity in which the role is assumed.

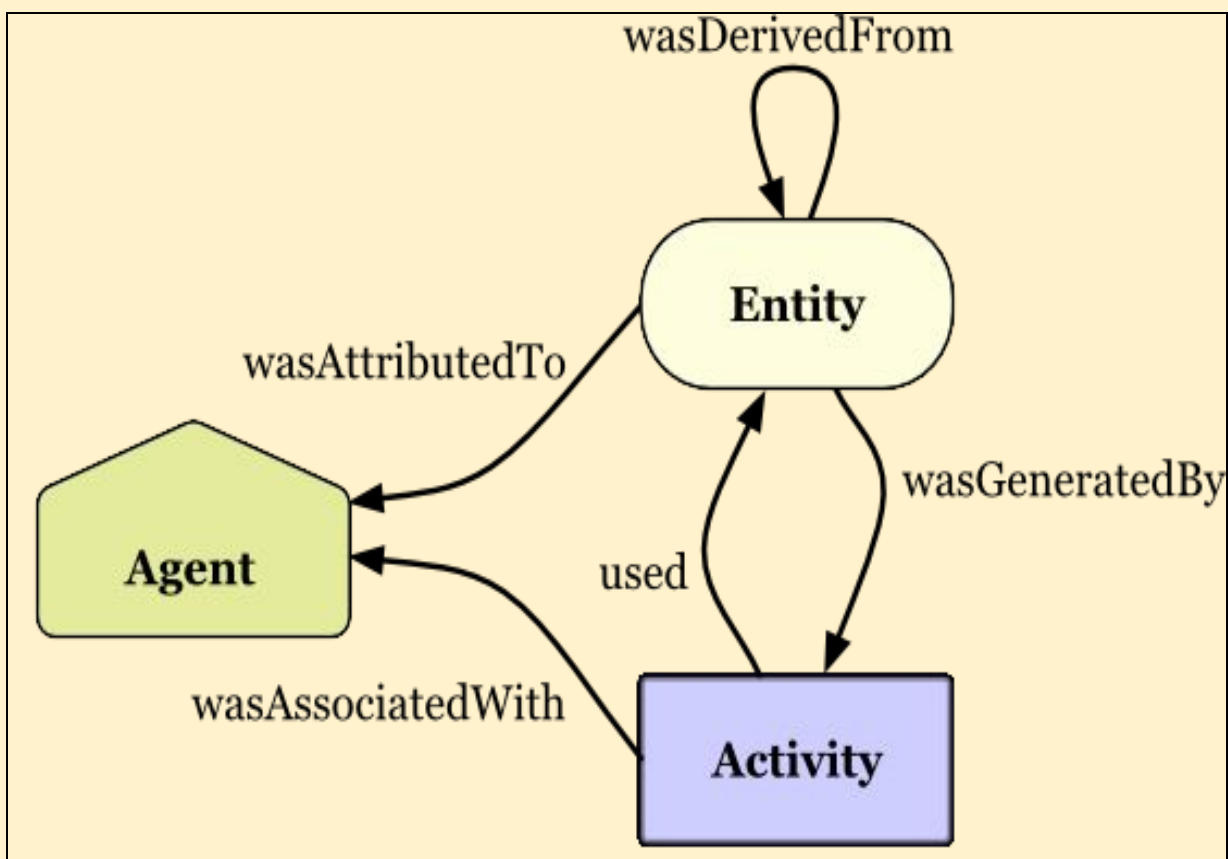
Simple Statement

A property such as “authorOf” allows a simple statement (http://www.proofwiki.org/wiki/Definition:Simple_Statement) about the relationship between the article and an agent to be represented in an RDF triple. In the RDF triple, the role is the property (or predicate) that links the subject and object. Besides the type of role that is held, this simple statement does not offer any information on the context of the relationship. For this, we need a more complex RDF representation as described in the next section.

< http://id.net/John Smith>	author	< http://id.net/journalArticle123 >
subject	predicate	object

Complex Representation - Putting a Role in Context

To describe a role in context we have decided to implement the W3C's PROV-O ontology (<http://www.w3.org/TR/prov-o/>) that became a W3C Recommendation in April 2013. The PROV-O ontology includes a core model that facilitates the description in RDF of the relationships between an entity, agent and activity. PROV-O also includes the property "hadRole" that allows us to describe the role of an agent or entity in a given activity.



Core model of PROV-O. Illustration source: <http://www.w3.org/TR/prov-o/>

RDF Representation

In developing the data model, we can take as a starting point a simple metadata property

describing a relationship, and then define a context using PROV-O, that will allow the relationship to be qualified in an RDF representation.

Simple Representation

Despite the value of being able to describe a relationship in context, there continues to be a requirement to be able to represent the relationship as a simple triple. A number of reasons are evident, including;

- data integration - many popular vocabularies define relationships as properties, and being able to represent metadata using these vocabularies would facilitate integration of data with third-party data
- data visualisation - requirement to present a simplified view of the underlying data

The simple RDF representation of the contribution context is shown below:

```
@prefix dcterms: <http://purl.org/dc/terms/> .
```

```
@prefix : <http://bodleian.ox.ac.uk/id/> .
```

```
:person dcterms:contributor :item .
```

Transformation to a Simple Representation with SPARQL Construct

To transform the complex RDF representation to this simple RDF statement, we use a SPARQL Construct query.

SPARQL is a query language for RDF that is a W3C recommendation (<http://www.w3.org/TR/rdf-sparql-query/>). [SPARQL Construct](#) allows RDF triples to be specified in a query using a graph template. The following SPARQL Construct query will transform the complex representation of the contribution context to a simple statement:

```
@prefix camelot: <http://vocab.ox.ac.uk/camelot#> .
```

```
@prefix dcterms: <http://purl.org/dc/terms/> .
```

```
@prefix : <http://bodleian.ox.ac.uk/id/> .
```

```
CONSTRUCT {
```

```
  ?person camelot:contributor ?item .
```

```
} WHERE {
```

```
  :contributionActivity a camelot:ContributionActivity;
```

```
    prov:wasAssociatedWith ?person;
```

```
    prov:qualifiedAssociation [
```

```
      a prov:Association; prov:agent ?person;
```

```
      prov:hadRole camelot:Contributor;
```

```
    ];
```

```
    prov:generated ?item ;
```

```
  .
```

```
}
```

SPARQL Construct query to transform a contextual description of the contributor role to a simple statement

Transformation to a Complex Representation with SPARQL Construct

Conversely, to construct a complex RDF representation from a simple statement we can define a SPARQL Construct query, e.g.

```
@prefix dcterms: <http://purl.org/dc/terms/> .
```

```
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .
```

```
@prefix prov: <http://www.w3.org/ns/prov#> .
```

```
@prefix camelot: <http://vocab.ox.ac.uk/camelot#> .
```

```
@prefix : <http://bodleian.ox.ac.uk/id/> .
```

```
CONSTRUCT {
```

```
  :contributionActivity a camelot:ContributionActivity;
```

```
    #prov:startedAtTime ""^^xsd:dateTime; no information available
```

```
    #prov:endedAtTime ""^^xsd:dateTime; no information available
```

```
    prov:wasAssociatedWith ?person;
```

```
    prov:qualifiedAssociation [ a prov:Association; prov:agent ?person;  
    prov:hadRole camelot:Contributor; ] ;
```

```
    prov:used ?item ;
```

```
    #prov:generated ; no information available
```

```
  .
```

```
} WHERE {
```

```
  ?person dcterms:contributor ?item .
```

```
}
```

