FINAL REPORT 2017

DIGITIZING EARLY FARMING CULTURES

(DEFC)

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https://defc.acdh.oeaw.ac.at/

In the Digitizing Early Farming Cultures (DEFC) project research data on Neolithic sites and finds from Greece and Anatolia, most of them resulting from projects of the OREA AAPP research group (Aegean Anatolian Prehistoric Phenomena), have been integrated in an online open access site database – the DEFC App. DEFC App enables research across the whole region and overcomes the existing problem of fragmentation of knowledge through differing terminology, chronologies, typologies. DEFC app is an archaeological data management system complying with standards of data interoperability and data sharing.

The documentation of the workflow of the DEFC app is available in form of a blog on the project homepage: https://defc.acdh.oeaw.ac.at/blog/

Project start: 1st November 2014

Project end: 31st October 2017 (extended from 31. 10. 2016)

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- ACDH (Austrian Centre for Digital Humanities): Matej Durco, Peter Andorfer, Ksenia Zaytseva.

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Research groups: OREA Digital Archaeology, OREA AAPP

Research questions (objectives):

The main aim of the project has been to overcome fragmentation of research on Neolithic Greece and Western Anatolia: to create standardized research data according to user requirements, making it accessible online and allowing collaborative research across the whole area.

A further objective has been to digitize analogue OREA resources on Neolithic Greece and Western Anatolia: to enrich non-digital information and data with metadata and integrate them with harmonized existing digital datasets.

A new research objective (user requirement) was defined as a result of the focus groups (user needs assessment) with the AAPP research group in the first months of the project: to make available information about *typical finds* for the period and region (e.g. characteristic pottery).

SCIENTIFIC REPORT (ACCORDING TO PROJECT TASKS DEFINED IN PROJECT PROPOSAL)

1. ANALYSIS OF DATA

The first step to achieve standardized and integrated research data of Neolithic and Chalcolithic sites and finds of Greece and Anatolia was to analyse the data resources. The result of the analysis was that the weight of digital datasets is on pottery, while most of the site information is contained in publications, in particular the 'Ägäische Frühzeit'. Therefore, there was a need to digitise the information on sites – we created a database of archaeological sites in the Aegean and Anatolia which we can link to our information on finds and the digital information on pottery and excavations.

2. DEFINITION OF USER REQUIREMENTS

In the first project year focus group meetings with AAPP research group have been held to identify user needs and establish the requirements for the data and data management system:

- a site database that provides more detail than existing online open access site databases for the region
- an online research resource for students and researchers that shows typical finds, in particular pottery characteristic for the period and region (see additional objective/user requirement above)
- a map interface that allows searching for both Greek and Anatolian sites
- 3D models of selected pottery sherds of the Schachermeyr pottery collection
- database can be extended or linked with other relevant databases
- online open access publication of all data

3. DATA MODEL

A mind map with all existing database fields, as well as information from some analogue resources (see data analysis above) formed the basis for the creation a conceptual data model.

A data model was created, which is centred on the site, which is subdivided into different areas (Figure 1). Additional information like research event, interpretation and finds are all related to the site.

The DEFC App data model meets the particular requirements of dealing with data of different granularity. This means that some data sets are very detailed containing many sub-levels (such as the documentation of modern archaeological excavations and pottery databases), whereas other data sets comprise of broad archaeological data (e.g. old excavation reports and other legacy data). The data model therefore connects different levels of information about excavation processes, finds and chronological periodization.

