ÖAW ÖSTERREICHISCHE AKADEMIE DER WISSENSCHAFTEN

ÖREA Institut für Orientalische und Europäische Archäologie

‘A puzzle in 4D’: using semantic technologies for the integration of resources from a long-term excavation project

Tell el-Dabᶜa
PUZZLE IN 4D

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CAA 2019, Krakow

ÖREA Institut für Orientalische und Europäische Archäologie

acdh austrian centre for digital humanities

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www.ariadne-infrastructure.eu

ÖAW

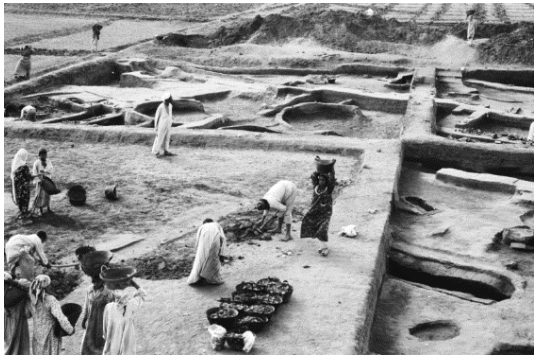
1) Introduction to A Puzzle in 4D
   i. Tell el-Daba: Archaeological site and excavations
   ii. Project ‘A Puzzle in 4D’: Aims and challenges
2) Data integration
3) System architecture & Workflow
4) Next (final) steps

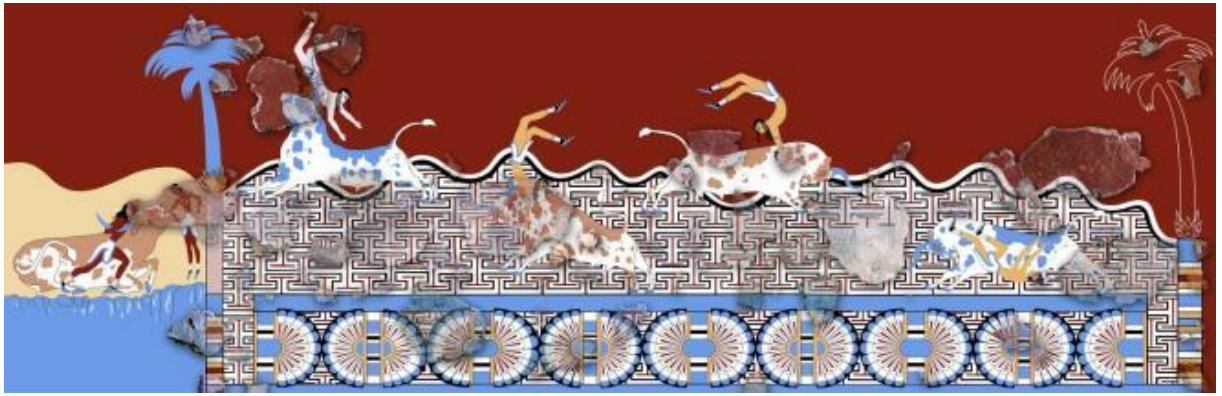
Tell el-Dabᶜa
PUZZLE IN 4D

1) Introduction

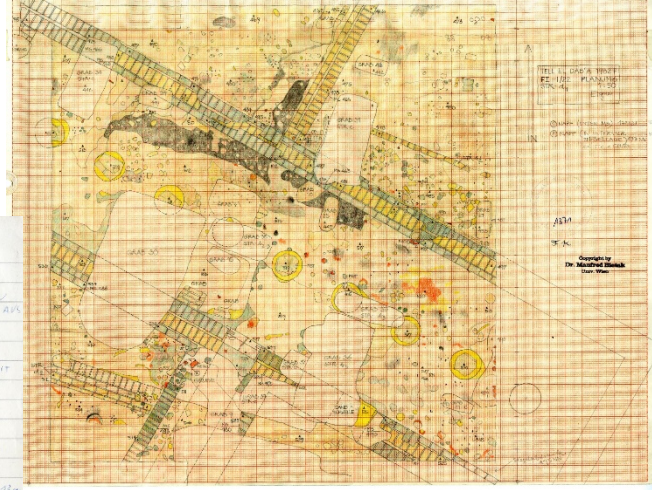
Tell el-Daba (eastern Nile delta)

