ARIADNE

D4.6: Final Report on Good Practices

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1 Executive Summary

This document is a deliverable (D4.6 *Final Report on Good Practices*) of the ARIADNE project ("Advanced Research Infrastructure for Archaeological Dataset Networking in Europe"), which is funded under the European Community's Seventh Framework Programme. D4.6 is associated with WP4, which is titled Good Practices and Dissemination, and which is focussed on the dissemination of project outcomes and to inform and create a wider community of good practice. D4.6 reports the results of Task 4.6.

This task is inspired by the successful series published by the Archaeology Data Service (ADS) in the UK in collaboration with Digital Antiquity in the United States. It concerns the preparation and publication of a series of guides aimed at non-IT-specialist archaeological researchers, explaining how to organise different aspects of archaeological activity and documentation to ensure the long term sustainability and re-use of archaeological data, thereby making the best use of the ARIADNE Infrastructure. Archaeological real-life examples illustrate and demonstrate applications. The existing Guides define data and metadata standards covering the deposit of data. Within ARIADNE, the Guides have been extended to incorporate a range of European case studies and to encompass a range of new data types with which the project partners have specific expertise.

The existing wiki format of the Guides lends itself to updating as a collaborative endeavour by a number of ARIADNE partners. The scope of the Guides includes common data formats (text, spreadsheets, sound, video) as well as more discipline-dependant formats including GIS, geophysics, 3D photogrammetry and laser scanning.

Areas of contribution to the Guides have been previously identified through a survey of Good Practices carried out in Task 4.5 and reported in D4.4 *Initial Report on Good Practices*. The survey involved the identification, assessment and definition of good practices in archaeological research activities, potentially affecting the use of the ARIADNE research infrastructure, including:

- Survey of current good practices related to the use of existing infrastructures
- Assessment, adaptation and customisation of such practices
- Guidance on applications, including examples
- Reference information.

Within these areas, particular themes were explored, including:

- GIS, archaeological prospection and related datasets
- Scientific data organisation and related datasets
- Applications of visualisation technologies in archaeology and related datasets
- Semantics and metadata.

D4.4 described and assessed the nature of good practice in use by the content-providing ARIADNE partners, and listed potential areas of contribution to the Guides to Good Practice by these partners.

The contributions identified in D4.4 have formed the basis for work carried out under Task 4.6, Guides to Good Practice, and reported in this deliverable, D4.6. The survey of the ARIADNE content-providing partners highlighted a diverse range of guidance and Good Practice. Such Good Practice usually takes the form of guidance documents, which reflect the partner's areas of expertise and function, and range from:

- Broad guidelines on data and report structures and the structure of national databases
- Guidelines and recommendations for excavation and fieldwork
- Guidelines for specific survey (e.g. lidar) or data set types (e.g. 3D or dating techniques)

In some cases these guidelines have tied into wider guidance (e.g. CIDOC CRM) or good practice projects such as ArchaeoLandscapes or 3D-ICONS. D4.4 identified five broad themes that have formed the basis for the work on the Guides to Good Practice carried out under Task 4.6, these areas of contribution are:

- The alignment with, and referencing of, existing Good Practice documents
- The creation of case studies illustrating the application of Good Practice documents to specific data sets for which no good practice currently exists
- The referencing and incorporation of guidelines currently under production through the ArchaeoLandscapes and 3D-ICONS projects into existing guidelines and the illustration of these guidelines through relevant case studies
- The revision, creation or enhancement of guidelines for 3D datasets
- The creation of guidelines for data from scientific dating and analysis, specifically dendrochronological datasets.

2 Introduction and Background

2.1 The Role of Task 4.6 within ARIADNE

WP4 Good Practices and Dissemination combines the tasks required for communicating information about the ARIADNE project with the work on Good Practices. These areas have been combined because it is not only important to understand the nature of Good Practices for and within the network, but to also make that information freely available to the domain. Task 4.6 builds upon the results of Task 4.5 (*Good Practices*), as reported in D4.4: *Initial Report on Good Practices*. A summary of the outcomes of D4.4 is presented in Section 4 of this document (below).

The focus of Task 4.6 is on the preparation and publication of a number of new Guides to Good Practice[1] aimed at non-IT-specialist archaeological researchers. These Guides explain how to organise different aspects of archaeological activity and documentation to maximise the opportunities for preservation and re-use within the ARIADNE Infrastructure. Content-providing partners within the ARIADNE project have contributed to the existing, formal Guides to Good Practice (the history of which is detailed below) allowing the Guides to be expanded according to the partner's areas of expertise and ensuring that European approaches to Good Practice are better represented. The Guides define data and metadata standards for the deposition and documentation of data and cover common data formats (text, spreadsheets, sound, video) as well as more discipline-dependent formats including GIS, geophysics, 3D photogrammetry and laser scanning. The existing wiki format of the Guides has lent itself to updating as a collaborative endeavour by a number of partners.

These contributions will further aid archaeological researchers with expanded and updated sections within the existing Guides to Good Practice, taking into account European practice, and further case studies highlighting European examples. This represents another important resource and contribution to the domain from the ARIADNE project as a whole.

2.2 Background – A Brief History of the Guides to Good Practice

This section highlights the history of work undertaken by the Archaeology Data Service (ADS) to produce a set of Guides to Good Practice focussed on documenting and preserving data created through archaeological research. This information has been previously outlined in D4.4.

