

Archiving digital and analogue resources of the Tell el Daba excavations: the 'A puzzle in 4D' project

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A puzzle in 4D:

Digital Preservation and Reconstruction of an Egyptian Palace

Edeltraud Aspöck, Karin Kopetzky, Gerald Hiebel

OREA

- Barbara Horejs
- Edeltraud Aspöck
- Manfred Bietak, Karin Kopetzky
- Angela Schwab

In co-operation with

- Austrian Center for Digital Humanities
- **Ludwig Boltzmann Institute ArchPro**
- Chicago University
- Österreichisches Archäologisches Institut, Grabung Tell el Dab'a
- Archaeology Data Service
- PIN Scri - Polo Universitario "Città di Prato"

Tell el Daba (TED)

- 12th – 18th Dynasty (early second millenium BC)
- Historically known as: *Avaris*, *Piramesse*, *Perunefer*, *Raamses/Ramesse*
- Excavations revealed:
 - residential buildings, tombs and temples:
show a wealthy society
 - contacts to many parts of the eastern
Mediterranean - Minoan culture.



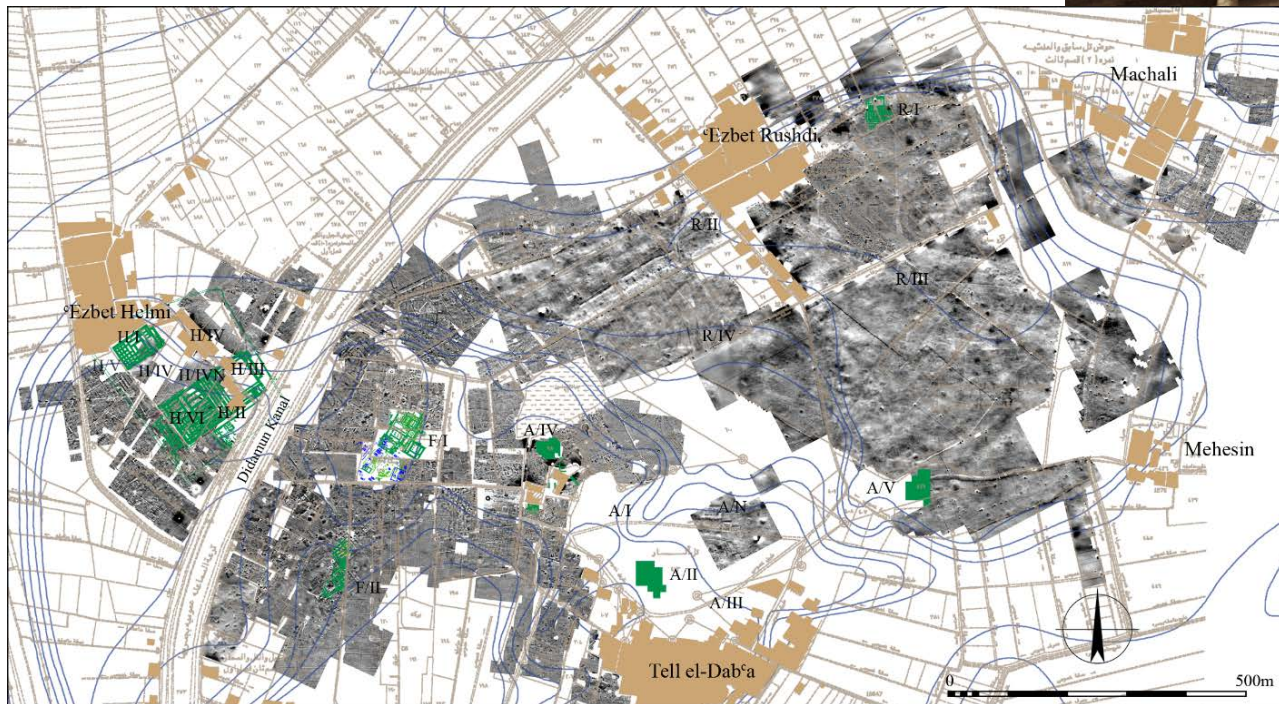
http://www.auaris.at/html/index_en.html



TED wall painting depicting bull leapers

Excavation

- Since 1966 (in total 45 years, no work in 1970 and 1975 due to Egyptian-Israeli war.
- 8 excavation areas
- 88 fieldwork campaigns



Photos

- 15 000 photos
- 200 000 photo negatives (black & white and coloured) of which 1/3 are 6x6 negatives
- 45 000 slides

Drawings

- find drawings: 15 200 pencil on cardboard + 8000 ink on cardboard
- 35 000 field drawings (plana, sections, details): colour pencils on millimeter paper
- 4500 plans, nearly all DIN A2 or A1: ink on tracing paper

Written documentation

- 5 folders of excavation protocols - 300 pages each
- Lists, find cards, etc.