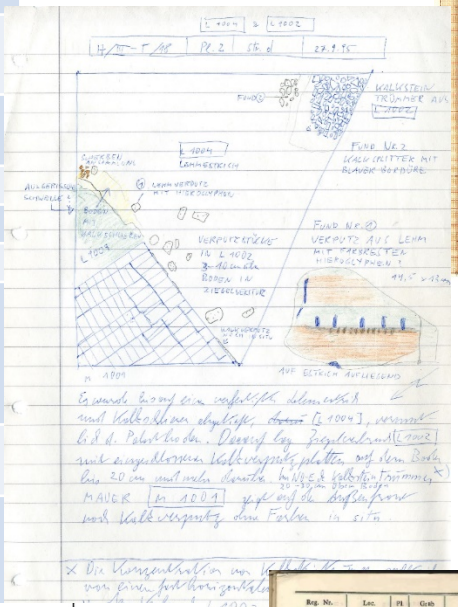
- 12th – 18th Dynasty (early second Millenium BC)
- Wealthy society, contacts to eastern Mediterranean and Minoan culture
- Fieldwork since 1966 (88 campaigns)
- Austrian Archaeological Institute (M. Bietak, I. Forstner-Müller)

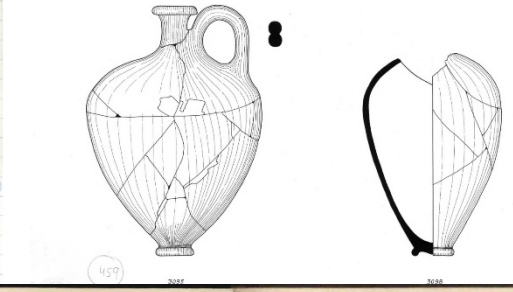


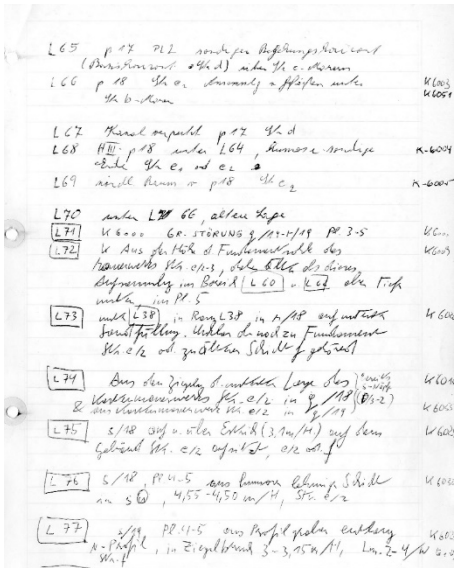


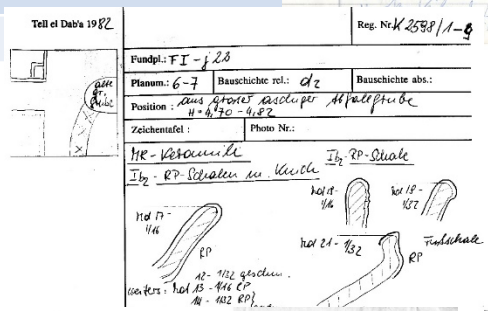
Analogue Resources	Estimated number @OREA
Dias (colour)	45 000
Fielddrawings	3700 (Vienna), 800 (Kairo)
Fotonegative (B/W, col)	68 000
Find drawings	23 200
Findsheets	10 Folders
Diaries	15
Inventories	14 207 (Wien), 200 (Kairo)
Konvolute cards	1000 (Wien), 9000 (Kairo)
Protocols, Lists	681
Plans	1000