In addition to its core role as a digital archive, ADS also has a responsibility to promote standards and provide guidance in best practice in the creation, description, preservation and use of archaeological information and technical advice to the research community. In 1998 it published the first two publications in a series of Guides to Good Practice covering *Aerial Photography and Remote Sensing Data* and *GIS*. Subsequently, four guides looking at excavation and geophysical datasets, CAD, and virtual reality were published between 1998-2002 and all drew together key authors and contributors to produce widely relevant guidance in applying recognised standards for the creation, preservation, and re-use of digital resources. The original guides sat within a much larger cross-disciplinary series of Guides to Good Practice published by the Arts and Humanities Data Service

(AHDS)[2], of which the ADS was then part. These guides have become widely used, cited, and endorsed by a number of key archaeological bodies in the UK including English Heritage and the Council for British Archaeology.

In 2006 ADS undertook the Big Data Project[3], funded by English Heritage, to look specifically at the practical issues raised in storing and disseminating large 3D datasets through three case studies covering marine survey, laser scanning, and Lidar data. The project included a data audit alongside a questionnaire survey and workshop aimed at 'big data' creators and produced a final report providing guidance in terms of both policy and practice for creating, storing, and accessing 'big data'. The project report also provided a key set of recommendations[4] for future research which have informed subsequent Guides to Good Practice projects.

Additionally, ADS involvement in the 2006-9 FP6 VENUS project[5] also looked at the preservation of large, complex marine survey datasets and the key role that data selection plays in producing robust and reusable digital archives. While the VENUS project aimed to develop scientific methodologies and tools for the virtual exploration of underwater sites, the ADS role focussed on the long term preservation of the project's digital outputs and resulted in the publication of a VENUS Guide to Good Practice[6] alongside an exemplar digital archive[7]. As with the Big Data Project, the VENUS project made a significant contribution to the subsequent revision and expansion of the Guides to Good Practice through the development of elements of the VENUS guide into a new general guide looking at marine survey data[8].

In 2009, and with the support from the Andrew Mellon Foundation, the ADS began working with Digital Antiquity (tDAR) partners in the United States at the University of Arkansas and at Arizona State University on a collaborative project to revise and extend the previous series of guides. In addition to updating the content from the original six guides, the new project covered marine survey – building on the VENUS project guide – and terrestrial remote sensing, as well as laser scanning[9] and close range photogrammetry[10]. A key element of the new project was the integration and restructuring of existing guidance so that common generic sections from the old guides were combined with new material to form new 'guide-wide' sections covering elements such as archival strategies, project level metadata, copyright and archive deposition.

The merging and restructuring process, aside from ensuring a homogenous and comprehensive set of new guidelines, also allowed an integrated workflow structure, with greater linking between common themes and elements between each guide or data type. The idea of a ‘complete workflow’ also allowed easy identification and variation of specific parts of the new guidelines, such as required deposit formats and metadata, to fit with the requirements of both the ADS and tDAR repositories. To allow future community updating, the Guides were also transferred to a wiki format.

Moreover, the current Guides also incorporate and revise a number of existing ADS project reports and working documents. Results and reports from projects such as the Big Data Project (looking at large datasets such as 3D and survey data) and the VENUS project (focussed on marine survey data) have provided studies of new types of data, often from outside the UK, upon which guidance and procedures have been created. The revision of the Guides has also allowed the incorporation of a number of internal ADS 'data procedure' documents thereby incorporating into the guides ingest

and archiving procedures of what could be considered ‘core’ or common file types such as text documents, spreadsheets, databases, images, digital audio and digital video.

As well as more formal revision of procedures, the ACE ('Archaeology in Contemporary Europe'') project provided a number of placements during 2012 which allowed students and professionals from Sweden, Greece, France, the Netherlands, and Poland to visit the ADS and receive training in digital archiving. A key component of the bursary was the application by the placement holder of ADS archiving procedures (specifically the Guides) to a dataset from their parent institution. The process of applying ADS archiving procedures to a familiar dataset allowed the bursary holder to familiarise themselves with the archiving procedure while also highlighting the applicability of ADS procedures to data outside of their usual geographic remit. This process proved to be valuable exercise and a number of case studies were produced and incorporated into the Guides to Good Practice[11].

3 Summary of Initial Report on Good Practices

This section provides a summary of the work presented in D4.4 *Initial Report on Good Practices.*

Task 4.5 (Good Practices), as reported in D4.4, aimed to survey and understand the nature of Good Practices currently in use by the content-providing ARIADNE partners. This in turn aids understanding as to how archaeological data is created, used and stored by the partners, and informs the way this data can best be incorporated into the ARIADNE infrastructure. Additionally, the survey has allowed the ARIADNE project to make an important assessment of how archaeological data is handled across Europe in terms of best practice. While the assessment was limited to the partners providing data to ARIADNE, and cannot be considered comprehensive, it formed a starting point from which general differences and similarities of practice were defined and reported.

3.1 Summary of Survey of Good Practice

The survey of Good Practices initially consisted of compiling individual reports, organised by partner organisation, outlining specific areas of expertise and good practice work, proposed areas of contribution to Task 4.6, and areas where individual organisations felt that they would benefit from good practice documents and procedures.

Each report from the survey provides a brief description and history of the organisation before detailing current areas of expertise, available guidelines, and good practice. These elements, alongside proposed areas of contribution and areas where they feel development is required, are summarised at the start of the report. The major themes that emerge from these individual reports are subsequently summarised and discussed in Section 3 of D4.4. Section 4 then proceeds to allocate these themes to discrete areas of contribution for Task 4.6 Guides to Good Practice.