Categories of prosopographical activity types

Prosopographical activity types were grouped into the following categories:

- Basic Data
- Ecclesiastic Activity
- Education
- Learned Activity
- Location History
- Hierarchical Relationship
- Political Activity
- Professional Activity
- Social Contacts
- Social Status Change

Definitions

The definitions for each of the activity types and role types are contained in the semantic data model representation: [owl file](#) and [auto-generated documentation](#)

Activity types

Basic Data

Birth

Born
Father
Mother

Death

CauseOfDeath
Deceased

Family Relationships

AdoptedDaughter
AdoptedSon
AdoptiveFather
AdoptiveMother
Ancestor
Aunt
BloodRelation
Brother
BrotherInLaw
Cousin
Daughter
Descendant
DistantCousin
FamilyRelation
Father
FatherInLaw
Fiancé
Fiancée
FirstCousin
FosterBrother
FosterDaughter
FosterFather
FosterMother
FosterSister
FosterSon
Granddaughter
Grandfather
Grandmother
Grandson
GreatAunt
GreatGrandfather

GreatGrandmother
GreatGreatGrandfather
GreatGreatGrandmother
GreatGreatUncle
GreatNephew
GreatNiece
GreatUncle
Guardian
HalfBrother
HalfSister
Husband
IllegitimateDaughter
IllegitimateSon
InLaw
Mother
MotherInLaw
Nephew
Niece
RelationByMarriage
SecondCousin
Sibling
Sister
SisterInLaw
Son
SonInLaw
Spouse
Stepdaughter
Stepfather
Stepmother
Stepson
ThirdCousin
Uncle
Ward
Wife

Ecclesiastic Activity

Baptism

BaptismalCandidate
Church
Godchild
Goddaughter
Godfather
Godmother
Godson
Officiant
Religion

Confession

ConfessionGiver
ConfessionRecipient

Confirmation

Bishop
ConfirmationCandidate

Conversion

Church
Convert

Deliver Sermon

Audience

Preacher

Disqualified From Ecclesiastical Office

EcclesiasticalOffice

EcclesiasticalGoverningOffice

MinisteringOffice

MonasticOffice

Establishment Of Institution

Founder

Excommunication

ExcommunicatedPerson

Holding An Ecclesiastical Office

EcclesiasticalOffice

EcclesiasticalGoverningOffice

MinisteringOffice

MonasticOffice

Membership Of Ecclesiastical Body

Chapter
Congregation
Council
EcclesiasticalOrganisation
Member
Synod

Ordination

OrdainedPerson

Vision

VisionaryPerson

Education

AdministrativeActivity
DeliverSpeech
Disputation
EstablishmentOfInstitution
InclusionClassList
PersonalTestimony
PromotionToDegree
Study
TeachingActivity
UniversityMatriculation

Administrative Activity

Administrator

Institution

Deliver Speech

Audience

Institution

Speaker

Disputation

AcademicInstitution

Praeses

Respondens

Establishment Of Institution

Inclusion Class List

Student

Personal Testimony

AcademicInstitution

Testifier

Promotion To Degree

AcademicInstitution
Degree
Graduate
Supervisor
University

Study

AcademicInstitution
Student
Teacher
Tutor

Teaching Activity

AcademicSubject
CollegeFellow
ConRector
Lecturer
Professor
Rector
Student
Teacher
TeachingInstitution
Tutor

University Matriculation

AcademicInstitution
Matriculant
NonStudent
Oath
Participant
Rector
Subject

Learned Activity

CreationOfWorkActivity
DedicationActivity
DeliverSpeech
EstablishmentOfInstitution
ExchangeOccasionalVerse
HoldingOfficeInALearnedOrgani sation
MembershipOfALearnedOrgani sation
PrintingActivity
PublishingActivity
Research
Salon

Creation Of Work Activity

Author
Contributor

Creator
Dedicatee
Editor
Translator

Dedication Activity

CreativeWork
Item
Dedicatee
Dedicator

Deliver Speech

Audience
Institution
Speaker

Establishment Of Institution

Founder

Exchange Occasional Verse

Author
Recipient

Holding Office In A Learned Organisation

OfficeLearnedOrganisation
President
Secretary
Treasurer

Membership Of A Learned Organisation

LearnedOrganisation
Member

PrintingActivity

Engraver
Illustrator
Printer

PublishingActivity

Publisher

Research

Collaborator
Funder
Patron
Researcher

Salon

Attendee
Saloniste

Location History

Displacement
Emmigration
Exile
Habitation

Immigration
Imprisonment
Relocation
Residence
SocialVisit
Travel
Visit

Displacement

Refugee

Emmigration

Emigrant

Exile

ExiledPerson

Habitation

Inhabitant

Immigration

Immigrant

Imprisonment

Prisoner

Relocation

Relocator

Residence

CoResident
Inhabitant
Resident

Social Visit

Guest
Host

Travel

TravelCompanion
Traveller

Visit

Visitor

Hierarchical Relationship

MedicalTreatment
Patronage
Reign
Tenancy

Medical Treatment

Patient
Physician

Patronage

Client
Patron

Reign

Courtier
Ruler

Tenancy

Landlord
Tenant

Political Activity

DeliverSpeech
EstablishmentOfInstitution
HoldPoliticalOffice
MembershipOfPoliticalGroup
PresidedOver
RepresentativeAssembly

Deliver Speech

Audience
Institution
Speaker

Establishment Of Institution

Founder

Hold Political Office

OfficeHolder

PoliticalEntityCity

PoliticalEntityEmpire

PoliticalEntityRegion

PoliticalEntityState

Membership Of Political Group

Member

PoliticalOrganisation

Presided Over

Presider

Representative Assembly

Participant

RepresentativeAssembly

Professional Activity

ProfessionalActivity

Apprenticeship

DeliverSpeech
DisqualificationFromOffice
Employment
EmploymentLegalProfession
EmploymentMedicalProfession
EstablishmentOfInstitution
HoldOffice
MembershipProfessionalBody

Apprenticeship

Apprentice
Master

Deliver Speech

Audience
Institution
Speaker

Disqualification From Office

DisqualifiedFromOffice

Employment

Actor
Alchemist
Ambassador
Anatomist
Antiquary

Architect
Archivist
Artisan
Assistant
Astrologer
Astronomer
Banker
Biographer
Bookseller
Botanist
Cartographer
Chemist
Classicist
Colleague
Counsellor
Diplomat
Dramatist
EducationalTheorist
Employee
Employer
Engineer
Engraver
Farmer
GovernmentOfficial
Historian
InstrumentMaker
Inventor
Keeper
LetterCarrier
Librarian
Linguist