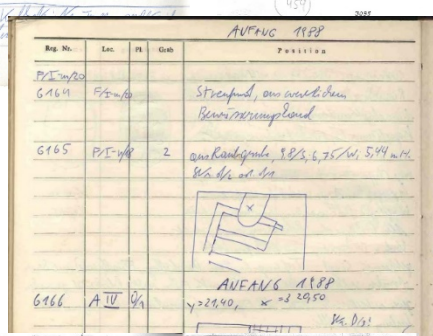


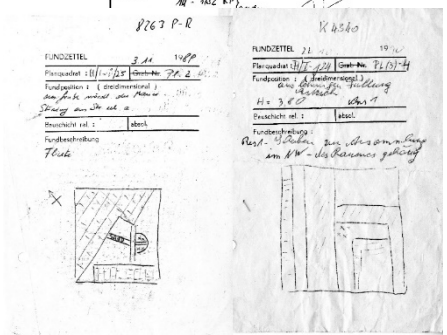


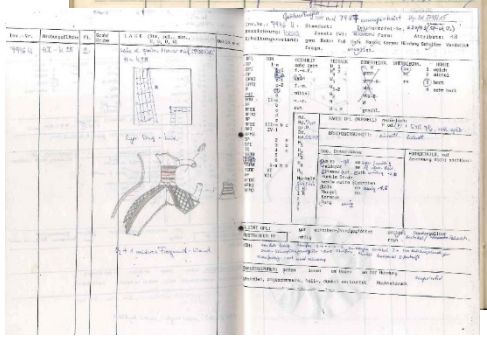


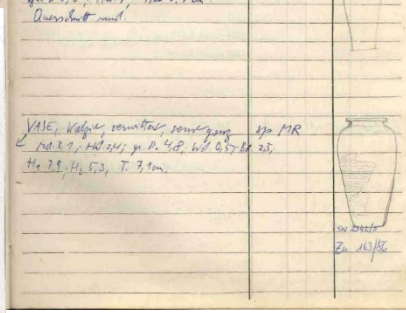












Digital resources	Fileformat	Number
AutoCAD	.dwg	1433
Databases	.mdb, fp5, fp7	112
GIS		
GIS	.tif, .jpg, adf (TIN), .shp	71
HTML	.html	260
PDF	.pdf	1659
Graphics and Photos	.jpg	116 523
	.gif	1450
	.tif	63 766
	.tiff	2
	.nef	10 773
	.png	147
	.psd	15631
Tables	.xls	944
Text	.doc/x	476
	.txt	177
XML	.xml	233
Vector graphics	.ai (Adobe Illustrator)	1442
	.cdr (Corel Draw)	713
	.indd (Indesign)	2
	.eps	65
	.dwf	11
Videos	.avi	9

A puzzle in 4D: digital preservation and reconstruction of an Egyptian palace

Project aim:
To provide digital long-term preservation of resources from Austrian excavations at Tell el-Daba (Egypt)

- February 2015 – January 2020
- Funding: Austrian National Foundation for Research, Technology & Development (DH 2014/12)
- Main cooperation partners: OREA & ACDH (Austrian Academy of Sciences)
- Supported by ARIADNE

OREA Institut für Orientalische und Europäische Archäologie

austrian centre for digital humanities

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Tell el-Dabᶜa PUZZLE IN 4D

A puzzle in 4D: challenges

- Create a data model
- Integrate the metadata (and data)
- Develop a workflow for digitization, metadata creation and ingest of data and metadata into a repository
- Technology stack

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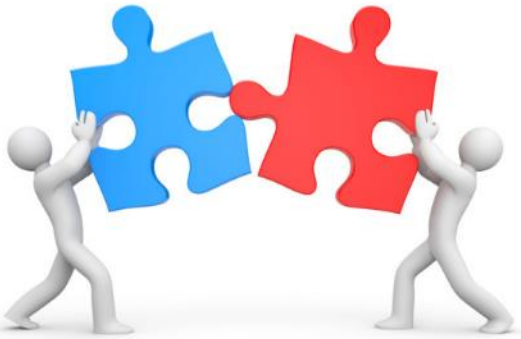
PUZZLE IN 4D

2) Data Integration



The Puzzle in 4D approach….

- … influenced by ARIADNE approach
- Data model compliant with the CIDOC CRM ontology
- Semantic technologies for data integration to be able to work with the complex relations between the different resources