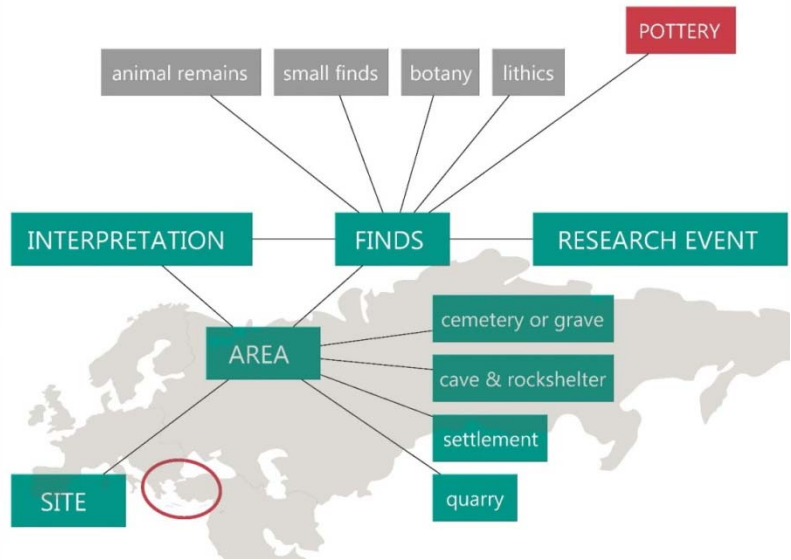

FIGURE 1 DEFC APP DATA MODEL

4. SET UP AND MODIFICATION OF DATA MANAGEMENT SYSTEM

In spring 2015, the analysis of different data management systems resulted in choosing *Arches*, an open source software system designed for the heritage sector to manage all types of immovable cultural heritage (https://www.archesproject.org/). A new version of *Arches* was just being launched (April 2015). The new *Arches* version (v3.0) appeared to be a graph database with the ontology CIDOC CRM integrated. It is possible to customize the *Arches* application 'Heritage Inventory Package' (HIP) according to user needs and *Arches* also includes a tool for creating thesauri, mapping features and a timeline. This allows publishing data online according to internationally accepted standards. Hence, Arches provided most features that we needed for our system to achieve DEFC project objectives. We therefore decided to customize *Arches* for our project. This was done in close collaboration with ACDH.

However, setting up *Arches*, we experienced problems which showed that *Arches* was not a practical solution for our project requirements:

- the documentation was not finished at this time
- SKOS import of thesauri was not working properly
- the mapping of the Arches data model did not always fit our requirements
- our data model was too specific and not all concepts were covered by Arches
- the user interface did not adapt to modifications in the data model, and we would have had to create a new user interface

Experiencing all this problems DEFC project and ACDH decided to develop a new site database from scratch in summer 2015. Peter Andorfer and Ksenia Zaytseva (ACDH) created a Django-based database that we then called *DEFC app*. The database set up took around 6 months (from July to December 2015). In this time, many meetings between Digital Archaeology research group and ACDH technical developers took place to make sure all requirements will be implemented. AAPP research group has been involved in the process through several workshops and has given regular feedback after testing each version of the app.

The data model of DEFC app consists of all our previously defined components: Sites, Research Event, Area, Finds, and Interpretation. Data is entered into each component individually, while the components and the

data are linked to each other. Most of the entry fields consist of (interdependent) dropdown lists filled with controlled vocabulary to minimize data entry mistakes and ensure better querying conditions.

The database features a map interface with all entered sites and views of the 3D scanned potsherds of the Schachermeyr collection. Additionally, DEFC App is linked to the Zotero online bibliography database that combines several bibliographic databases of AAPP research group (see below, data entry).

DEFC App is browser-based, which gave easy access for data entry and allowed students to enter data wherever they were based. Data can be queried and downloaded by everyone, but to enter data users have to register for an account.

5. DATA ENTRY

Testing: In several rounds of testing and feedback AAPP students and digital Archaeology research assistants entered test data to the system.

Data entry for real: The construction of the DEFC app was completed at the beginning of 2016 and there was intensive data entry the whole of 2016. In 2017, information from the remaining publications was added to the database.

As help for the data entry the following tools have been created:

- Pottery image gallery that provides visual examples of different types of pottery form, decoration and detail from different regions in Greece and Anatolia (for copyright reasonss this tool is only visible to users who have registered)
- A map of regions and districts of Turkey and Greece differentiated by the AAPP research group and DEFC app. The regions of Turkey are a result of research of AAPP research group, whereas the districts correspond to the official districts of Turkey. The map of Greece and its regions has been created based on the resources used by the British School of Athens.

Data from the following publications have been entered (M. Brzakovic, Th. Rinner, D. Bochatz, Sh. Schilk):

ALRAM-STERN, E., 2014. Times of Change: Greece and the Aegean during the 4th Millennium BC, in: B. Horejs, M. Mehofer (ed.), Western Anatolia before Troy. Proto-Urbanisation in the 4th Millennium BC. Proceedings of the International Symposium, KHM, Vienna, Austria, 21-24 November 2012 (ÖAW Verlag, Vienna), pp. 305-238.

ALRAM-STERN, E., 1996. Die Ägäische Frühzeit“. Band 1: Das Neolithikum in Griechenland. Veröffentlichungen der Mykenischen Kommission 16.

ALRAM-STERN, E., unpublished. Die Ägäische Frühzeit. Band 2: Ägäische Frühzeit: Das Neolithische Und Vorpalatiale Kreta.

GALLIS, K., 1992. Atlas Proistorikón Oikismón Tés Anatolikés Thessalikés Pediada.

MEHOFER, M. 2014. Metallurgy during the Chalcolithic and the Beginning of the Early Bronze Age in Western Anatolia, in: B. Horejs, M. Mehofer (ed.), Western Anatolia before Troy. Proto-Urbanisation in the 4th Millennium BC. Proceedings of the International Symposium, KHM, Vienna, Austria, 21-24 November 2012 (ÖAW Verlag, Vienna), pp. 463-490.

