Book of the Dead Project:
A new approach to Digital Editions of Ancient Manuscripts
using CIDOC-CRM, FRBRoo and RDFa

Dr. Barry Norton,
Development Manager, ResearchSpace*

* Funded by the Andrew W. Mellon Foundation
* Hosted by the Collections Directorate, British Museum
The Egyptian Book of the Dead is a funerary text:
- consists of a number of codified spells;
- often illustrated by a stereotypical set of vignettes;
- represented on papyri and linens buried with the dead;
- developed by a number of geographically diverse traditions/schools.
Everyone’s Favourite Source...

For other uses, see Book of the Dead (disambiguation).

There was no single or canonical Book of the Dead. The surviving “papyri” contain a varying selection of religious and magical texts and vary considerably in their “illustrations.” Some people seem to have commissioned their own copies of the Book of the Dead, perhaps choosing the spells they thought most vital in their own progression to the afterlife. The Book of the Dead was most commonly written in hieroglyphic or hieratic script on a papyrus scroll, and often illustrated with vignettes depicting the deceased and their journey into the afterlife.

Actually, in their very (textual) content

We’ll come back to that
Malcolm Mosher

- Mosher’s first volume concentrates on Spells 1-16
  - collects the variants into versions representing the traditions;
  - provides an aggregate translation, paragraph by paragraph, with annotation of internal variability (e.g. late/early);
  - relates the versions to identified museum objects;
  - illustrates each spell with vignettes and original text fragments.
Malcolm Mosher

Dr. Malcolm Mosher: Egyptologist to Senior Software Designer

In 1982, while working on the requirements for his Egyptology PhD, Malcolm landed a job with Tandem. He worked on a variety of projects until 1988 when he was assigned to RDF.
Malcolm Mosher

Dr. Malcolm Mosher: Egyptologist to Senior Software Designer

In 1982, while working on the requirements for his Egyptology PhD, Malcolm landed a job with Tandem. He worked on a variety of projects until 1988 when he was assigned to RDF

[...]

Remote Duplicate Database Facility, a disaster recovery program that monitored changes made to a database on a local primary system and replicated those changes to a database on a remote backup system.
As one would expect, the BM has some of these objects:
British Museum RDF

• ... and publishes these in RDF:

(as in the W3C standard for data publication, Resource Description Framework)

<table>
<thead>
<tr>
<th>Predicate</th>
<th>Object</th>
</tr>
</thead>
<tbody>
<tr>
<td>rdf:type</td>
<td>ecrm:E22_Man-Made_Object</td>
</tr>
<tr>
<td>ecrm:P46:consists_of</td>
<td>this:x11412</td>
</tr>
<tr>
<td>ecrm:P51:has_former_or_cur</td>
<td><a href="http://collection.britishmuseum.org/id/person-institution/82925">http://collection.britishmuseum.org/id/person-institution/82925</a></td>
</tr>
<tr>
<td>bmp:P5X:has_main_representative</td>
<td><a href="http://www.britishmuseum.org/collectionimages/N000376/N000376013_001.jpg">http://www.britishmuseum.org/collectionimages/N000376/N000376013_001.jpg</a></td>
</tr>
<tr>
<td>ecrm:P126:was_present_at</td>
<td><a href="http://collection.britishmuseum.org/id/object/YCA2067/1">http://collection.britishmuseum.org/id/object/YCA2067/1</a></td>
</tr>
</tbody>
</table>
... allowing querying in SPARQL

(N.B.: this is quite a crude query to achieve a broad estimate)
• … allowing querying in SPARQL
• so we can (somewhat) answer that earlier question:

```
1  PREFIX ecrm: <http://erlangen-crm.org/current/>
2  PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
3  PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
4
5  SELECT DISTINCT ?material (COUNT(DISTINCT ?object) AS ?count)
6  { ?Object ecrm:P128_carries/rdfs:label "Book of the Dead" ;
7    ecrm:P45_consists_of/skos:prefLabel ?material }
8  GROUP BY ?material
9  ORDER BY DESC(?count)
```

(N.B.: again, this query could be refined)

No more SPARQL, I promise…
British Museum
‘Terminology’

• From a given starting point, e.g.:

Either from this ID
or by text search
(plus a bit of work)
“Follow your Nose”

- We can easily (without SPARQL) find interesting relationships:

  1. Clicking here
  2. Then here

   ![Diagram showing the interaction process with the Osiris and YCA23978 interfaces.](image)
CIDOC-CRM

- Modelling these relationships is what RDF is for after all:

```
crm:P62_depicts

bm-obj:YCA23978

bm-person:54984
```
CIDOC-CRM

• Modelling these relationships is what RDF is for after all:

![Diagram](image)

bm-obj:YCA23978

crm:P62_depicts

bm-person:54984

• The CRM ontology defines:
  – **properties** to provide a shared conceptualisation of kinds of relationship
CIDOC-CRM

- Modelling these relationships is what RDF is for after all:

  - The CRM ontology defines:
    - **properties** \((Pn)\), a shared conceptualisation of kinds of relationship
    - **classes** \((En)\), a shared conceptualisation of kinds of resources
• Ultimately we can use these classes and properties to build a rich model of our data:
Requirements beyond CRM

- CRM provides a good model for the objects
- In order to model Mosher’s conceptual structure, however, we need to model:
  - the wholly conceptual ‘Book of the Dead’;
  - the decomposition into spells, paragraphs, etc.;
  - Mosher’s (whole) volume;
  - Mosher’s conception of coherent versions/traditions;
  - Mosher’s translations;
  - the relationships to vignettes;
  - spell (original) texts, vignettes, and their relationship to the objects that carry them.
FRBRoo

- FRBRoo:
  - is a sister ontology to CRM and natural used in combination with it;
  - like CRM, takes an ‘object-oriented’ approach to formalising a foregoing Entity-Relationship model;
  - models precisely these implied classes (Fn) and relationships (Rn) –
    - **Works** are the product of **Expressions**, which are made physically available through **Manifestations**
BoD in CRM and FRBRoo

We’ll come back to this after a short detour
ResearchSpace

- ResearchSpace
  - provides a collaborative research environment;
  - provides a number of tools to facilitate this –
    - search and browse,
    - data annotation,
    - image annotation, (and many others);
  - integrates RDF from multiple sources (per project);
  - without explicit SPARQL, etc.
ResearchSpace Search

- Semantic search based on terminology, not just free text:
ResearchSpace Search

• Semantic search using explicit (but possibly abstracted) relationships:
ResearchSpace
Data Annotation

• Data annotation allows us to question and add new relationships, e.g.:
Data annotation allows us to question and add new relationships, e.g.:
ResearchSpace Image Annotation

- Given an image (associated with an object), user can
  - create a geometric outline within image
  - relate this new component resource to terminology
Text Annotation

• So what about annotations within text?

**Version 1** (figs. 1.1 - 1.47)

§T Beginning of the spells of going forth by day, \textit{raising up the glorious ones} in the necropolis, what is spoken on the day of burial, of entering after going forth by Osiris-N.\textsuperscript{4}

§P Words spoken by Osiris-N.\textsuperscript{5}

---

Fig. 1.1: §T of BD 1, Version 1 - BM 10558.

Fig. 1.2: §T of BD 1, Version 1 - N3281.

---

\textsuperscript{1} Saite/Hellenistic papyri: Cairo 40029, lahtesnaht (much missing), K3091, Nespetseft, Tasheref, BM 10558, M61 (§T to midway in §6 omitted), K3091 (only §T through §3; rest omitted). Nicholson 1885 - linen bandages, ROMA #1 (§R omitted), BM #71, BM 10809 (only §7-§9 survive; §R omitted), 117257 (§9-§R lost). Getty A (§T, §P, and 99% of §1 lost; §R omitted), Getty B (§T omitted), Mesher-I (only §9 is complete), K3057 (HG text; §4-§6 lost; remaining text), K3058 (§T omitted), UC32419 (only §5 through §9 survive; §R omitted). Theban HT papyri: BM 10837, BM 10838 (much lost; §9-§R omitted). BM #711, K3072, K3126, K3281. HG papyri: Milbank, Parma (§6-§R omitted), Turin 1783. Total Documents 28. I limit notes for BD 1 only to surviving text without noting what is lost. Regarding Cairo 40029, Milbank, K3057, Nicholson R85, Turin 1783, see comments after translation.
Several Choices

- Stand-off mark-up (common in NLP)
- In-place mark-up with XML tagging
  - A custom schema
  - Shoe-horning into existing schema, *i.e.* TEI
- In-place mark-up with RDFa

- Need to define semantics
- Need to process into HTML/UI
- Can derive CRM (but not FRBRoo?) semantics
- Can derive HTML/UI...
In contrast with other approaches:

- XHTML/RDFa *is* already HTML;
- RDFa allows embedding of CRM, FRBRoo and any other vocabulary (classes and properties) we choose; *(Schema.org? OpenGraph?)*
- allows ‘distillation’ of RDF by generic means;
- works alongside the Web model (being our target), disambiguating the hyperlinks we’d make in any case.
Future Work

- In the coming weeks ResearchSpace will hire a User Experience team member.
- We will produce a Web site for the data and services already produced.
- Longer-term we’ll look at the TEI exposure of the manuscript:
  - This may allow different paths through the structure, via SPARQL queries, to be exported as TEI ‘views’.