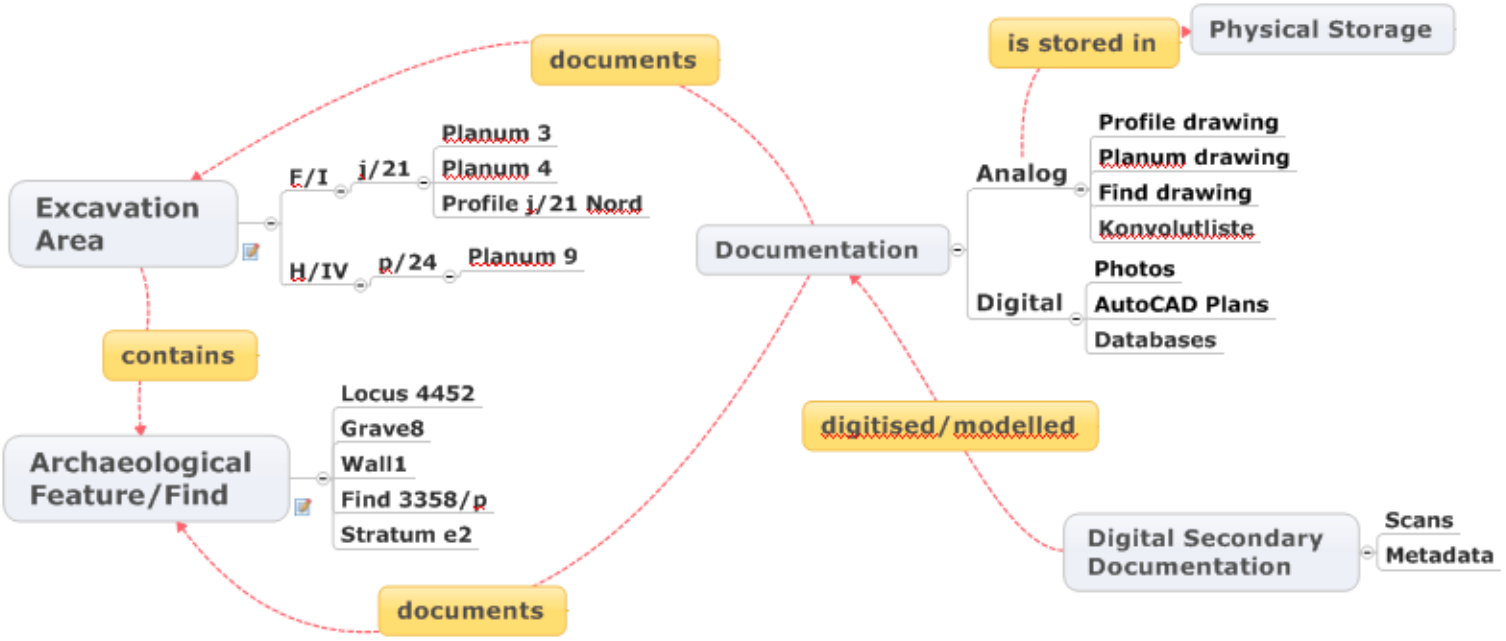
CIDOC CRM CONCEPTUAL REFERENCE MODEL

ARIADNE www.ariadne-infrastructure.eu

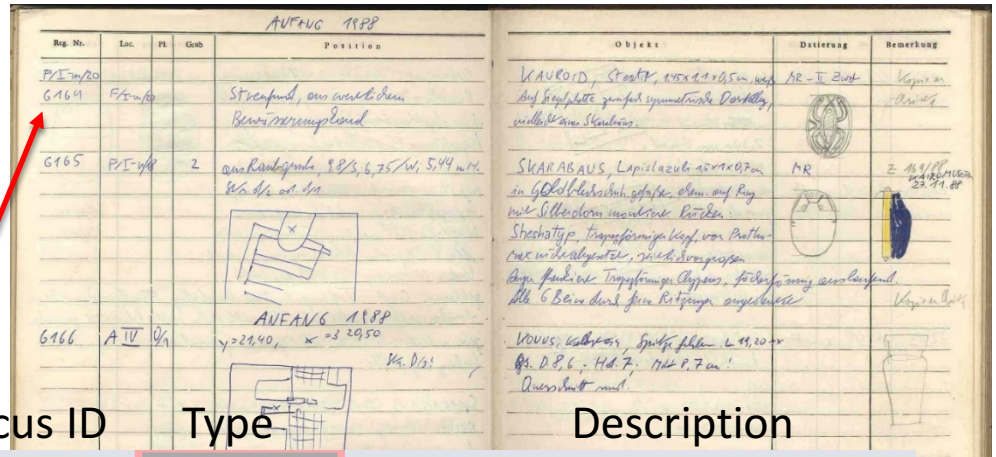
Data model: CIDOC CRM

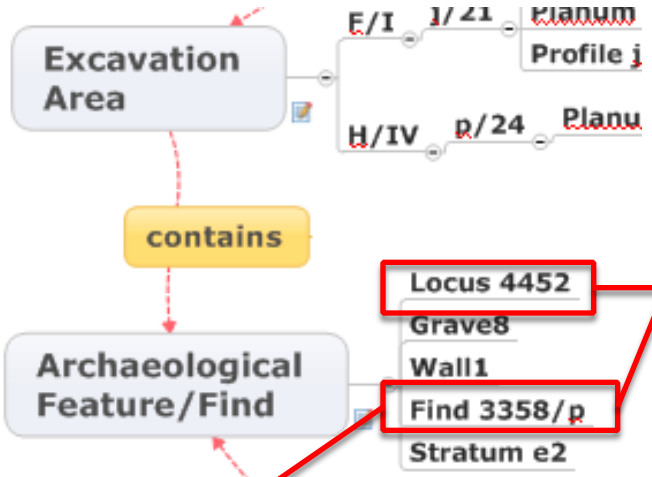
What questions do we want to answer with Metadata created from analogue sources?

- All documents of a specific **excavation area** – or **archaeological feature/find types** (grave, wall , vase, ….) – or specific **archaeological features/finds** (e.g. grave 5 in area Area F/1)
- All **archaeological features/finds** of a specific **type** in an **excavation area** (all graves in area F/1)



Integration of resources





Locus ID Type Description

Nummer	Kategorie	Beschreibung
L6153	Schicht	Sandschicht, darauf Steinsplitter, ve
L6154	Schicht	Füllschutt, Lehmziegel, in Innenraun
L6155	Grube	flache Grube, schneidet in L6035 ein,
L6156	Grube	Grube, tief, mit Lehm gefüllt, Tonsch