ÖZDOĞAN, M.; BAŞGELEN, N.; KUNIHOLM, P. (ed.), The Neolithic in Turkey. New Excavations & New Research. Volume 1 - The Tigris Basin, 2011, Istanbul.

ÖZDOĞAN, M.; BAŞGELEN, N.; KUNIHOLM, P. (ed.), The Neolithic in Turkey. New Excavations & New Research. Volume 2 - The Euphrates Basin, 2011, Istanbul.

ÖZDOĞAN, M.; BAŞGELEN, N.; KUNIHOLM, P. (ed.), The Neolithic in Turkey. New Excavations & New Research. Volume 3 – Central Turkey, 2012, Istanbul.

ÖZDOĞAN, M.; BAŞGELEN, N.; KUNIHOLM, P. (ed.), The Neolithic in Turkey. New Excavations & New Research. Volume 4 – Western Turkey, 2012, Istanbul.

SCHACHERMEYR, F. (†), 1991. Sammlung Fritz Schachermeyr: Die neolithische Keramik Thessaliens. Aus dem Nachlass bearbeitet von Eva Alram-Stern. Veröffentlichungen der Mykenischen Kommission 13.

SCHWALL, Ch, 2016. Çukuriçi Höyük 2. Das 5. und 4. Jahrtausend v. Chr. in Westanatolien und der Ostägäis. PhD thesis.

Additionally sites (mostly in Turkey) have been entered from a list provided by AAPP research group (M. Börner). These entries include only spatial information about the site – no further entries (area, research event etc.).

Spatial data (coordinates) were provided by AAPP research group (M. Börner), literature (Gallis 1992), IGEAN project, OREA (M. Brzakovic, Crete by E. Semilidou checked by M. Brzakovic).

All entered data is referenced to the source bibliography as well as to additional bibliography where further information about the archaeological entity can be found. This is done using a Zotero online bibliography database (available at: https://www.zotero.org/defc-orea-oeaw).

The Zotero online library is the result of the integration of the project bibliographic databases from the AAPP research group, which were in proprietary formats (endnote, askSam). Zotero is an open source software. The resulting bibliographic database holds nearly 10.000 entries which were the basis for entering references into the DEFC App.

6. 3D MODELS OF SCHACHERMEYR POTTERY COLLECTION

90 most representative sherds were selected from the Schachermeyr pottery collection and 3D digitized using Breuckmann smart Scan HE 5 Megapixel Colour 3D Scanner (Figure 2). The 3D models were added to the DEFC app homepage using 3DHOP (3D Heritage Online Presenter). The 3D models were incorporated within the DEFC App database as a part of a rich dataset providing the archaeological information.

In order to ensure a certain technical reliability the 3D model provenance metadata were added to the 3D models. When deciding on which data to include with the digital Schachermeyr models, we considered the standards recommended by 3D ICONS, the Archaeological Data Service (ADS) Guides to Good Practice and the IANUS project. Additionally, the CIDOC CRMdig extension has been taken into account, since all data were to be mapped to the CIDOC CRM and its extensions a part of this project. The provenance metadata are divided into three groups (https://defc.acdh.oeaw.ac.at/blog/post02/).

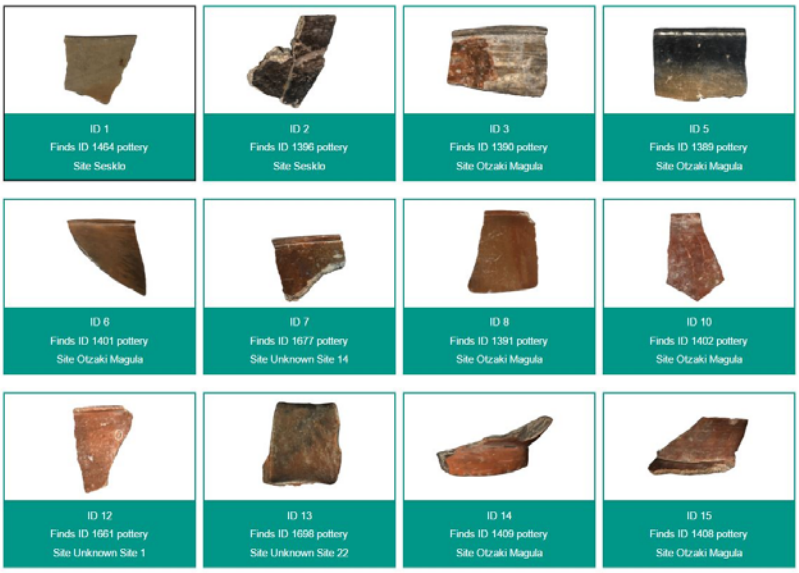

FIGURE 2 SCHACHERMEYR POTTERY AS 3D MODELS IN THE DEFC APP

7. HOMOGENIZATION: THESAURUS

DEFC Thesaurus was created in 2017, and has not been reported in previous reports. Therefore it will be described in more detail.