The survey found that, while a number of partner organisations such as ADS, DAI, and DANS have developed generic good practice guides on file formats and metadata standards to inform the preservation and future re-use of archaeological data, for other partners 'best practice' reflects their procedures for undertaking specific areas of archaeological fieldwork or research, or simply reflect the design of recording systems such as databases.

3.2 Summary of Practice and Areas of Expertise

The survey identified seven major themes in terms of practice and areas of expertise. The themes provide the background for partner contributions to the Guides to Good Practice (Task 4.6). These specific areas of contribution are outlined in the subsequent Objectives section.

3.2.1 Digital Archives and Repositories

The survey identified that all ARIADNE partner organisations collect and store digital data at a variety of levels and that some partners actively research, publish, and promote guidelines and best practice

documents for the digital preservation of archaeological datasets. The general focus of these organisations in terms of expertise is on ingestion, storage, preservation, and dissemination of archaeological data and incorporates consideration of file formats for preservation and dissemination, and metadata specifications. It was identified that a number of previous joint projects, alongside a history of close collaboration, have resulted in a level of cooperation between organisations in the development of guidelines.

3.2.2 National Databases

Most, if not all, ARIADNE partners involved in Task 4.4 host, maintain, or populate some form of national archaeological or cultural heritage database. These databases vary in both scale and content from national fieldwork and museum databases to smaller regional or type-specific databases and repositories. While not guidelines themselves, these large databases exist as structured systems for storing data and implicitly promote a way of recording information. Additionally, these databases vary both in terms of functionality and access with some systems moving beyond simply recording records of archaeological work to include associated documents and files.

3.2.3 Excavation and Field Survey Data

Full datasets resulting from fieldwork and measured surveys are stored by a number of organisations separately to any centralised record or report. For some organisations there is a 'closed loop' relationship between those who create these data and those who store the resulting datasets resulting in little to no conflict between the type of data being created and the ability of that organisation to store and access it. In such cases, best practice documents and guidelines are highly specific to the work undertaken by the organisation whereas organisations who do not undertake fieldwork necessarily have a broader range of guidelines which aim to cover most possibilities.

3.2.4 Geophysical Survey Data

Geophysical survey data was highlighted as both an area of expertise for some partners and one that, for others, requires the development of more guidance. As with excavation datasets, ARIADNE partner organisations are involved with geophysical data at a variety of levels from the creation of geophysical datasets through to the archiving and storage.

3.2.5 Aerial Survey Data: Lidar and photography

Aerial survey data was also highlighted as an area of both expertise and one for further guidance development. New digital techniques and capture methods have introduced various new issues alongside new applications. A number of partners were identified as being actively involved in the capture of aerial survey data while others are focussed more on the storage and dissemination of such datasets.

3.2.6 3D Datasets

A number of ARIADNE partners were identified as having expertise in 3D datasets or a need for further development of guidance for this type of data, taken here to primarily include datasets resulting from techniques such as terrestrial laser scanning and photogrammetry alongside models and visualisations derived from a number of acquisition methods. A range of expertise was identified covering the complete lifecycle of 3D data from creation to archiving Partner involvement ranged from the acquisition of 3D data in the field through to developing repository and research platforms for data storage, dissemination and documentation. Partners are also involved in the production of guidelines for the creation, documentation, and preservation of 3D datasets.

3.2.7 Scientific Analysis and Dating

A number of partner organisations expressed an interest in developing and sharing best practice with regard to scientific techniques and dating methods including the development of a dendrochronology guide. In addition, experience in a range of scientific techniques for the analysis and dating of archaeological material was highlighted.

3.3 Objectives

From the seven themes identified during Task 4.5, D4.4 established five areas of work to form the basis for the contributions to the Guides to Good Practice. These five areas of work, described in full in D4.4, form the objectives of Task 4.6. These specific objectives do not match on a one-to-one basis with the seven themes discussed in the previous section and the production of case studies and alignment of existing guidelines is planned to occur over a number of themed areas.

The specific objectives associated with Task 4.6 *Guides to Good Practice* are:

- The alignment and referencing between existing Good Practice documents
- The development of case studies applying relevant areas of existing Good Practice documents to specific data sets held by ARIADNE partners.
- The alignment and referencing of forthcoming Good Practice documents, specifically those being created under the ArchaeoLandscapes and 3D-ICONS projects.
- The development of existing 3D guidelines – either through case studies or the extension of existing documents – focussed on the preservation, dissemination, and documentation of 3D models and visualisations.
- Production of a new dendrochronology guide led by DANS.

These areas of work are described in more detail in Section 4 of D4.4.

4 Guides to Good Practice

This section provides an overview of the individual Guides to Good Practice and case studies produced by Task 4.6 in line with the previously described Objectives.

4.1 Dendrochronological Data in Archaeology: A Guide to Good Practice

The guide *Dendrochronological Data in Archaeology: A Guide to Good Practice*[12] has been contributed by DANS and authored by Prof. Esther Jansma (Cultural Heritage Agency and Utrecht University, The Netherlands) and Peter Brewer (Laboratory of Tree-Ring Research, University of Arizona). The guide was published online in June 2015 and was later updated with the addition of a case study (described below) in June 2016. The guide addresses the need to provide guidance for the production, documentation, and storage of dendrochronological datasets and incorporates existing good practice developed by organisations in the Netherlands and the United States, specifically the Tree Ring Data Standard (TRiDaS).