Logician
Mathematician
Merchant
MilitaryOfficer
Musician
NaturalHistorian
NaturalPhilosopher
Orator
Profession
Painter
Philosopher
Poet
Politician
Printer
Publisher
Sailor
Scholar
Sculptor
Secretary
Soldier
Steward
Theologian
Writer
PoliticalEntityCity
PoliticalEntityEmpire
PoliticalEntityRegion
PoliticalEntityState

Employment Legal Profession

Judge

Lawyer

Employment Medical Profession

MedicalPractitioner
MedicalProfession
Physician

Establishment Of Institution

Founder

Hold Office

OfficeHolder

Membership Professional Body

Member
ProfessionalOrganisation

Social Contacts

Acquaintanceship
Collaboration
Contract
Controversy
Correspondence
ExchangeOccasionalVerse
FirstContact
Friendship
Gift
InclusionAlbumAmicorum

Introduction
Meeting
SocialContact
SocialVisit
Trade
Travel

Acquaintanceship

Acquaintance

Collaboration

Collaborator

Contract

Contractee
Signatory
Witness

Controversy

Participant

Correspondence

Correspondent
Intermediary

LetterAuthor
LetterRecipient
LetterSender

Exchange Occasional Verse

Author
Recipient

First Contact

Acquaintance

Friendship

Acquaintance

Gift

Giver
ObjectGiven
Recipient

Inclusion Album Amicorum

Inscriber
Inscription
Owner

Introduction

Instigator
Intermediary
LetterAuthor

Meeting

Participant

Social Contact

Acquaintance

Social Visit

Guest
Host

Trade

Buyer
Client
Factor
Merchant
ObjectPurchased
Seller
TradingCompany

Travel

TravelCompanion

Traveller

Social Status Change

AcquisitionOfCitizenship

Banishment

Ennoblement

GainOfSocialStatus

LossOfCitizenship

LossOfSocialStatus

LossOfTitle

Acquisition Of Citizenship

CitizenshipAcquirer

Banishment

BanishedPerson

Ennoblement

EnnobledPerson

Gain Of Social Status

EnrichedPerson

Loss Of Citizenship

CitizenshipLoser

Loss Of Social Status

BankruptedPerson

BeggaredPerson

PauperedPerson

SocialStatusLoser

Loss Of Title

TitleLoser

Uncertainty type

Three types of certainty were used to describe the level of uncertainty for an assertion about an event time or event location:

- Approximate
- Inferred
 - indicates that the assertion was based on an explicit assertion in a textual source
- Uncertain

Participant type

Four types of event participant were defined:

- Document
- Group
- Organisation
- Person

Date type

- Before
- After
- Duration
- Between

Prosopography semantic data model

The semantic data model was created using Protege version 4.3. The semantic data model was created for a number of reasons:

- a requirement to capture definitions for the entities described in the conceptual data model
- a proposal for documentation of the data model in a 'formal' language
- the intention to export an RDF representation of the prosopographical data

The data model imports two W3C ontologies:

- PROV-O - provenance ontology <http://www.w3.org/TR/prov-o/>, and
- ORG - core organisation ontology <http://www.w3.org/TR/vocab-org/>

Prosopography data capture

Prosopographical data was captured with the use of a spreadsheet template that conformed to the conceptual data model.

Prosopography spreadsheet

There are three versions of the spreadsheet, contained in the Prosopography_spreadsheets folder in Dropbox:

categorised-prosopography-template-VERSION4-2015-01.xlsx
 categorised-prosopography-template-VERSION3-2014-12.xlsx
 categorised-prosopography-template-VERSION2-2014-03-13.xlsx

The template was updated with the addition and removal of activity types and role types.

Version 4 of the template has been copied to Google Docs and is available at:

<https://drive.google.com/file/d/0B2BLwA9ch7-ULTRkYnInT0pBTVE/view?usp=sharing>

Robin and Iva used the spreadsheet template to capture prosopographical data, and saved the files in the Dropbox Prosopographical_spreadsheets folder.

Robin's spreadsheets (105 items)

Dropbox\Prosopography_spreadsheets\RB_working folder\Completed spreadsheets

Iva's spreadsheets (100 items)

\Dropbox\Prosopography_spreadsheets\IL_working folder\Complete prosopographical spreadsheets IVA141103

Prosopography database

In 2015 the prosopographical spreadsheets were ingested into the 'ouls' PostgreSQL relational database on the emlo-edit server.

The database can be accessed via a phppgadmin web interface at :

<https://emlo-edit.bodleian.ox.ac.uk/phppgadmin/>

The database contains data that was ingested from prosopographical excel spreadsheets. It also is the database that is behind the prosopography input form and browse interface described below.

The tables that contain the ingested data are:

- pro_activity
- pro_activity_relation
- pro_assertion
- pro_location
- pro_primary_person
- pro_relationship
- pro_role_in_activity
- pro_textual_source

Table information query

```
select column_name from INFORMATION_SCHEMA.COLUMNS where table_name = 'table name';
```

pro_activity

The pro_activity table records information about events that people are participants in.

column_name	
-------------	--

event_label	this value is used in the ingest process - it is the numerical identifier for the event in the prosopographical spreadsheet
change_user	personal name for the most recent modifier of the database record - equal to the creator of the assertion initially
change_timestamp	auto-generated timestamp for last modification of record in the database table
creation_user	personal name for the creator of the assertion
creation_timestamp	auto-generated timestamp for creation of record in the database table
additional_notes	Any comments about the event by the creator of the assertion
notes_used	the personal name of the person whose notes were used for reference
date_to_uncertainty	type of uncertainty for date value - controlled vocabulary - Approximate, Uncertain, Inferred
date_to_day	day (numerical)
date_to_month	month (numerical)
date_to_year	year (numerical)
date_from_uncertainty	type of uncertainty for date value - controlled vocabulary - Approximate, Uncertain, Inferred
date_from_day	day (numerical)
date_from_month	month (numerical)
date_from_year	year (numerical)
date_type	type of date - controlled vocabulary - After, Between, Duration, Before
activity_description	description of the activity
activity_name	label for the activity
activity_type_id	a textual identifier for the type of activity, and corresponds to activity types defined in the prosopographical data model
id	a unique numerical identifier

pro_activity_relation

In the spreadsheets, an event description can extend across more than one row of the spreadsheet. In the spreadsheet, the event has a numerical identifier and this is used to relate multiple rows and will identify rows as being descriptions of the same event.