To build a project thesaurus, the AAPP research group created word lists from their research vocabularies (site types, finds types, etc.). These word lists formed the basis for the controlled vocabulary for the DEFC app for data entry (drop-down lists). Most DEFC app entries are part of the controlled vocabulary, but there are also fields for description (free text).

Because different people might use different terms to describe the same concept, it is important to unify the terminology to reduce the description and retrieval ambiguity caused by free text entries. However, DEFC word lists many times include terms that are not on the same hierarchical level, i.e. the same word list contains hypernyms and hyponyms. Furthermore, the same concept appears in different parts of the database and the meaning of some terms is sometimes similar but not the same. For this reason we are using thesaurus as a reference work that lists and contextualizes terms from DEFC word lists based on their meaning, to present and explain the data structure.

DEFINING TERMINOLOGY

The first step of building the thesaurus for the DEFC app was to create a hierarchical arrangement of terms and link them to each other based on their meaning. To do this, each term that appears in controlled vocabulary of the DEFC app database was first defined to prevent any misconceptions and to serve as a tool for easier hierarchical and other arrangement of the terms. The definitions were formed in a close collaboration with the AAPP research group as well as by using archaeological literature and online resources (online database, thesauri, glossary and encyclopaedia):

- Historic England Thesaurus
- Encyclopaedia Britannica
- Oxford Dictionary

- DBpedia
- Encyclopaedia of Life
- Kipfer, B. A. 2000, Encyclopedic Dictionary of Archaeology. Kluwer Academic/Plenum Publishers, New York.
- Kipfer, B. A. 2007, Dictionary of Artifacts. Blackwell Publishing, Oxford.
- Mollett, J. W. 1966, An Illustrated Dictionary of Art and Archaeology. American Archives of World Art, New York.
- Shaw, I., Jameson, R. (eds.) 1999, A Dictionary of Archaeology. Blackwell Publishers, Oxford.
- Inizan, M.-L., M. Reduron-Ballinger, H. Roche, J. Tixier 1999, Technology and Terminology of Knapped Stone. Nanterre, CREP.
- D. Srejovic (ed.) 1997, Arheološki Leksikon.
- Peregrine, P. N., Ember, M. (eds.) 2002. Encyclopedia of Prehistory. Vol. 8: South and Southwest Asia. Kluwer Academic/Plenum Publishers, New York, Boston, Dortrecht, London, Moscow.
- Gopher, A. 1994. Arrowheads of the Neolithic Levant. Wiona Lake, Eisenbrauns.
- Biers, W. R. 1969. Excavations at Phlius, 1924 the prehistoric deposits. Hesperia: The journal of the American School of Classical Studies at Athens. Vol. 38, No.4. pp. 443-458.

CLASSES AND TOP CONCEPTS – BUILDING HIERARCHY

Based on their meaning the terms have been arranged in a hierarchical order using broader terms (BT) (and narrower terms) following the DEFC app database structure. Each top class of the data model (site, research event, area, finds, interpretation) presents a top class in the DEFC app thesaurus.

Top class SITE is dealing with the information about the topographic location where a certain archaeological activity took place (coastline, hill…).

Top class AREA holds concepts referring to archaeological areas: cave or rock shelter, settlement, quarry, cemetery or grave. The top concept “settlement” is further described using terminology concerning separate buildings (e. g. building techniques, types, shapes), enclosure types, settlement layout, settlement type and other archaeological features (e. g. installations, storage, ritual structures). Top concept “cemetery or grave” holds information about grave types, human remains, grave disturbances and other mortuary evidence. The top concept “cave or rock shelter” mostly includes the terms related to the evidence of occupations, whereas the top concept “quarry” gathers the terms that describe different types of extraction as well as the extracted raw material.

Top class RESEARCH EVENT holds concepts related to the type of research conducted on an archaeological site (such as archaeological excavation, field survey, remote sensing) or finds and soil (such as dating, sourcing analysis, isotope analysis, soil analysis).

Top class FINDS holds concepts about different types of archaeological artefacts including small finds (tools, jewellery, figurines), lithics, pottery, plant remains and animal remains. Each of them holds narrower terms with different level of detail (e. g. lithic types) and descriptive information (e.g. pottery decoration).

Top class INTERPRETATION holds top concepts about past human activities that have been recognized on a certain site including production (e. g. textile, metal, pottery production), subsistence (e.g. fishing, farming, hunting).