Figure 1. Screenshot of the guide *Dendrochronological Data in Archaeology: A Guide to Good Practice*

4.1.1 Aims and Objectives

The guide serves as a good-practice guide for the collection and archiving of dendrochronological data in the context of archaeological and historical research. The guide is aimed at both those creating dendrochronological datasets, and those that commission dendrochronological analyses. The guide does not cover the methods involved in dendrochronological analyses, but focusses on how to describe and archive the data and metadata involved in these analyses. The guide briefly describes the application of dendrochronology within an archaeological context and provides specific examples and use cases. The guide then outlines the relationship between data and metadata within dendrochronological analysis.

4.1.2 Creating Dendrochronological Data

Section 2 of the guide describes the project planning and requirements relevant to dendrochronological datasets including references to national guidelines for dendrochronological analyses. This section provides an overview of data formats currently in use by the dendrochronological community, recommended file naming conventions, and data structures. Documentation and metadata used while creating data is also discussed and the TRiDaS data model is introduced (Figure 2)

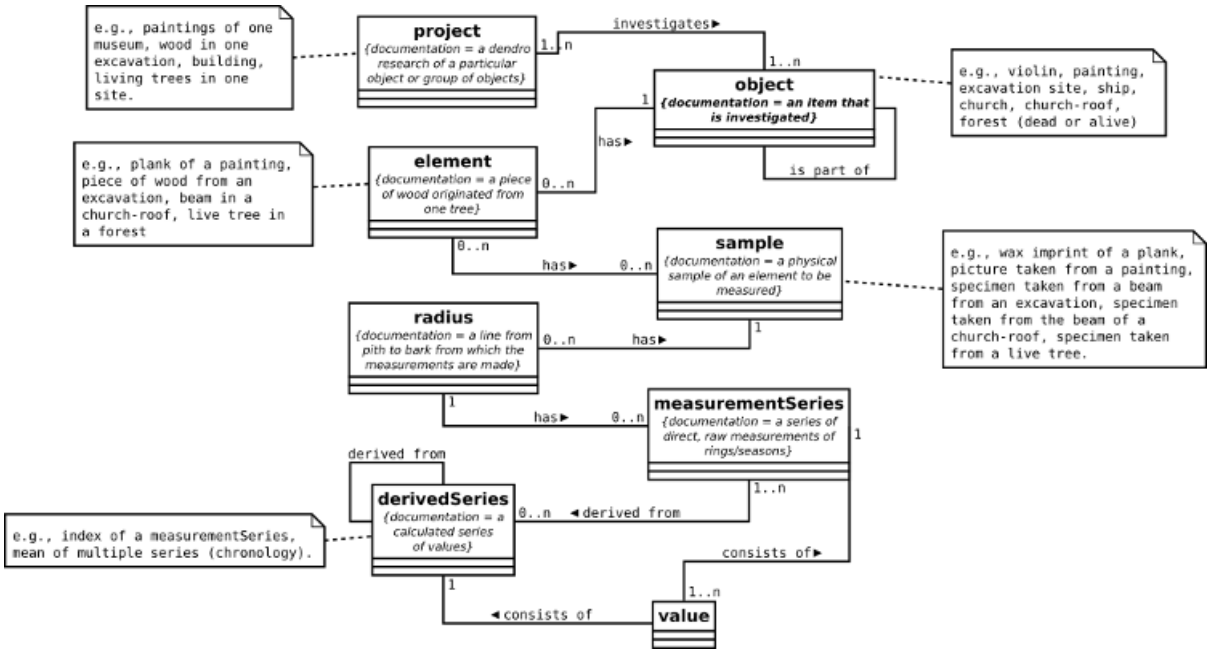

Figure 2. The TRiDaS data model.

4.1.3 Archiving Dendrochronological Data

Section 3 of the guide is focussed on archiving dendrochronological data and discusses the key elements of data selection, file formats, and documentation and metadata. This section provides a wide overview of file formats currently in use for the storage of dendrochronological data and

describes their suitability for storing data alongside a TRiDaS metadata file. Additionally, the guide goes on to discuss data conversion and the TRYCYCLE data conversion tool.

The TRiDaS data model is discussed in detail in this section and metadata fields are listed and defined along with guidelines on their implementation and use. The guide then briefly discusses copyright and IPR considerations specific to dendrochronological datasets. A case study is then presented in Section 5 (see below, section 5.3).

4.2 3D Datasets in Archaeology: A Guide to Good Practice

The guide *3D Datasets in Archaeology: A Guide to Good Practice*[13] has been contributed primarily by DAI in collaboration with ADS and DANS and authored by Martina Trognitz (IANUS, DAI), Kieron Niven (ADS), and Valentijn Gilissen (DANS). The guide is largely based on a German guide produced by IANUS in 2014 and was published online in the Guides to Good Practice in August 2016. The guide will be later updated with the addition of a case study during winter 2016. The 3D guide addresses the need to provide guidance for the production, documentation, and storage of 3D datasets, specifically 3D models, and is designed to complement and align with existing Guides focussed on data creation and digitisation, specifically those on Laser Scanning, Photogrammetry, CAD, and Structured Light Scanning. Additionally, the 3D guide also incorporates and aligns with existing good practice guides developed by the 3D-ICONS project[14] and refers heavily to this project's work on data creation pipelines.