This table is used to link together records in the database, that describe the same event.

column_name	
combined_spreadsheet_row	as part of the ingest process, the spreadsheet records are combined into a single csv file. Each record is assigned a unique identifier in this combined csv file. This field records the unique identifier
spreadsheet_row	This is the identifier for the event assigned in the individual spreadsheet
filename	This is the numerical filename of the excel spreadsheet (not including the file suffix) - after having been renamed as part of the ingest process
meta_activity_id	This field is not used in the spreadsheets. It is supported in the input form, and allows related events to be linked together.
id	a unique identifier for the database record

pro_assertion

The pro_assertion table captures provenance information about an assertion. It records information about an assertion (an identifier), and the textual source that provides evidence for the assertion.

column_name	
change_timestamp	auto-generated timestamp for last modification of record in the database table
source_description	A note describing the textual source in the spreadsheet event description
source_id	unique identifier for a textual source described in the pro_textual_source data table
assertion_id	unique identifier for an assertion - for an activity assertion - this id is equal to

	the unique identifier for an event pro_activity.id in the pro_activity data table
assertion_type	The type of assertion that is being made - controlled vocab - single value of 'activity' at the moment
id	a unique identifier for the database record

pro_location

The pro_location table captures information about the location of an event. It relates an activity to a location defined in the cofk_union_location data table.

column_name	
activity_id	equal to pro_activity.id - unique identifier for event in pro_activity data table
change_timestamp	auto-generated timestamp for last modification of record in the database table
location_id	identifier for location in cofk_union_location data table - equal to cofk_union_location.location_id
id	a unique identifier for the database record

pro_primary_person

The pro_primary_person data table records the primary person in the event description as recorded in the spreadsheet. The reason for recording the primary person, is that the spreadsheet and input form have been designed with this person-centred model in mind, that is, the descriptions are about a selected person's participation in events, along with additional participants and their respective roles.

column_name	
activity_id	equal to pro_activity.id - unique identifier for event in pro_activity data table
change_timestamp	auto-generated timestamp for last modification of record in the database table
person_id	A unique identifier for a person in the cofk_union_person data table - equal to cofk_union_person.iperson_id
id	a unique identifier for the database record

pro_relationship

The pro_relationship data table records direct relationships between people, groups, organisations, and documents. It is envisioned that this is necessary when direct relationships are required. It is possible that these relationships could be derived from the event descriptions. This data table is empty at present.

The relationship takes the form of subject - relationship - object, corresponding to a three-part RDF relationship, i.e. subject - predicate - object.

column_name	
activity_id	equal to pro_activity.id - unique identifier for event in pro_activity data table
change_timestamp	auto-generated timestamp for last modification of record in the database table
object_role_id	textual identifier for role as defined in the semantic data model
object_type	type of participant in relationship - controlled vocabulary - Person, Group, Organisation, Document
object_id	identifier for participant in relationship e.g. document, person, group, organisation
relationship_id	textual identifier for relationship type as defined in the semantic data model
subject_role_id	textual identifier for role as defined in the semantic data model
subject_type	type of participant in relationship - controlled vocabulary - person, group, organisation, document
subject_id	identifier for participant in relationship e.g. Person, Group, Organisation, Document
id	a unique identifier for the database record

pro_role_in_activity

The pro_role_in_activity data table records the role that a participant has in an event, with identifiers for the event, participant and type of participant.

column_name	
-------------	--

activity_id	equal to pro_activity.id - unique identifier for event in pro_activity data table
change_timestamp	auto-generated timestamp for last modification of record in the database table
role_id	textual identifier for role as defined in the semantic data model
entity_id	unique identifier for participant in relationship e.g. document, person, group, organisation
entity_type	type of participant in relationship - controlled vocabulary - Person, Group, Organisation, Document
id	a unique identifier for the database record

pro_textual_source

The pro_textual_source data table records the textual sources that were referenced in the spreadsheets.

column_name	
change_timestamp	auto-generated timestamp for last modification of record in the database table
change_user	the username of the person who most recently modified the record in the data table - set to NULL if no modifications
creation_timestamp	auto-generated timestamp for creation of record in the database table
creation_user	the username of the person who created the record in the data table - set to NULL
repository	
reprintFacsimile	
edition	
fullBibliographicDetails	
abbreviation	
urlResource	
datePublication	
placePublication	

editor	
pageNumber	
issueNumber	
volumeSeriesNumber	
chapterArticleTitle	
title	
author	
id	a unique identifier for the database record

Spreadsheet ingest tables

The following tables were used during the ingest process:

- pro_people_check
- pro_ingest_map_v2
- pro_ingest_v8
- pro_ingest_v8_toreview

pro_people_check

This table was used during the ingest process to check people identifiers that appeared to be missing or incorrect.

column_name	
iperson_id	
person_name	

pro_ingest_map_v2

The ingested spreadsheets conformed to version 2 of the spreadsheet. This data table contained mappings between types of activity category, activity and role in version 2 of the data model as expressed in the spreadsheet, and their mapping to version 4 of the data model.

column_name	
p_role	role type
p_event_type	event type
p_event_category	event category
s_role	role type
s_event_type	event type
s_event_category	event category
mapping	
relationship	

pro_ingest_v8

The pro_ingest_v8 data table held the records that were uploaded from a csv file containing the combined contents of the spreadsheets to be ingested.

column_name	
combined_csv_row_id	identifier for row in combined csv file
spreadsheet_row_id	identifier for event in original spreadsheet
filename	filename for spreadsheet during ingest process (removing suffix)
add_notes	additional notes
noted_used	name of person whose notes were used
editor	creator of the row in the spreadsheet
ts_detail	textual source description
ts_abbrev	textual source identifier
location_type	location type
location_country	location country name
location_region	location region name

location_city	location city name
location_detail	location description
location_i	location identifier - from cofk_union_location data table
date_type	date type
dt_uncertainty	uncertainty type of date to
dt_day	date to day
dt_month	date to month
dt_year	date to year
df_uncertainty	uncertainty type of date from
df_day	date from day
df_month	date from month
df_year	date from year
sp_role	secondary participant role
sp_type	secondary participant type e.g. person, group, organisation, document
sp_name	secondary participant name
sp_i	secondary participant identifier
pp_role	primary person role
pp_name	primary person name
pp_i	primary person identifier
event_name	event description
event_type	event type
event_category	event category

pro_ingest_v8_toreview

Records that needed to be checked during the ingest process were transferred to this table for review/update.

column_name
combined_csv_row_id
spreadsheet_row_id
filename
add_notes
noted_used
editor
ts_detail
ts_abbrev
location_type
location_country
location_region
location_city
location_detail
location_i
date_type
dt_uncertainty
dt_day
dt_month
dt_year
df_uncertainty
df_day
df_month
df_year
sp_role

sp_type
sp_name
sp_i
pp_role
pp_name
pp_i
event_name
event_type
event_category

Prosopography input form and record browser

The prosopography input form has been designed to allow the capture of prosopographical data that conform to the prosopographical data model. A browse function allows prosopographical events to be viewed in summary, and in detail.