L6157	Grube	Grube gerundet rechteckig, NNO-SS
	reppe	Gestuckte Treppe, führte von L6106

Inventory

INVNR	PHOTO	AREA	PL	GI	FINDN	DAT	TYPE	ZN	WA	FAB	FEINI	TECH	BODEI	BR	HA	MI	HD	Trep
0178	2783/05	AII-I12		2	bur 3	E1	TEY krug	66/034	SPI	Id	f	W2	W gef	re	3	2.8	1.2	
0179		AII-I12		2	bur 3	E1	TEY krug	66/036	SPI	Id	f	W2	W gef	re	3	2.7	1.2	
0180	2783/06	AII-I12		2	bur 3	E1	TEY krug	66/034	SPI	Id	vf	W2	W gef	re	3	2.7	1.3	
0181	2783/07	AII-I12		2	bur 3	E1	TEY krug	66/034	SPI	Id	f	W2	W gef	re	3	2.8	1.3	
0182	2783/08	AII-I12		2	bur 3	E1	TEY krug	66/034	SPI	Id	f	W2	W gef	re	3	2.8	1.3	
0183	2783/09	AII-I12		2	bur 3	E1	TEY krug	66/034	SPI	Id	vf	W2	W gef	re	3	2.7	1.4	
0184	2783/10	AII-I12		2	bur 3	E1	TEY krug	66/039	SPI	Id	f	W2	W gef	re	3	2.75	1.2	

3) Workflow & technology stack

Aim: to develop a system with open and well-defined interfaces

Data is the most important asset!