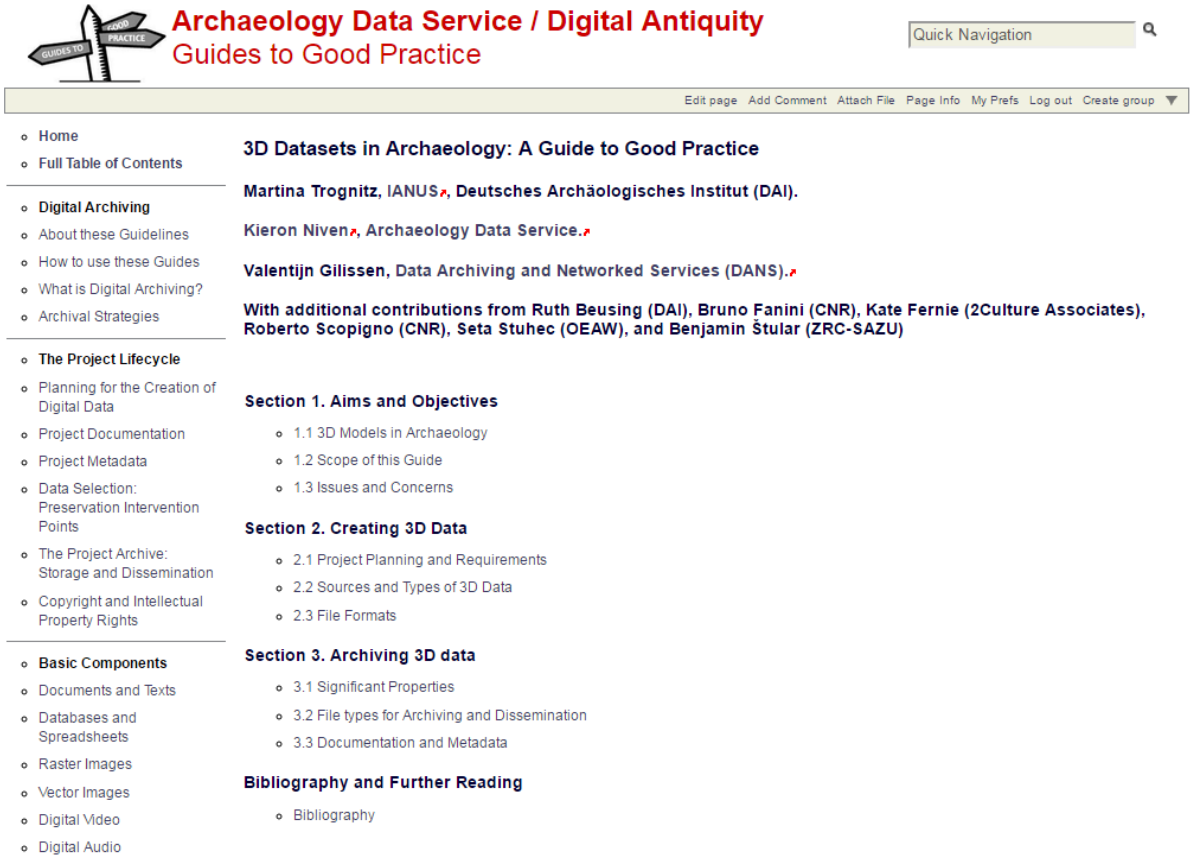

Figure 3. *3D Datasets in Archaeology: A Guide to Good Practice*

4.2.1 Aims and Objectives

The 3D guide aims to 'fill a gap' in existing technique-specific guidelines (laser scanning or photogrammetry) by focussing specifically on the preservation and documentation of 3D models. Such models are usually produced towards the end of a data acquisition and processing workflow (or "pipeline", as described by the 3D-ICONS guidelines), the start of which can be any number or

digitisation or data acquisition techniques. While the preservation and documentation of data from these specific techniques is covered in other individual guides, in situations where techniques are combined, or where data is incorporated from other sources, the archiving of final 3D models can be complicated. The 3D guide thus deals with these models in isolation while referring to other existing guides for context within wider workflows.

4.2.2 Creating 3D Data

Due to the complexity often involved in the creation and documentation of 3D data, the guide provides an overview of project planning and requirements and discusses specifically the principles set forward in the London Charter[15] regarding the creation of well-documented and intellectually rigorous computer-based visualisations.

Sources of 3D data, such as laser scanning or image-based modelling, are then outlined alongside a description of the main types of model geometry (point clouds, meshes, NURBS, etc.), significant properties, and characteristics. This section of the guide also describes various techniques that can be applied to model creation together with elements that are used within interactive virtual reality models.

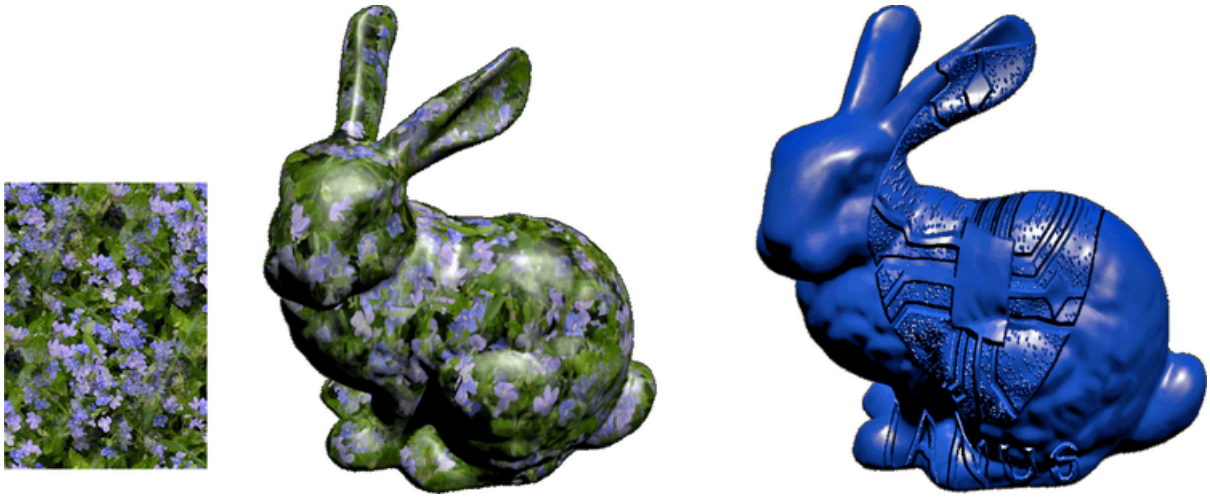

Figure 4. Image from Section 2.2 (Figure 3) of the 3D guide illustrating the use of textures and bump mapping