Code and libraries

The files are written in php, and make use of the following libraries:

jQuery

<https://jquery.com/>

jquery-1.11.1.min.js

jquery-ui-1.10.4.js

Foundation 5

<http://foundation.zurb.com/>

front-end framework

Select2

<https://select2.github.io/>

jQuery replacement for select boxes

File location

The files are located on the emlo-edit server at /srv/data/aeolus2/interface/proform

Authentication

A user needs to be authenticated, using the standard EMLO edit authentication method, to access the input form and browse function

Functionality

Input form

The input form allows the creation of new records to capture of prosopographical data as well as the modification to existing records, including those ingested from the excel spreadsheets described above.

The input form is people-centred, in a similar fashion to the prosopographical spreadsheet. Activity types and role types conform to those defined in the prosopographical semantic data model.

Browse records

Additionally, there is a browser function. By default this displays all records in the database, with filters to restrict the records displayed.

Web location

The input form and browse function can be accessed via the following page:

<https://emlo-edit.bodleian.ox.ac.uk/interface/proform/>

They can also be accessed via the “Edit person or organisation” page in the EMLO Edit union catalogue editing interface, e.g.

https://emlo-edit.bodleian.ox.ac.uk/interface/union.php?class_name=person&method_name=on_e_person_search_results&iperson_id=903978

Input form

https://emlo-edit.bodleian.ox.ac.uk/interface/proform/activity_add.php

Browse records

https://emlo-edit.bodleian.ox.ac.uk/interface/proform/activity_view.php

Prosopography spreadsheet ingest

The following files were ingested into the 'ouls' PostgreSQL relational database on the emlo-edit server:

Robin's spreadsheets (105 items)

Dropbox\Prosopography_spreadsheets\RB_working folder\Completed spreadsheets

Iva's spreadsheets (100 items)

\Dropbox\Prosopography_spreadsheets\IL_working folder\Complete prosopographical spreadsheets IVA141103

The records in the database are the result of a single ingest process in December 2014.

The spreadsheet files and scripts that were used in the ingest are available in the following zip file:

<https://drive.google.com/file/d/0B2BLwA9ch7-Ua3hMSFIRaU5hQW8/view?usp=sharing>

There was a significant amount of 'data munging' required and it was not possible to devise a programmatic pipeline. The process used has been documented at:

https://docs.google.com/document/d/1nmYOAxZ6gAk1Jx0NDRuXv7j9_KTDdobFwpJ3GgZ_f5o/edit?usp=sharing

Prosopography RDF Representation

It was proposed that an RDF representation of the data imported into the prosopography database, be generated.

Requirements

URIs for people, organisations, locations and events

There is a requirement to use URIs in the RDF dataset. URIs for people, organisations, and locations that resolve to HTML exist in EMLO. The pattern for people is

<http://emlo.bodleian.ox.ac.uk/profile/person/uuid>

The uuid is generated from the person_id field, as present in the cofk_union_person data table.

Matt Wilcoxson suggested querying solr using the person_id (possibly prefixed by "cofk_union_person") to get the uuid, but this approach was not tested.

Instead, URIs were generated using EMLO ids together with new URI prefixes. The idea is that a service can resolve the URIs to the HTML/RDF as required.

The new URI prefixes are as follows:

prefix e-person: <<http://emlo.ox.ac.uk/id/person/>>
prefix e-event: <<http://emlo.ox.ac.uk/id/event/>>
prefix e-loc: <<http://emlo.ox.ac.uk/id/location/>>
prefix e-doc: <<http://emlo.ox.ac.uk/id/document/>>
prefix e-prov: <<http://emlo.ox.ac.uk/id/provenance/>>

Representation of time

The PROV data model that is used to represent events in RDF, does not support the use of incomplete dates, e.g. when only the year or the month is known. This is because the PROV property prov:atTime has a range of xsd:dateTime.

As an alternative the W3C Time ontology was identified as a candidate vocabulary to represent time (<http://www.w3.org/TR/owl-time/>).

Two properties need to be considered when representing the temporal properties of an event:

- Time Uncertainty
 - approximate
 - inferred
 - uncertain
- Date type
 - before
 - after
 - duration
 - between

Representation using W3C Time ontology

Event - Instant - Before

e-event:matriculationZimmermannPeter

```

a pros:UniversityMatriculation;
a time:TemporalEntity;
time:before [
a time:Instant;
time:inDateTime
    [
    a time:DateTimeDescription;
    time:year 1621;
    c-time:hasUncertainty "Inferred|Approximate|Uncertain";
    ]
]
.

```

Event - Instant - After

```

e-event:matriculationZimmermannPeter
a pros:UniversityMatriculation;
a time:TemporalEntity;

time:after [
a time:Instant;
time:inDateTime
    [
    a time:DateTimeDescription;
    time:year 1621;
    c-time:hasUncertainty "Inferred|Approximate|Uncertain";
    ]
]
.

```

Event - Instant - At

```

e-event:matriculationZimmermannPeter
a pros:UniversityMatriculation;
a time:Instant;
time:inDateTime
    [
    a time:DateTimeDescription;
    time:year 1621;
    c-time:hasUncertainty "Inferred|Approximate|Uncertain";
    ]
.

```

Event - Instant - Duration

```
e-event:matriculationZimmermannPeter
  a pros:UniversityMatriculation;
  a time:ProperInterval;
  c-time:Duration; # date type

  time:hasBeginning
    [
      a time:Instant;
      time:inDateTime
        [
          a time:DateTimeDescription;
          time:year 1621;
          c-time:hasUncertainty "Inferred";
        ] ;
    ];

  time:hasEnd
    [
      a time:Instant;
      time:inDateTime
        [
          a time:DateTimeDescription;
          time:year 1623;
          c-time:hasUncertainty "Approximate";
        ] ;
    ];

  time:hasDurationDescription
    [
      a time:DurationDescription ;
      time:years ;
      time: months ;
    ]
  .
```

Event - Instant - Between

```
e-event:matriculationZimmermannPeter
  a pros:UniversityMatriculation;
  a time:Interval;
```

```

c-time:Between; # date type

time:before [
  a time:Instant;
  time:inDateTime
  [
    a time:DateTimeDescription;
    time:year 1624;
    c-time:hasUncertainty "Inferred|Approximate|Uncertain";
  ]
];
time:after [
  a time:Instant;
  time:inDateTime
  [
    a time:DateTimeDescription;
    time:year 1621;
    c-time:hasUncertainty "Inferred|Approximate|Uncertain";
  ]
]

.

time:hasDurationDescription
[
  a time:DurationDescription ;
  time:years 5;
  time: months 2;
]

.

```

Provenance of assertions

There is a requirement to be able to qualify assertions with provenance, including information on the creator of an assertion and textual sources that provide evidence for an assertion.

Assertion

An assertion is defined as:

a confident and forceful statement of fact or belief

(source: <http://www.oxforddictionaries.com/definition/english/assertion>)

An example of an assertion would be the following:

On 12th December [1901](#), [Guglielmo Marconi](#) received the first transatlantic [radio](#) signal, from [Poldhu Wireless Station](#) in [Cornwall](#), England, to [Signal Hill](#) in [St. John's](#), [Newfoundland](#).

