

# The MEKETREpository - Middle Kingdom Tomb and Artwork Descriptions on the Web

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**Abstract.** The MEKETREpository (MR) allows scholars to collect and publish artwork descriptions from Egypt's Middle Kingdom (MK) period on the Web. Collaboratively developed vocabularies can be used for the semantic classification and annotation of uploaded media. This allows all users with system access to contribute their knowledge about the published artworks. All data, including annotations and vocabularies, are published as Linked Data and can be accessed and reused by others. This paper gives an overview of MR's functionalities and the current state of our work.

## 1 Introduction

The MEKETRE project<sup>1</sup> is an interdisciplinary project conducted by the University of Vienna's Egyptology and Computer Science departments. The aim of the project is to collect and study digital representations of two-dimensional artworks (reliefs and paintings) stemming from tombs built during the MK in ancient Egypt.

The technical aim of the project is to provide a system (the MR) that enables researchers in the Egyptological domain to easily upload, classify and annotate digital versions of selected art items from that period. The collected data should be accessible in two representations, a human readable and a machine friendly version. Therefore, the data contained in the MR, except for media objects restricted by license, is available as Linked Open Data [1] on the Web.

Since its start in November 2009, the MEKETRE project has already collected comprehensive and detailed information on MK tombs and 2-dimensional art items. Much of this information is already available in the MR, and first experiences indicate acceptance by scholars from the Egyptology department.

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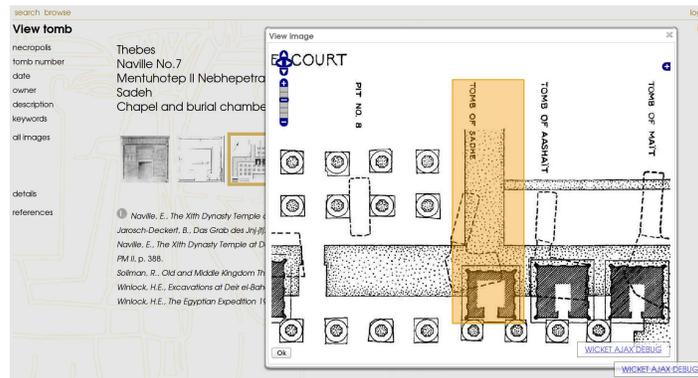
<sup>1</sup> The project is funded by the Austrian Science Fund (FWF) and is scheduled for 3 years until late 2012. Further information is available at <http://www.meketre.org>

## 2 Motivation

Although several databases provide information about Old Kingdom (OK) art items<sup>2</sup>, comparable sources for the MK are still missing. A problem with existing databases from the OK domain is, that for comparative studies the art items need to be described at a very high level of detail that is not present in existing databases. Further, existing databases offer limited search and retrieval functionality and most of them are closed repositories that do not provide machine friendly access to the collected raw data. The MR addresses these problems by

- Supporting description of art-items at many levels of detail
- Opening the repository and making its content accessible on the Web in human readable and machine friendly form
- Utilizing common standard ontologies for structuring both queries and their resulting data

## 3 Methodology



**Fig. 1.** An annotation (orange overlay) that shows the location of a tomb

For organizing artworks in the MR we distinguish between two types of first class objects: tombs and themes. Tombs are described by various properties, like the necropolis they are located at, a unique identifier, an owner (buried person), media objects (images), etc. Themes are 2-dimensional art items usually located at a tomb's walls that depict a certain detail of the life in ancient Egypt. Every

<sup>2</sup> A database of OK scene details has been created by the Oxford Expedition to Egypt in close cooperation with the Archaeology Data Service. It is accessible online at <http://ads.ahds.ac.uk/> and based on [2]. Also dealing with OK scenes is the Leiden Mastaba Project (see <http://www.peeters-leuven.be/boekoverz.asp?nr=8170> and [3]) which is available on CDROM only.

theme may contain various details that need to be described and classified, e.g., because they also appear in other themes located at different tombs.