Under the heading of Data Creation, the guide also provides an extensive summary of common file formats used for the creation and storage of 3D models. This summary includes a description of the format and, importantly, an indication of whether the format is suitable for long-term data preservation.

4.2.3 Archiving 3D Data

Section 3 of the 3D guide focusses specifically on the elements needed to ensure the preservation of 3D models. The guide lists specific file formats suitable for data preservation and discusses alternative formats for the dissemination of such data. Metadata and documentation requirements

are discussed in the subsequent section and a proposed set of metadata elements specific to 3D models, to be used in conjunction to metadata sets described in related Guides, are outlined. In addition, broader developments in regard to specific metadata sets for 3D data are highlighted such as the CARARE2 and CRMdig schemas.

4.3 Case Study: The Dendrochronology of the Early-medieval Emporium Dorestad (the Netherlands)

The case study *The Dendrochronology of the Early-medieval Emporium Dorestad (the Netherlands)*[16] has been contributed by DANS and authored by Prof. Esther Jansma (Cultural Heritage Agency and Utrecht University, the Netherlands). The case study was published online in June 2016 and was added as Section 5 to the existing dendrochronology guide. The case study provides a real-world worked example of the reanalysis of dendrochronological data using the Tree Ring Data Standard (TRiDaS) and associated tools.

Archaeology Data Service / Digital Antiquity
Guides to Good Practice

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Section 5. Case study: The Dendrochronology of the Early-medieval *Emporium* Dorestad (the Netherlands)

At the end of the seventh century Dorestad, situated near present Wijk bij Duurstede in the central part of the Netherlands, functioned as the centre of a flourishing North-Sea trade network (Jansma & Van Lanen 2016).[1] Located near the rivers Rhine and Lek it was important to the Frisian- and Carolingian world and many other parts of north-western Europe. Excavations at Dorestad started in the 1960s and have continued for decades. Dendrochronology was applied to its water wells and foundation piles in 1972-1974 at the Institute for Wood Biology (now Zentrum Holzwirtschaft) at Hamburg University, in 1990 at the Dutch national archaeological service ROB (predecessor of the current Cultural Heritage Agency of the Netherlands (RCE)), and in 1996-1997 and 2009-2011 at the Netherlands Centre for Dendrochronology/RING Foundation. The early research at Hamburg University already showed that many oak barrels re-used as water wells in Dorestad had been assembled in the German Rhineland (Eckstein *et al.* 1969). The material archive of the Dorestad excavations at present is stored in the depot of the National Museum of Antiquities (RMO) in The Hague.

Starting in 2011 the dendrochronological potential of Dorestad was reassessed in order to develop additional geographical and chronological information about the Dorestad excavations and about the trade and exchange network(s) in which Dorestad was a key player. The work consisted of:

1. Analysing a subset of uninvestigated yet dendrochronologically-suitable oak timbers and reanalysing available dendrochronological data from Dorestad in order to increase the chronological resolution for this site;
2. Creating an inventory of wood finds from - and dendrochronological results pertaining to - Dorestad in order to facilitate reanalyses and new research of this material;
3. Comparing dendrochronological data from exogenous oak (*Quercus robur/petraea*) excavated in Dorestad to other Early-medieval datasets, in order to identify common exogenous provenance and to improve our knowledge about the network(s) in which Dorestad was a key player;
4. Storing and unlocking new results using the DCCD repository (see Section 5.3; Jansma *et al.* 2010; Jansma 2013), in order to facilitate more follow-up research.

5.1 (Re)analysis of Wood from Dorestad

Twelve well-preserved and as yet unanalysed oak samples were selected for dendrochronological analysis, focussing on relatively early structures in Dorestad. None of these samples contain sapwood, which implies that successful dating only can result in *terminus post quem* (*tpq*) dates of the calendar years in which the trees were felled. Of this group two samples could be dated absolutely, yielding *tpq* dates after AD 489 and 643.

Sample metadata were administrated using the MS Access format TRiDaBASE database following the requirements of TRiDaS (table 1; sections 2.1 and 2.3; Jansma *et al.* 2010).[2] Using TRiDaBASE the metadata were exported to XML, which was uploaded to the DCCD together with the measurement series. The results were stored in the DCCD using the project identifier P:2011501 (Figs. 1-7), with the default level of access set at 'value (download)'. This access level ensures all DCCD members have full access to and can download the project file including the measurement series.[3]

Although the reanalysis of existing data did not result in new dates, it did enable the identification of elements derived from the same individual tree. In addition we noted a marked discrepancy between the end dates of staves from the same individual barrels (up to a hundred years; Jansma & Van Lanen 2016). This indicates that the dendrochronological date of barrels cannot be determined with any accuracy by studying only a limited number of staves, which due to financial considerations, amongst others, is quite common in archaeological research.