(source: http://en.wikipedia.org/wiki/December_12)

Provenance of an Assertion

The provenance of an assertion might include the following types of information:

- who authored the assertion and when
- who curated the assertion and when
- the agent that created the assertion in a digital form and when
- who contributed towards the assertion and when the contribution was made
- if the assertion was imported or retrieved
- if the assertion is a revision of an earlier assertion
- if the assertion was made as a result of consulting a specific source
- if the assertion is derived from an earlier assertion

Assertions in RDF

An assertion in RDF could be represented in a simple form or in an event-based representation using PROV-O.

The following RDF is a representation of the assertion:

On 12th December [1901](#), [Guglielmo Marconi](#) received the first transatlantic [radio](#) signal, from [Poldhu Wireless Station](#) in [Cornwall](#), England, to [Signal Hill](#) in [St. John's](#), [Newfoundland](#).

```
:equipment
  a sio:SIO_000926 ;
  rdfs:label "kite-supported antenna" ;
  .
```

```

:radioSignal a camelot:RadioSignal .

### describe activity

:researchActivity a camelot:ResearchActivity;

    prov:startedAtTime "1901-12-12T01:48:36Z"^^xsd:dateTime;
    prov:endedAtTime "1901-12-12T02:12:36Z"^^xsd:dateTime;
    prov:wasAssociatedWith <http://dbpedia.org/page/Guglielmo_Marconi>;
    prov:qualifiedAssociation [
        a prov:Attribution;
        prov:agent <http://dbpedia.org/page/Guglielmo_Marconi>;
        prov:hadRole camelot:Researcher;
        prov:hadlocation [
            a prov:Location;
            vcard:url <http://live.dbpedia.org/resource/Poldhu>;
            rdfs:label "Poldhu Wireless Station";
        ];
    ] ;

    prov:used :equipment ;
    prov:generated :radioSignal;

.

```

Provenance Statements in RDF

The PAV (Provenance, Authoring and Versioning) ontology

(<http://www.jbiomedsem.com/content/4/1/37>) allows the provenance of an assertion to be described.

Example provenance statement using PAV

An example of a provenance statement expressed using PAV for an assertion in RDF (simple representation) :

```
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .
@prefix owl: <http://www.w3.org/2002/07/owl#> .
@prefix prov: <http://www.w3.org/ns/prov#> .
@prefix camelot: <http://vocab.ox.ac.uk/camelot#> .
@prefix pav: <http://purl.org/pav/> .
@prefix vcard: <http://www.w3.org/2006/vcard/ns#> .
@prefix dct: <http://purl.org/dc/terms/> .
@prefix : <http://bodleian.ox.ac.uk/id#> .
```

:provenance

```
    pav:version "1.1";
    pav:previousVersion :assertionVersion1;
    dct:rightsHolder :universityOxford ;
    pav:authoredBy :agent ;
    pav:authoredOn "2008-09-09"^^xsd:date ;
    pav:curatedBy :agent1 ;
    pav:curatedOn "2009-09-09"^^xsd:date ;
    pav:createdBy :agent2 ;
    pav:createdOn "2009-09-09"^^xsd:date ;
```

```
pav:createdWith :mediawiki ;  
pav:contributedBy :agent3 ;  
pav:contributedOn "2009-09-09"^xsd:date ;  
pav:retrievedFrom <http://en.wikipedia.org>;  
pav:retrievedBy :agent;  
pav:importedFrom <http://www.google.com> ;  
pav:importedBy :agent1;  
pav:importedOn "2009-09-09"^xsd:date ;  
pav:sourcedAccessedAt <http://en.wikipedia.org> ;  
pav:sourceAccessedBy :agent ;  
pav:sourceAccessedOn "2009-09-09"^xsd:date ;  
pav:sourceLastAccessedOn "2011-09-09"^xsd:date ;  
.
```

Example provenance statement using PAV (event-based description)

An example of a provenance statement for an assertion in RDF (event representation) :

```
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .  
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .  
@prefix owl: <http://www.w3.org/2002/07/owl#> .  
@prefix prov: <http://www.w3.org/ns/prov#> .  
@prefix camelot: <http://vocab.ox.ac.uk/camelot#> .  
@prefix pav: <http://purl.org/pav/> .  
@prefix vcard: <http://www.w3.org/2006/vcard/ns#> .
```

@prefix dct: <http://purl.org/dc/terms/> .

@prefix pro: <http://purl.org/spar/pro/> .

@prefix : <http://bodleian.ox.ac.uk/id#> .

:provenance

pav:version "1.1";

pav:previousVersion :assertionVersion1;

dct:rightsHolder :universityOxford ;

prov:generatedBy :creationActivity;

prov:generatedBy :contributionActivity;

prov:generatedBy :authoringActivity;

.

:creationActivity

a prov:Activity, camelot:CreationActivity ;

prov:wasAssociatedWith :agent ;

prov:qualifiedAssociation [a prov:Attribution; prov:agent :agent;
prov:hadRole camelot:Creator;] ;

prov:atTime "2009-09-09"^xsd:date ;

prov:generated :assertion ;

.

:contributionActivity

a prov:Activity, camelot:ContributionActivity;

prov:wasAssociatedWith :agent ;

prov:qualifiedAssociation [a prov:Attribution; prov:agent :agent;
prov:hadRole pro:contributor;] ;

```

    prov:atTime "2009-09-09"^xsd:date ;

    prov:generated :assertion ;

.

:authoringActivity
    a prov:Activity, camelot:AuthoringActivity;

    prov:wasAssociatedWith :agent ;

    prov:qualifiedAssociation [ a prov:Attribution; prov:agent :agent;
prov:hadRole pro:author; ] ;

    prov:atTime "2009-09-09"^xsd:date ;

    prov:generated :assertion ;

.

```

Associating the Provenance Statement with the Assertion

To associate an assertion with a provenance statement, named graphs can be used (https://en.wikipedia.org/wiki/Named_graph). A named graph is a set of RDF statements that is identified by a URI.

The following example illustrates how to associate a provenance statement with an assertion in RDF using named graphs:

```

@prefix camelot: <http://vocab.ox.ac.uk/camelot#> .

# assertion named graph
:assertion {
    # assertion as described above
}

```

```
# provenance named graph

:provenance {
    # provenance statement as described above
}

:assertion camelot:hasProvenance :provenance . # association between
assertion and provenance statement
```

Nanopublication to qualify assertions with provenance

An alternative to the above representation to associate an assertion with a provenance statement would be to represent the association in terms of a nanopublication, as described at <http://www.nanopub.org>. The corresponding RDF would look like:

```
@prefix : <http://www.example.org/mynanopub/>.
@prefix ex: <http://www.example.org/>.
@prefix np: <http://www.nanopub.org/nschema#>.
@prefix dct: <http://purl.org/dc/terms/>.
@prefix go: <http://purl.obolibrary.org/obo/>.
@prefix up: <http://purl.uniprot.org/core/> .
@prefix pav: <http://swan.mindinformatics.org/ontologies/1.2/pav/>
```

@prefix xsd: <http://www.w3.org/2001/XMLSchema#>.