The MR allows Web users to contribute knowledge about these first-class objects using an annotation mechanism. It is possible to highlight an (rectangular- or polygon-shaped) area of interest (Fig. 1). This highlighted region can then, for example, be classified using a controlled vocabulary or described by free-text. Each first-class object can be referenced by any number of annotations from every user of the repository with write-access. Thus it is possible to annotate an arbitrary number of visual details in the depictions of a MK tomb or theme.

In the course of the project, controlled vocabularies are collaboratively developed by scholars from the egyptological domain. So far, no comprehensive standard vocabulary for describing art items exists that is widely accepted by the Egyptological community. Our approach is to support creation of such a vocabulary in a collaborative way with the goal to reflect the opinions of all contributors. This is done by integrating an online tool for vocabulary development (PoolParty<sup>3</sup>) into the MR user interface that supports collaborative development of vocabularies that are made available on the Web, using the SKOS<sup>4</sup> (de-facto) standard. Besides the integration of this vocabulary development tool, we integrated the Web Reference Database (refbase<sup>5</sup>) in order to be able to manage, cite and reference literature that further describes a MK tomb, theme or media object.

The content of the repository will further be periodically replicated to the University of Vienna's long-term archiving solution PHAIDRA<sup>6</sup>. This allows for secure (versionized) storage with high availability and constant citability.

Finally, all data (art item descriptions, annotations, references, vocabularies, etc.) stored in the MR are made available as HTML and RDF (for human, respectively, machine consumption) using the Linked Data [1] principles. By this, these data can be easily integrated into other systems and data sets.

## 4 Current Implementation Status and Database Content

A beta version of the MR is available online<sup>7</sup>. Up to now, almost 120 tombs have been entered, including comprehensive metadata like date information, free-text description, ~400 images and ~700 annotations. Furthermore, an initial thesaurus for classifying themes has been created as well as a list of standardized terms to be used, for example, as person names and keywords. The process of entering tombs, themes and according metadata as well as creating controlled vocabularies (at the moment dozens of terms) is currently ongoing.

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<sup>3</sup> <http://poolparty.punkt.at/>

<sup>4</sup> <http://www.w3.org/2004/02/skos/>

<sup>5</sup> <http://www.refbase.net>

<sup>6</sup> <https://phaidra.univie.ac.at/>

<sup>7</sup> Visit <http://www.meketre.org/repository/> using a current version of Firefox or WebKit-based browser. An RDF representation of the data can be downloaded by dereferencing the preliminary URL <http://www.meketre.org/triplify/>

MR supports full-text and faceted search based on Apache Lucene. We further support the OpenSearch<sup>8</sup> format to enable a simple integration of our search results into other applications. A preliminary draft of the MEKETRE RDF vocabulary for describing various aspects of art items (e.g., their location, depictions, annotations, temporal classification) exists. This vocabulary makes use of other well-known ontologies such as Dublin Core and FOAF. Triplify<sup>9</sup> is used to expose the data from the underlying relational database as Linked Data.

Long-term archiving support is in its beginning state, currently supporting the export of tombs including all their metadata and images.

## 5 Intended Demo and Future Work

In our demo we will present the system's user and data interfaces. Interaction with the Web frontend is shown by performing tasks like browsing, searching and adding new items. The adoption and usage of controlled vocabularies will be motivated and the vocabularies developed in the MEKETRE context will be introduced. Their practical application is illustrated by using them for content annotation. Accessing the machine friendly representation of the data constitutes another major point. The advantages of publishing content as linked data will be discussed, supported by examples of obtaining RDF data from the MR. The current status of the MR's interaction with PHAIDRA is also subject of the demo, providing details on the utilized replication approach.

Future work will encompass a detailed survey of existing ontologies and vocabularies and an analysis on their applicability in the MEKETRE context (e.g., the OAC<sup>10</sup> data model). Integration with tools specialized in supporting the development of SKOS vocabularies is another milestone.

We believe that due to its accessibility features (e.g., Web enabled, read access for everyone, stable URIs for artworks) and reliance on established standards for data annotation and publication, the MR will constitute an open and so far unparalleled source of knowledge about the MK, forming a basis for further research in the field.

## References

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<sup>8</sup> <http://www.opensearch.org>

<sup>9</sup> <http://triplify.org/>

<sup>10</sup> Open Annotation Collaboration, <http://www.openannotation.org/>