Throughout the DEFC controlled vocabulary terms such as “unidentified”, “unknown”, “undetermined” appear. These terms describe entities that were recognized, but either could not be further identified during the archaeological recording, were not further described in the available documentation or were not further

investigated for various reasons. However, it has been recognized as essential to acknowledge their presence and document it in the database.

Adding synonyms, related terms etc.

After the basic hierarchical structure of the concepts has been established, the individual concepts were linked to each other and/or complemented by additional terms.

Since the terms were originally written in English, they have been translated also to German. Additionally, terms for plant and animal remains were specified in Latin. Greek and Turkish language and alphabet were used to denote geographic names of corresponding regions and districts.

Original terms (in English) were then complemented with alternative terms (AT) that included different spelling (such as “tel” and “tell”) and synonyms (such as “perforator”, “borer”, and “drill”). When possible, also new alternative names were translated into German and additional German synonyms and different spellings were added to the thesaurus. Several terms from the database whose meaning is somehow related such as “textile equipment” and “textile production” were linked through related terms label (RT). This means that the AT terms are external, whereas RT are already included in the database.

Practical implementation

There are several available tools used to build a thesaurus such as TemaTres and CLAVAS & CLARIN concept registry. However, to keep a clear overall view over the thesaurus structure in the making we found easiest to first draft the structure using one of many mind mapping tools (http://www.xmind.net/). After the general structure has been created the terms were organized using tables and spreadsheets in the Microsoft Excel environment. One term per row was presented as a concept with broader and narrower terms. For more detail see: https://defc.acdh.oeaw.ac.at/blog/post03/

SKOS Mapping

SKOS stands for a Simple Knowledge Organization System and is a W3C recommended data model for sharing and linking knowledge organization systems such as thesauri and other types of controlled vocabulary (classification schemes, subject heading lists and taxonomies) within the framework of semantic web.

SKOS uses Resource Description Framework (RDF) to encode the information, which is the standard model for data interchange on the Web.

Mapping with OPEN Refine

Open Refine (previously known as Google Refine) is a free tool for cleaning, transforming and extending the data. Using the RDF extension the tool has been used to build an RDF skeleton using standard vocabularies of SKOS for the thesaurus concepts and Dublin Core for their metadata (source of the term´s definition).

When all concepts got assigned their unique URIs, related and exact matches were created in a separate mapping.

Several terms appear several times in the controlled vocabularies (e. g. stone: building material/find material, fireplace: installation/occupation evidence), but represent the same concept and are therefore represented by the same URI. Because these terms have several broader terms they appear several times in a hierarchical view of the thesaurus, however, only one concept has been defined for all of them.

VISUALISATION OF THESAURUS ON HOMEPAGE

All mappings were imported as RDF files and joined in one file which was validated via Skosify tool. SKOS play service was then used to visualize the thesaurus as a hierarchical tree on the DEFC homepage.

8. CIDOC CRM MAPPING

INTRODUCTION

CIDOC CRM mappings were carried out in 2017, so we will also describe this part of the workflow with more detail.

In computer science ontologies are means to formally model the structure of a system using concepts and relations between them (Guarino, Oberle, & Staab, 2009). CIDOC CRM is such a reference work for concepts and relations built to describe the world of cultural heritage. A dataset that has been mapped to CIDOC CRM (http://www.cidoc-crm.org/) framework is semantically enriched and furthermore it can be (at least theoretically) integrated with other datasets also mapped to the same ontology. This way the problem of interoperability and integration between various complementary information from different systems can be efficiently addressed (Doerr, 2009).

To map a dataset to CIDOC CRM ontology basically means that each database field has to be assigned to a CIDOC CRM class and relationships between them have to be expressed with CIDOC CRM properties. The definition of a class is described in scope notes. Furthermore, each class has a certain domain and range of properties, which means not all properties can be used with all classes. However, since classes are hierarchically ordered, each subclass inherits all properties (relationships as well as the semantic meaning) of its upper class.

MAPPING

DEFC app is a relational database, which consist of 5 main tables (site, area, finds, interpretation, research event), their vocabulary tables and intermediate tables. All of them have been mapped to CIDOC CRM field by field following the relational database structure.

All DEFC app tables have been mapped with the exception of:

- defcdb_dc_reference_type
- defcdb_dc_site_coordinatesource
- defcdb_dc_site_geographicalreferencesystem
- defcdb_reference
- tables referring to the 3D models
- other admin tables

Additionally certain fields within the main “area” table were not mapped (concerning the radiocarbon dating – delta13, radiocarbon dating, date of calibration, standard deviation earliest, standard deviation latest).

These tables and fields were not mapped, because their content did not seem to be of immediate value for further archaeological investigation, but can be mapped in the future.