{

:nanopub1

np:hasAssertion :G1;

np:hasProvenance :G2;

np:hasSupporting :G3 .

:G1 a np:Assertion.

:G2 a np:Provenance.

:G3 a np:Supporting.

}

:G1 {

assertion

}

:G2 {

:nanopub1 pav:versionNumber "1.1"

:nanopub1 pav:previousVersion "1.0".

:nanopub1 dct:created "2009-09-03"^^xsd:date.

:nanopub1 dct:creator ex:JohnSmith.

:nanopub1 dct:rightsHolder ex:SomeOrganization.

}

```
:G3 {  
  # supporting information  
}
```

Further Reading

1. "The anatomy of a nanopublication"
<http://iospress.metapress.com/content/ftkh21q50t521wm2/>
2. Named Graphs, Provenance and Trust
<http://www.conference.org/2005a/cdrom/docs/p613.pdf>
3. How can we identify a useful sub-set of RDF triples within a triple store?
<http://patterns.dataincubator.org/book/named-graphs.html>
4. Managing RDF using named graphs
<http://blog.ldodds.com/2009/11/05/managing-rdf-using-named-graphs/>
5. Overview of Named Graphs
<http://wifo5-03.informatik.uni-mannheim.de/bizer/pub/Bizer-NamedGraphs-ProvXG.pdf>

Prosopography RDF representation

RDF Representation (without provenance)

An example RDF representation of an event description is provided below. The event description has not been qualified with provenance, e.g. textual source for the assertions. This will be addressed in the next section.

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
```

```
PREFIX owl: <http://www.w3.org/2002/07/owl#>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>

prefix time: <http://www.w3.org/2006/time#>
prefix dcterms: <http://purl.org/dc/terms/>
prefix vcard: <http://www.w3.org/2006/vcard/ns#>
prefix geo: <http://www.w3.org/2003/01/geo/wgs84\_pos#>
prefix skos: <http://www.w3.org/2004/02/skos/core#>
prefix org: <http://www.w3.org/ns/org#>
prefix prov: <http://www.w3.org/ns/prov#>
prefix np: <http://www.nanopub.org/nschema#>

prefix e-person: <http://emlo.ox.ac.uk/id/person/>
prefix e-event: <http://emlo.ox.ac.uk/id/event/>
prefix e-loc: <http://emlo.ox.ac.uk/id/location/>
prefix e-doc: <http://emlo.ox.ac.uk/id/document/>
prefix e-prov: <http://emlo.ox.ac.uk/id/provenance/>

prefix id: <http://www.vocab.ox.ac.uk/camelot/identifierTypes#>
prefix pros: <http://www.vocab.ox.ac.uk/camelot/Prosopography#>
```

people and organisations

```
e-person:ZimmermannPeter
    a prov:Person ;
    dcterms:identifier 30826^^id:EmloIPersonId ;
    dcterms:identifier "person_id"^^id:EmloPersonId ;
    vcard:fn "Peter Zimmermann";
```

.

```
e-person:UniversityFrankfurtOder
    a prov:Organization, org:Organization ;
    dcterms:identifier 907165^^id:EmloIPersonId ;
    dcterms:identifier "person_id"^^id:EmloPersonId
    skos:prefLabel "University of Frankfurt Oder";
```

.

locations

```
e-loc:FrankfurtOder
    a prov:Location;
    dcterms:identifier 300093^^id:EmloLocationId;
```



```

    skos:prefLabel "";
    geo:lat "";
    geo:long "";
.

### describe activity
e-event:matriculationZimmermannPeter
  a pros:UniversityMatriculation;
  prov:atLocation e-loc:FrankfurtOder ;

  a time:Instant;
  time:inDateTime [
    a time:DateTimeDescription;
    time:year 1621;
  ]
  prov:wasAssociatedWith e-person:ZimmermannPeter;

  prov:qualifiedAssociation [
    a prov:Association;
    prov:person e-person:ZimmermannPeter;
    prov:hadRole pros:Student;
  ] ;

  prov:wasAssociatedWith e-person:UniversityFrankfurtOder;
.

```

RDF Representation (with provenance)

The following RDF is an example of the RDF representation of an event, with the provenance of the assertions represented using the PAV vocabulary and the nanopublication construct. This representation requires the use of identifiers for assertions, and the use of N-Quads.

```

PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX owl: <http://www.w3.org/2002/07/owl#>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
prefix time: <http://www.w3.org/2006/time#>
prefix dcterms: <http://purl.org/dc/terms/>
prefix vcard: <http://www.w3.org/2006/vcard/ns#>

```

```
prefix prov: <http://www.w3.org/ns/prov#>
prefix np: <http://www.nanopub.org/nschema#>

prefix e-person: <http://emlo.ox.ac.uk/id/person/>
prefix e-event: <http://emlo.ox.ac.uk/id/event/>
prefix e-loc: <http://emlo.ox.ac.uk/id/location/>
prefix e-doc: <http://emlo.ox.ac.uk/id/document/>
prefix e-prov: <http://emlo.ox.ac.uk/id/provenance/>

prefix id: <http://www.vocab.ox.ac.uk/camelot/identifierTypes#>
prefix work: <http://www.vocab.ox.ac.uk/camelot/CreativeWork#>
prefix pros: <http://www.vocab.ox.ac.uk/camelot/Prosopography#>
prefix life: <http://www.vocab.ox.ac.uk/camelot/PersonalLife#>
```

people and organisations

```
e-person:ZimmermannPeter
  a prov:Person ;
  dcterms:identifier 30826^^id:EmloId ;
  dcterms:identifier "person_id"^^id:EmloPersonId
.
```

```
e-person:UniversityFrankfurtOder
  a prov:Organization ;
  dcterms:identifier 907165^^id:EmloId ;
  dcterms:identifier "person_id"^^id:EmloPersonId
.
```

locations

```
e-loc:FrankfurtOder
  a prov:Location;
  dcterms:identifier 300093^^id:EmloLocationId
.
```

describe activity

```
e-prov:head {
  e-prov:nanopub1 a np:NanoPublication .
}
```

```

    e-prov:nanopub1 np:hasAssertion e-prov:assertion1 .
    e-prov:nanopub1 np:hasProvenance e-prov:provenance1 .
    e-prov:nanopub1 np:hasPublicationInfo e-prov::pubInfo1 .