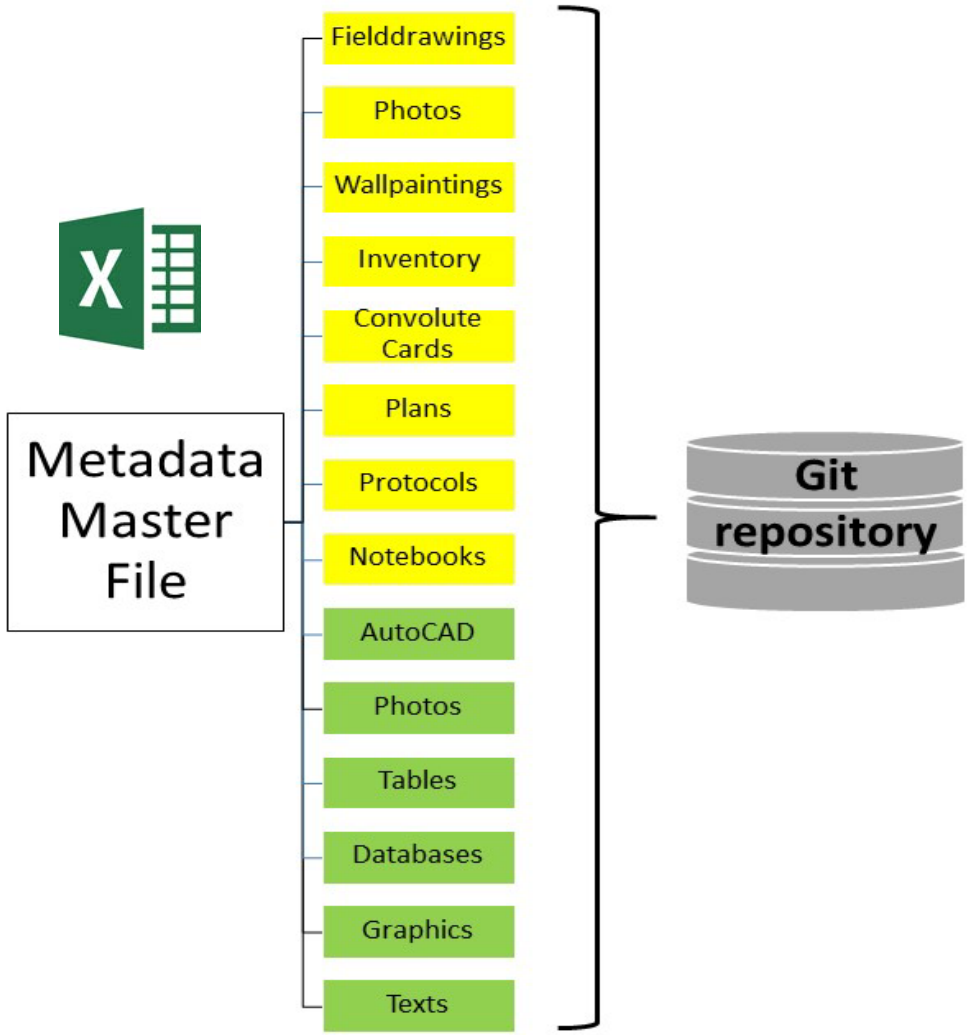
3 components:

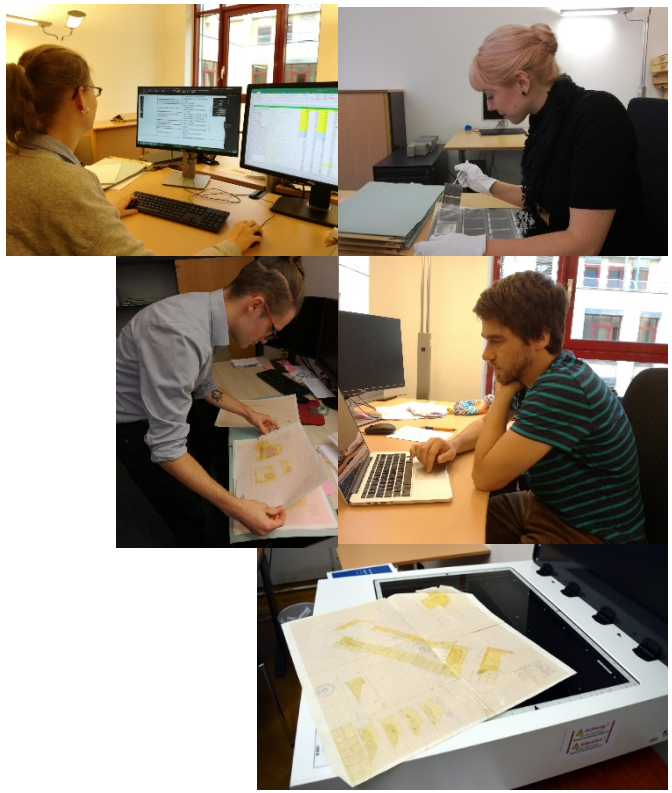
A. Data Creation & Curation

B. Data Integration, Storage & Archiving

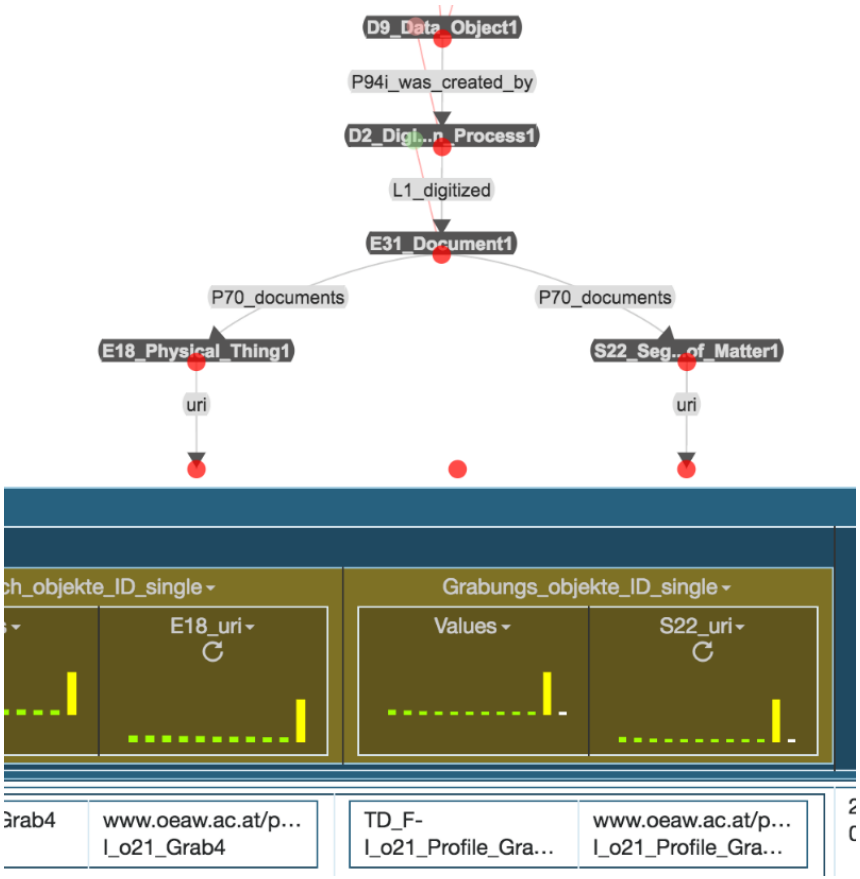
C. Data Presentation & Publication

A. Data Creation & Curation





B. Data integration, storage & archiving



Transform Excel to CIDOC CRM and extensions using Karma tool

Integrate data of different sources (Field Drawings, Fotos, Controlled Vocabularies…)

Ingest into triple store and/or to the repository

Repository - ARCHE

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

- Based on Fedora 4 (major changes between Fedora versions 3 and 4, v.3 EoL 2015)
- + own implementation in PHP (https://github.com/acdh-oeaw)
- + own custom metadata schema with support for (and mapping to) other formats

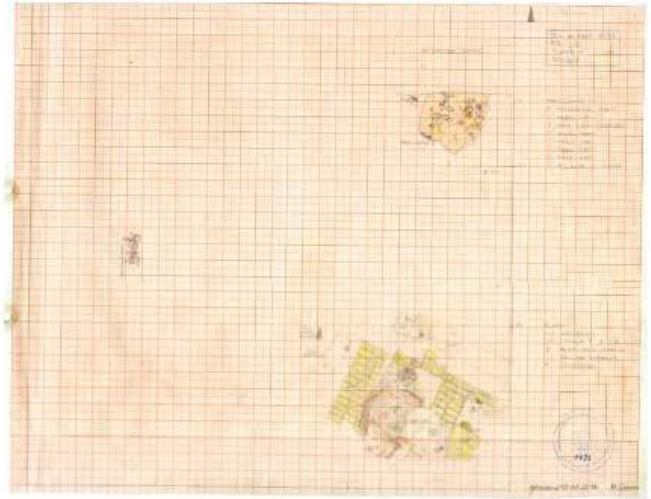
C. Data presentation & publication

https://4dpuzzle.orea.oeaw.ac.at/

field drawing: TD_FZ_1026

document id	TD_FZ_1026
document type	Feldzeichnung
document subtype	Planum
scan	https://4dpuzzle-iiif.acdh.oeaw.ac.at//TD_FZ_1026__TD_F-I_j21_Planum1/info.json
site	TD
area	F-I
square trench	j21
planum	1
perspective of drawing	
stratum comment	
drawn by	
year	1979
season	H
month	
scale	1:50
paper type	Millimeterpapier
archaeological object	
excavation object	TD_F-I_j21_Planum1