Figure 5. Case study: The Dendrochronology of the Early-medieval Emporium Dorestad (the Netherlands)

The case study describes the four elements of work undertaken in order to reassess the dendrochronological potential of the early-medieval 'Emporium' of Dorestad in the Netherlands. The first element consisted of analysing a subset of uninvestigated oak timbers and reanalysing available data in order to increase the chronological resolution for this site. This work demonstrates the use of the TRiDaBASE database tool to export metadata to the online DCCD repository.

The second element of work focussed on creating an inventory of wood finds and results in order to facilitate reanalyses and new research. Again, this element highlights the use of the TRiDaBASE tool to import and enhance metadata and to export it to a single format.

The third element of work discussed in the case study looks to compare dendrochronological data to other early-medieval datasets. This work involved, among other elements, digitising measurement series and research reports, and reformatting digital measurement files. Associated metadata were improved and expanded according to the fields defined by TRiDaS using TRiDaBASE.

The final element discussed in the case study focussed on the storing and unlocking new results using the DCCD repository in order to facilitate more follow-up research. The case study briefly discusses the two main approached to entering data into the DCCD repository and their implications in terms of work required and on accuracy of results.

4.4 Case Study: Selection and Retention of Files in Big Data Collections: The Example of the Pergamon Excavation of the DAI Istanbul

The case study *Selection and Retention of Files in Big Data Collections: The Example of the Pergamon Excavation of the DAI Istanbul*[17] has been contributed primarily by DAI and authored by Felix Schäfer (DAI). The case study was published online in the Guides to Good Practice in August 2013. The case study looks at 'big data collections' created through long, multi-phased and multi-disciplinary processes of generating, transforming and finalizing data. Such datasets, while large in themselves, also require storage of files at multiple levels covering multiple phases, file formats, applications, and stages. The case study addresses two basic questions: the selection of data from large datasets, and the best way to document such datasets so that the processes, relationships, and dependencies can be easily understood.

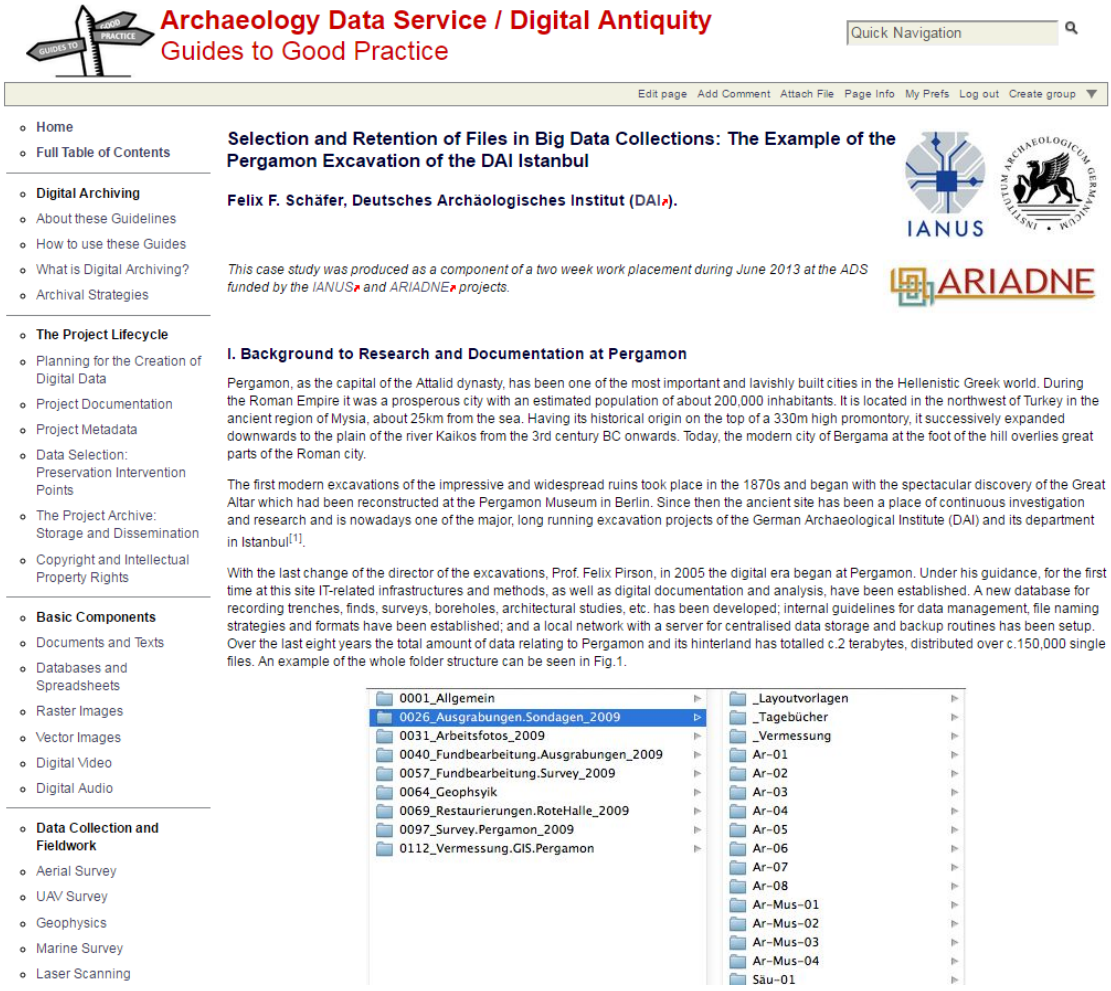

Figure 6. Case Study: Selection and Retention of Files in Big Data Collections: The Example of the Pergamon Excavation of the DAI Istanbul

In order to address these questions, the case study uses excavation data from the DAI project at Pergamon together with the Guides to Good Practice sections on Data Selection, Photogrammetry, and Laser Scanning as the theoretical basis.