}

e-prov:assertion1 {
e-event:matriculationZimmermannPeter
  a pros:UniversityMatriculation;
  prov:atLocation e-loc:FrankfurtOder ;

  a time:Instant;
  time:inDateTime [
    a time:DateTimeDescription;
    time:year 1621;
  ]
  prov:wasAssociatedWith e-person:ZimmermannPeter;
  prov:qualifiedAssociation [
    a prov:Association;
    prov:person e-person:ZimmermannPeter;
    prov:hadRole pros:Student;
  ] ;

  prov:wasAssociatedWith e-person:UniversityFrankfurtOder;
.
}

e-prov:provenance1 {
  e-prov:assertion1 prov:generatedAtTime
"2012-02-03T14:38:00Z"^^xsd:dateTime .

  e-prov:assertion1 prov:wasDerivedFrom e-prov:source1 .
  e-prov:assertion1 prov:qualifiedDerivation [
    a prov:Derivation;
    prov:entity e-prov:source1;
    rdfs:comment "source detail";
  ]

  e-prov:source1
  [

```

```

        a prov:Entity, work:CreativeWork;
        dcterms:title "Matr.Frankfurt";
    ]
    .

    e-prov:assertion1 prov:wasAttributedTo
    [
        a prov:Person;
        vcard:fn "Iva Lelková";
        vcard:hasName
            [
                a vcard:Name;
                vcard:family-name "Lelková";
                vcard:given-name "Iva";
            ]
    ] .
}

e-prov:pubInfo1 {
    e-prov:assertion1 prov:wasAttributedTo .
    e-prov:assertion1 prov:generatedAtTime
"2014-10-26T12:45:00Z"^^xsd:dateTime .
}

```

RDF Export

There is some work outstanding for the RDF export but I understand that this can be completed during phase III of the project.

The intention was for the RDF export from the database to be in the form of multiple files, each concerned with a different aspect of the event representation:

- participants
 - people
 - organisations
 - groups
 - documents

- locations
- event descriptions (without provenance) including associated to participants
- nanopublication provenance
- nanopublication assertions - description of an event as above, but with an identifier associated with the event and its assertions

People

RDF

```
e-person:EmloIPersonId
  a prov:Person ;
  dcterms:identifier 30826^^id:EmloIPersonId ;
  dcterms:identifier "person_id"^^id:EmloPersonId ;
  vcard:fn "Peter Zimmermann";
.
```

SQL Query

```
SELECT a.iperson_id as iperson_emlo_id, a.foaf_name, a.person_id FROM
cofk_union_person a,
(
SELECT DISTINCT CAST(entity_id AS INTEGER) as iperson_emlo_id from
pro_role_in_activity where entity_type = 'Person'
UNION
SELECT DISTINCT CAST(person_id AS INTEGER) as iperson_emlo_id from
pro_primary_person
) b

WHERE CAST(b.iperson_emlo_id AS INTEGER) = a.iperson_id
ORDER BY iperson_emlo_id
```

saved results as csv file to people.csv

<https://drive.google.com/file/d/0B2BLwA9ch7-UeHo5SkhMVGZVnc/view?usp=sharing>

Organisations

RDF

```
e-person:EmloOrgId
  a prov:Organization, org:Organization ;
  dcterms:identifier 30826^^id:EmloIPersonId ;
  dcterms:identifier "org_id"^^id:EmloPersonId ;
  skos:prefLabel "Organisation name";
  foaf:name "Organisation name";
  vcard:fn "Organisation name";
.
```

SQL Query

```
SELECT a.iperson_id as iperson_emlo_id, a.foaf_name, a.person_id FROM
cofk_union_person a,
(
SELECT DISTINCT CAST(entity_id AS INTEGER) as iperson_emlo_id from
pro_role_in_activity where entity_type = 'Organisation'
) b
WHERE CAST(b.iperson_emlo_id AS INTEGER) = a.iperson_id
ORDER BY iperson_emlo_id
```

saved results as csv file to organisations.csv

<https://drive.google.com/file/d/0B2BLwA9ch7-URGFSUmN0Mm9mbk0/view?usp=sharing>

Locations

RDF

```
e-loc:FrankfurtOder
  a prov:Location;
  dcterms:identifier 300093^^id:EmloLocationId;
  skos:prefLabel "";
```

```
geo:lat "";  
geo:long "";
```

SQL Query

```
Select distinct cast(a.location_id as integer), b.location_name, b.latitude,  
b.longitude  
from pro_location a, cofk_union_location b  
where cast(a.location_id as integer) = cast(b.location_id as integer)  
order by location_id
```

saved results as csv file to locations.csv

<https://drive.google.com/file/d/0B2BLwA9ch7-UcUs4d2hWLXExVIE/view?usp=sharing>

Documents

RDF

```
e-doc:EmloDocId  
  a prov:Entity ;  
  dcterms:identifier 30826^^id:EmloDocId ;  
  skos:prefLabel "" ;  
.
```

Event

RDF

```
e-event:matriculationZimmermannPeter  
  a pros:UniversityMatriculation;
```

```

    a time:Instant;
    time:inDateTime [
        a time:DateTimeDescription;
        time:year 1621;
    ]
.

### EVENT ASSOCIATED WITH ENTITY
e-event:matriculationZimmermannPeter prov:wasAssociatedWith
e-person:ZimmermannPeter .

### QUALIFIED ASSOCIATION
e-event:matriculationZimmermannPeter prov:qualifiedAssociation [
    a prov:Association;
    prov:person e-person:ZimmermannPeter;
    prov:hadRole pros:Student;
] ;

e-event:matriculationZimmermannPeter prov:wasAssociatedWith
e-person:UniversityFrankfurtOder;

### LOCATION INFORMATION
e-event:matriculationZimmermannPeter prov:atLocation e-loc:FrankfurtOder ;

```

Nanopublication assertions

RDF

```

### describe activity

e-prov:assertion1 {
e-event:matriculationZimmermannPeter
    a pros:UniversityMatriculation;
    prov:atLocation e-loc:FrankfurtOder ;

    a time:Instant;
    time:inDateTime [

```



```

        a time:DateTimeDescription;
        time:year 1621;
    ]
    prov:wasAssociatedWith e-person:ZimmermannPeter;
    prov:qualifiedAssociation [
        a prov:Association;
        prov:person e-person:ZimmermannPeter;
        prov:hadRole pros:Student;
    ] ;

    prov:wasAssociatedWith e-person:UniversityFrankfurtOder;
.
}

```

Nanopublication provenance

RDF

```

### describe activity
e-prov:head {
    e-prov:nanopub1 a np:NanoPublication .
    e-prov:nanopub1 np:hasAssertion e-prov:assertion1 .
    e-prov:nanopub1 np:hasProvenance e-prov:provenance1 .
}

e-prov:provenance1 {
    e-prov:assertion1 prov:generatedAtTime
"2012-02-03T14:38:00Z"^^xsd:dateTime .

    e-prov:assertion1 prov:wasDerivedFrom e-prov:source1 .
    e-prov:assertion1 prov:qualifiedDerivation [
        a prov:Derivation;
        prov:entity e-prov:source1;
    ]
}

```

```

        rdfs:comment "source detail";
    ]

    e-prov:sourcel
    [
        a prov:Entity, work:CreativeWork;
        dcterms:title "Matr.Frankfurt";
    ]
    .

    e-prov:assertion1 prov:wasAttributedTo
    [
        a prov:Person;
        vcard:fn "Iva Lelková";
        vcard:hasName
        [
            a vcard:Name;
            vcard:family-name "Lelková";
            vcard:given-name "Iva";
        ]
    ] .
}

```