The following CIDOC CRM version and extensions have been used to map the DEFC app:

- CIDOC CRM version 6.2.1
- CIDOC CRMarchaeo version 1.4.1

- CIDOC CRMsci version 1.2.3

TOOLS

The first conceptual draft has been created in 3M (mapping memory manager) tool - http://139.91.183.3/3M/ (title: DEFCapp, creator: seta).

Mapping the DEFC data and transforming them to RDF was carried out in Karma - http://usc-isi-i2.github.io/karma/.

Base URI: http://defc.acdh.ac.at/data/

URI suffix form: DBfieldname/ID

CLASSES AND PROPERTIES

The SITE has been mapped as S20PhysicalFeature as this class inherits the temporal as well as spatial components.

The district (province) as well as the region where the site is located is mapped as E44Place_Appellation because they denote the names of places. Some of these names are official administrative names as used today; however, some of them are defined by the AAPP research group and may differ from the official definitions. E44 has been chosen because it allows differences of definition in name and spatial span.

More information about which classes and properties were used for mapping DEFC app tables, as well as a graphic representation of the mapping can be found on the DEFC homepage:
https://defc.acdh.oeaw.ac.at/mapping2cidoc/

FUTURE WORK

The structure of DEFC thesaurus follows the DEFC app structure, because it aims to explain and contextualize DEFC terminology and simplify data retrieval process. In this form it can be used also by other projects dealing with similar subject, however, slight restructuring might be needed. We are hoping that a new, general thesaurus including DEFC terminology will be built in the framework of future projects.

9. DATA RETRIEVAL – DEFC OPEN DATA AND LICENCES

DEFC app is an open access database (available at: https://defc.acdh.oeaw.ac.at/) and everyone is able to browse, query and retrieve published data. App online data is licensed by OREA ÖAW under the CC BY 4.0 license. As such, you are free to share, use and remix DEFC App data, as long as you attribute the source data accordingly.

Geo-visualization of sites is available as well as customized filtering and ordering of separate entries.

Data can be downloaded in the form of csv files, or accessed via the restful API interface (https://defc.acdh.oeaw.ac.at/api/). Furthermore, expert users can query data via a SPARQL endpoint (https://defc.acdh.oeaw.ac.at/sparql/query/).

The code of the database is available on Git Hub https://github.com/acdh-oeaw/defc-app.

Due to copyright reasons the pottery image gallery is only visible to registered users.

10. INTEROPERABILITY, PELAGIOS

It has already been mentioned, that for DEFC app we applied a series of standards and identifiers to make the dataset interoperable:

- Geolocations (e. g. regions and sites) are defined or/and linked to GeoNames database (available at: http://www.geonames.org/).
- Bibliographic units appearing in the database are linked to the Zotero database (available at: https://www.zotero.org/defc-orea-oeaw).
- For animal remains and botanical remains Encyclopaedia of Life IDs are used, which are also used by the OpenContext online database (available at: https://opencontext.org).
- We have created identifiers for the chronological periods used in DEFC app with the PeriodO gazetteer of period definitions (available at: http://perio.do/). This process is still ongoing, and will be completed after we have got the feedback from the PeriodO team.

In October 2017 we were contacted by the Pelagios team (http://commons.pelagios.org/) and asked whether we would be interested in bringing our project into the Pelagios linked data system. Pelagios is a community supporting open data methods and provides an infrastructure for Linked Open Geodata in the humanities.

Since DEFC application is based on the well-established web framework Django, writing a serialiser for a PELAGIOS specific JSON file was quite straightforward. This serialiser (implemented with the Django REST framework) basically queries all 'site objects' from the database, extracts the information needed by Pelagios and returns them as JSON whenever someone addresses this endpoint https://defc.acdh.oeaw.ac.at/api/geojson/.

DEFC data will be available with the next update of Pelagios data (probably December 2017).

11. DEFC HOMEPAGE

DEFC homepage consists of five sections (Figure 3).

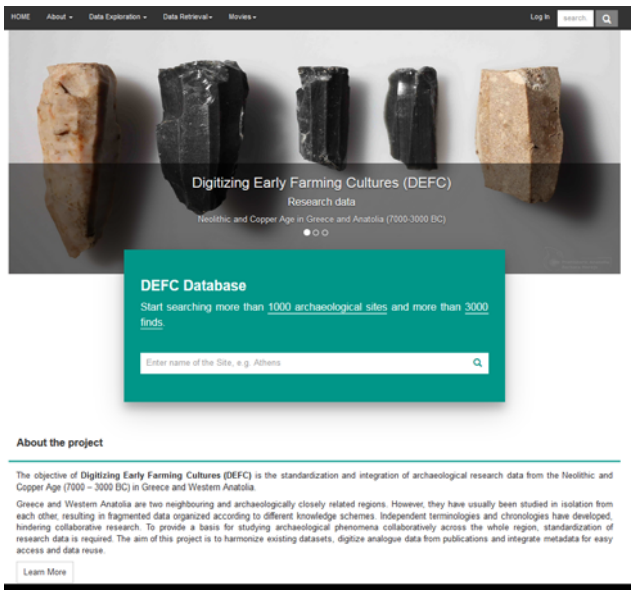

FIGURE 3 DEFC APP WEB-INTERFACE

- HOME:
  - Short overview of project
  - Quick access to DEFC Database
  - Access to interactive map interface, 3D pottery gallery, bibliography (Zotero), Visualization of Thesaurus, DEFC blog and movies.