The case study first describes the documentation process and workflow for the production of data at different stages of the excavation. This process includes the initial creation of digital images, their subsequent conversion, and storage in a hierarchical folder system (figure 7).

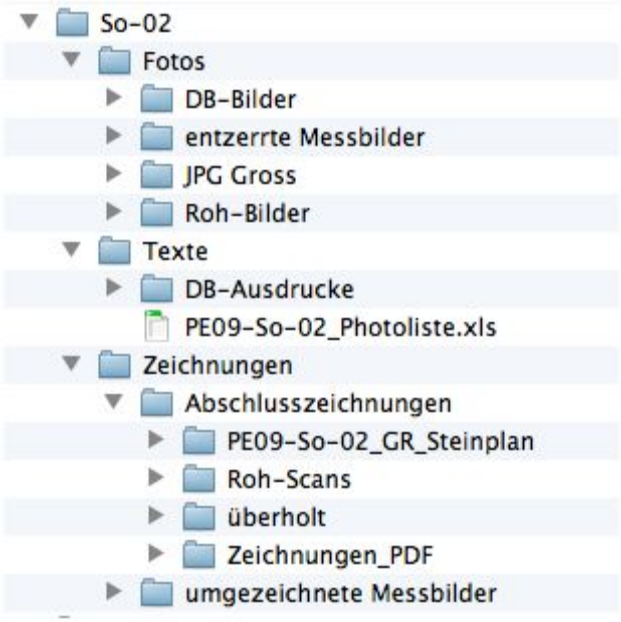

Figure 7. The folder system used to store project data for the Pergamon Excavation.

Subsequent steps are then described in terms of the data they generate and the documentation produced. These steps include the collection of survey point data, georeferencing and rectification of images, and the processing of files in CAD software.

The case study, after describing the data creation process, then examines the entire dataset in terms of file formats and their suitability for preservation (or conversion to preservation formats). This analysis is then expanded on through a detailed step-by-step analysis of the data creation process within against four main criteria for data selection.

Once the main data types for preservation have been identified, the case study then examines the metadata and documentation required in order to understand not just the individual files but also the entire workflow process, including the interdependencies of different file types, the implications for management of folders and files, and information about the decisions regarding which files are archived, which are disseminated, and which are not.

5 Final Work

In addition to the Guides and case studies described in section 5 of this report, one guide and one additional case study are planned for completion prior to January 2017. These contributions have not been reported in full in this report due to the timing of this deliverable but are briefly summarised below. These additional contributions will be made available from the Guides to Good Practice website as and when they are completed.

5.1 RTI Guide

A guide focussed on the preservation and documentation of Reflectance Transformation Imaging (RTI) datasets is currently in draft form. This guide has been contributed primarily by ADS with contributions from DAI. The RTI guide addresses the need to provide preservation guidance for what is becoming an increasingly popular technique for the creation of interactive RTI 'images'. The guide incorporates current guidelines for data acquisition and processing produced by Cultural Heritage Imaging (CHI) and Historic England and naturally extends this to include data selection, preservation and documentation considerations. The guide will also reference and incorporate elements, where possible, of the recently produced DAI guidelines for RTI datasets (currently only available in German).

5.2 3D Guide Case Study

A case study for the guide *3D Datasets in Archaeology: A Guide to Good Practice* is also planned to be added to the Guides. The case study is intended to complement the existing guidelines through the illustration of data creation processes, data selection, and the creation of metadata and documentation using a real world dataset.

6 Conclusions

The initial survey of ARIADNE partner organisations carried out as Task 4.5 highlighted the existence of a variety of guidance and Good Practice documents. These documents reflect a broad range of expertise and function while also highlighting a number of specific themes which have formed the objectives for work to be carried out under Task 4.6 *Guides to Good Practice*. The objectives, as outlined in section 4.3 of this report, included:

- The alignment and referencing of existing Good Practice documents.
- The creation of case studies illustrating the application of Good Practice documents to specific data sets for which no good practice currently exists.
- The referencing and incorporation of guidelines currently under production through the ArchaeoLandscapes and 3D-ICONS projects into existing guidelines and the illustration of these guidelines through relevant case studies.
- The revision, creation or enhancement of guidelines for 3D datasets.
- The creation of guidelines for data from scientific dating and analysis, specifically dendrochronological datasets.

In conclusion, Tasks 4.5 and 4.6 have successfully met these objectives and have produced a number of new and much-needed guidelines which individually incorporate one of more of the areas identified for contribution. The new guides and case studies have successfully incorporated existing material and guidelines from a wide range of sources, ranging from the outputs of other collaborative projects such as 3D-ICONS through to organisation-specific guidelines produced by project partners such as DAI and DANS. Additionally, case studies have been used both within individual guides and as stand-alone contributions, to successfully illustrate the application of data selection, archiving, and documentation procedures to real-world datasets. When viewed together, the outputs of Task 4.5 and 4.6 highlighting that, while language, procedure, and the archaeology itself may vary widely between countries and institutions, the data that arises from archaeological investigations and projects, irrespective of geography, share common elements that allow guides for good practice to be commonly developed and widely applicable.

7 References

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