Zoom In Default Zoom Out Full Sceen



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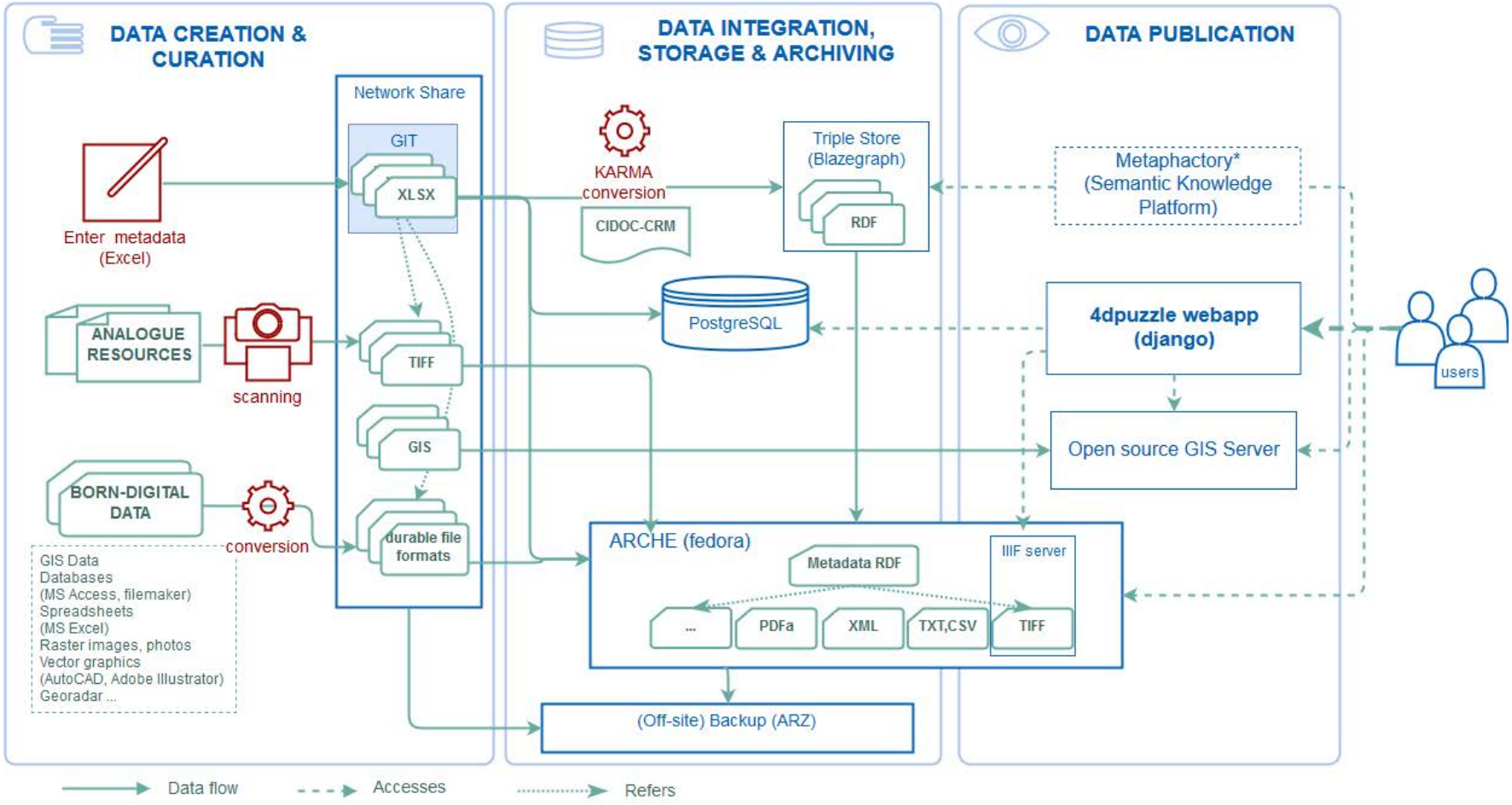
System architecture and workflow



Final steps

- Begin Ingest
- Finalize data model and web application
- Update all documentation and workflow

Thank you for your attention!

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