  Footer of webpages: Access to Terms of use/license; imprint; access to DEFC source code on GitHub; OREA digital archaeology twitter account, contact email.

- ABOUT:
  - General:
    - Project description and list of publications
    - DEFC Team
    - Events (workshops, conferences where we presented DEFC app)
    - Contact
  - Building the DEFC app: a little blog where we describe the workflow of creating the DEFC app.
  - Visualization of DEFC app data model
- DATA EXPLORATION:
  - User interfaces for querying data based on information in the five main tables (sites, research events, areas, finds, interpretation).
  - Map of archaeological sites (= interactive map interface to search sites)
  - Supplementary (help) material: maps showing the geographical distinctions that were used to enter the data (archaeological regions and districts of Turkey and Greece); a visualization of the archaeological periods (chronology table).
  - 3D pottery gallery: view 3D models of pottery sherds and associated archaeological and technical metadata
  - Visualization of DEFC Thesaurus
  - Zotero bibliography
- DATA RETRIEVAL
  - API
  - SPARQL Endpoint
  - Mapping to CIDOC CRM
  - DEFC2REDF demo
- MOVIES
  - Link to movies (e.g. Çukuriçi Höyük movie)
  - Link to DEFC trailer (made for CHNT 2017 app competition)

DATA ENTRY AND USER ACCOUNTS

For data entry, a user account is required. A user account that allows adding data and/or editing DEFC app data may be provided by the project leader to archaeological researchers. To get a user account, students and researchers have to get in touch with the project leader who will decide individually whether an account will be given and which rights a user will have. However, the DEFC app is not 'completed' but has been designed that new data can be added continually.

The user interface for data entry follows the same layout as the openly accessible content of the DEFC app. Additionally, registered users will see the pottery image thesaurus, to support data entry. Furthermore, students and researchers who may be using the app for data entry have the option to not publish the data immediately, but release them after they have completed their projects and published their data.

12. CONCLUSIONS AND FUTURE WORK

The DEFC project has reached the aims that were set out in the project proposal: we have created a standardised research dataset on sites and finds from Neolithic Greece and Anatolia, which is available open access online and a tool for collaborative research (further data entry and querying) across the whole region.

The dataset contains information from published resources as well as manuscripts and databases held by the OREA AAPP research group. As a new research objective that emerged as part of the project, the provision of information about typical finds for a period and region (e.g. characteristic pottery) has been defined. The DEFC dataset contains 3D models of typical pottery sherds of the Schachermeyr collection, which are also linked to the dataset through the archaeological and technical metadata. The image thesaurus, with more typical pottery forms, is available for registered users only because of copyright reasons.

The DEFC app contains standards and identifiers which make the data interoperable and in October/November we have made use of these features (geonames) to integrate DEFC app data into the Pelagios open data network (http://commons.pelagios.org/).

The process of creation of PeriodO identifiers for DEFC app periods (http://perio.do/) will be completed as soon as we hear back from the PeriodO team.

The structure of DEFC thesaurus follows the DEFC app structure, because it aims to explain and contextualize DEFC terminology and simplify data retrieval process. In this form it can be used also by other projects dealing with similar subject, however, slight restructuring might be needed. We are hoping that a new, general thesaurus including DEFC terminology will be built in the framework of future projects.

The DEFC app is hosted and maintained by the Austrian Centre for Digital Humanities, the main project partner https://defc.acdh.oeaw.ac.at/. DEFC app is open for further data entry. To get a user account, researchers have to contact the project leader who will decide on access rights. Currently one PhD student of OREA AAPP group uses the app for data entry and data from another, recently completed PhD thesis, has just been added (Ch. Schwall, Çukuriçi Höyük 2. Das 5. und 4. Jahrtausend v. Chr. in Westanatolien und der Ostagäis, OREA Serie (in print).

We will provide long-term preservation for the DEFC app dataset by depositing it in the ÖAW data repository ARCHE, which was launched in December 2017 (https://www.oeaw.ac.at/acdh/tools/arche/).

A publication describing a use case of DEFC app (research on pottery types) is planned in collaboration with the AAPP group (Aspöck et al in prep.).

ACTIVITIES

PRESENTATIONS

Aspöck, Edeltraud; Štuhec, Seta; Zaytseva, Ksenia; Andorfer, Peter (10. 11. 2017) DEFC app. Presentation at: ‚CHNT 22, ‚App-Session', Vienna, Austria. http://www.chnt.at/program-2017-abstracts/

Aspöck, Edeltraud; Štuhec, Seta; Masur, Anja; Andorfer, Peter; Zaytseva, Ksenia (2. 9. 2017) Digitizing Early Farming Cultures (DEFC): converting, browsing and sharing archaeological legacy data. Presentation at: EAA 2017, session 372, 'Re-engineering the process. How best share, connect, re-use and provide access to archaeological information' Maastricht, Netherlands. http://www.eaa2017maastricht.nl/

Aspöck, Edeltraud; Štuhec, Seta; Masur, Anja; Andorfer, Peter; Zaytseva, Ksenia (5. 12. 2016) Digitizing Early Farming Cultures: sharing data from Neolithic and Copper Age Greece and Anatolia. Presentation at: 3rd DHA Conference – dha 2016, Vienna, Austria. (http://www.digital-humanities.at/en/dha/s-news/3rd-dha-conference-dha2016)

Aspöck, Edeltraud; Štuhec, Seta; Masur, Anja; Andorfer, Peter; Zaytseva, Ksenia (28. 4. 2016) Digitizing Early Farming Cultures: Making new use of digital resources from Neolithic sites in Greece and Anatolia. Presentation at: 10th ICAANE conference, "Old excavation data – what can we do" workshop, Vienna, Austria. https://www.orea.oeaw.ac.at/10icaane.html/

Aspöck, Edeltraud (30. 8. 2016) Digitizing Early Farming Cultures: sharing data on Neolithic sites and finds in Greece and Anatolia. Presentation at: WAC-8, Kyoto, Japan. http://bit.ly/2vESZtF

Štuhec, Seta; Aspöck, Edeltraud; Masur, Anja; Andorfer, Peter; Zaytseva, Ksenia (5. 9. 2016) Putting 3D models into context - the Schachermeyr pottery collection and the DEFC app. Poster presentation at: International Congress on Archaeology, Computer Graphics, Cultural Heritage and Innovation 'ARQUEOLÓGICA 2.0', Valencia, Spain. http://arqueologica8.webs.upv.es/

Aspöck, Edeltraud (21. 10. 2016) The Digitizing Early Farming Cultures (DEFC) database. Presentation at: ERC – Prehistoric Anatolia Closing Workshop, Vienna, Austria.

PUBLICATIONS

In preparation

Aspöck, Edeltraud; Schwall, Christoph; Štuhec, Seta; Andorfer, Peter; Zaytseva, Ksenia (in prep.). Overcoming heterogeneity: using a web-based data management system (DEFC app) for researching Chalcolithic Greece and Anatolia.

Published

Štuhec, Seta; Aspöck, Edeltraud; Masur, Anja; Andorfer, Peter; Zaytseva, Ksenia, (2016). Putting 3D models into context - the Schachermeyr pottery collection and the DEFC app. Proceedings of the 8th International Congress on Archaeology, Computer Graphics, Cultural Heritage and Innovation 'ARQUEOLÓGICA 2.0', 5. – 7. Sept. 2016, Valencia, Spain. - URL: http://ocs.editorial.upv.es/index.php/arqueologica20/arqueologica8/paper/viewFile/4155/2288

Andorfer, P., Aspöck, E., Ďurčo, M., Masur, A., Zaytseva, K. (2016). The DEFC-App: A Web-based Archaeological Data Management System for 'Digitizing Early Farming Cultures'. In Digital Humanities 2016: Conference Abstracts. Jagiellonian University & Pedagogical University, Kraków, pp. 726-728. - URL:

http://dh2016.adho.org/abstracts/27

OTHER DISSEMINATION

Project homepage (available at: http://defc.digital-humanities.at) includes:

- the DEFC app (and the data model),
- project information (basic information, team, events, contact)
- blog posts and twitter about the development of the DEFC project
- "Çukuriçi Höyük - The World Heritage Site through Time" video depicting the research done and history of the Çukuriçi Höyük archaeological site. The video is supplemented by text explanation and video creation documentation. The Çukuriçi Höyük presentation has been created by LBI ArchPro and 7reasons Medien GmbH.
- DEFC app trailer, created for App-Session at CHNT 2017

Digital Archaeology Research group on twitter: @OREA_digArch

WORKSHOPS PARTICIPATION

Edeltraud Aspöck and Seta Štuhec took part at the ARIADNE Summer School 2016 (23. – 27. May 2016) on "Mapping existing datasets to the CIDOC CRM" at PIN, Prato, Italy.