F/I - D/23

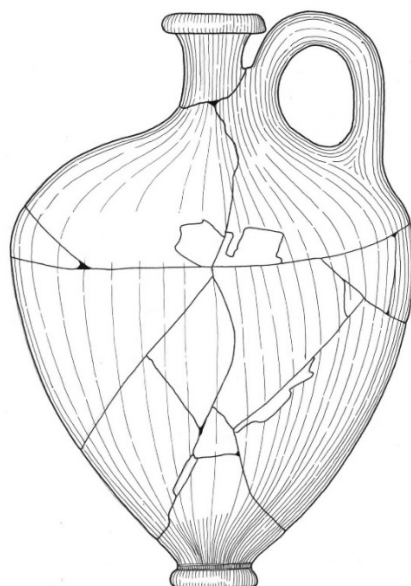
GRAB 1

139/1979 H

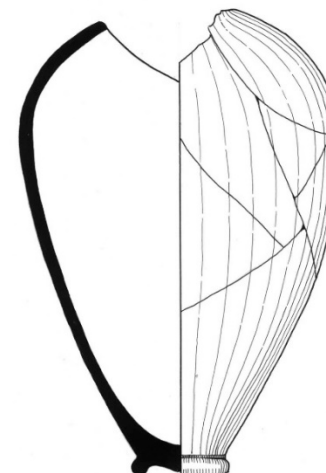
Profile drawing

Ground plan drawing

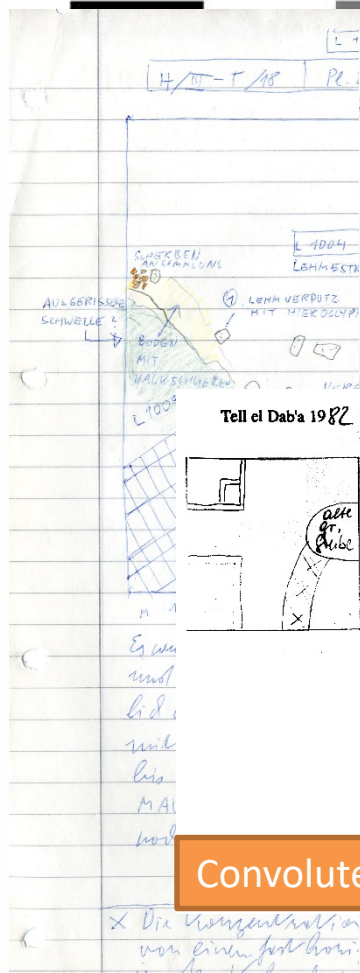
Find drawing



3095
FUND-NR. 16



3098
FUND-NR. 24



Tell el Dab'a 1982

Hand-drawn site plan showing various structures and features. Labels include: "H/III-T/18", "L-1004", "LOHMEIST", "LEHMA VERDITZ MIT HIEROGLYPHEN", "BOGEN MIT WALDSEHNSCHNITT", "L-1005", "Es war", "und", "bis", "nach", "bis", "MA", "und".

Convolute card

Handwritten notes and sketches for loci 165-170. Locus 165: p 18 PL2 nord für Befestigungshorizont (Basislinie mit 1/4 d) unter 1/2 c. d. m. Locus 166: p 18 1/2 c. d. m. Locus 167: Kanal repariert. Locus 168: H/III-p 18 unter Ende 1/2 c. d. m. Locus 169: nord Baum + p. Locus 170: unter L 70 66, a.

Reg. Nr. K 25

Fundpl.: FI-j 28

Planum: 6-7 Bauschichte rel.: dz Bauschichte at

Position: aus stromer Rascheper H. paleptube H = 4.70 - 4.82

Zeichentafel: Photo Nr.:

HR-Keramiken

Ib2-RP-Schale

Hand-drawn sketches of pottery fragments with labels: "Hd 17-1/16", "RP", "Hd 18-1/16", "Hd 19-1/32", "Hd 21-1/32", "RP", "Hd 22-1/32", "RP", "Hd 23-1/32", "RP".

Find card

AUFZUG 1988

Reg. No.	Loc.	Pl.	Grab	Position
FI-j 20				
6169	FI-j 20			Streifenfund, aus weißem Stein, aus demselben Fundament

FUNDZETTEL 3.11. 1988

Planquadrat: H/III-1/25 Grab-Nr. 71.2

Fundposition: (dreidimensional) aus stromer Rascheper H. paleptube

Strich aus der Erde

Beschicht rel.: abscl.

Fundbeschreibung: Fluke

Hand-drawn sketch of a fluke.

Ceramics inventory

K 4340

FUNDZETTEL 21.10. 1988

Planquadrat: H/III-1/25 Grab-Nr. 71.2

Fundposition: (dreidimensional) aus stromer Rascheper H. paleptube

H = 3.80

Beschicht rel.: abscl.

Fundbeschreibung: Rest-4. Boden aus stromer Rascheper H. paleptube

Hand-drawn sketch of a pottery fragment.

Objekt	Datierung	Bemerkung
KAUOID, Stein, 145x110x45 cm, weiß	IR-II Zeit	Kopie an
Auf Steinplatte gefasert symmetrische Vertiefung, weißer Stein		Stein

Hand-drawn sketches of pottery fragments with labels: "Hd 17-1/16", "RP", "Hd 18-1/16", "Hd 19-1/32", "Hd 21-1/32", "RP", "Hd 22-1/32", "RP", "Hd 23-1/32", "RP".

Protocol

Locus lists

Inventories

Ceramics inventory

Photos

- Photos: field- and finds-photos, since 2007

Drawings

- AutoCAD Plans: fieldplans of some areas digitized
- Scans of finds drawings, since 2011 complete, before only occasionally

Written documentation

- TED Documentation access database, since 2007 (protocol-, locus-&wall lists)
- Scans of inventories of Pottery and Small finds (complete)

Other

- Databases: wall painting fragments, stone tools, human remains, animal bones, botanic remains, seals
- Spreadsheets: C14 measurements
- Geophysical surveys (geo-magnetic and geo-physics)
- GPS-plans
- Various maps
- Illustrator files: reconstruction drawings

Documentation resources

Tabellen

- Bildpfad
- Fundstellen
- Kategorie
- Planquadrate
- Planum
- Stratum
- Supplementum

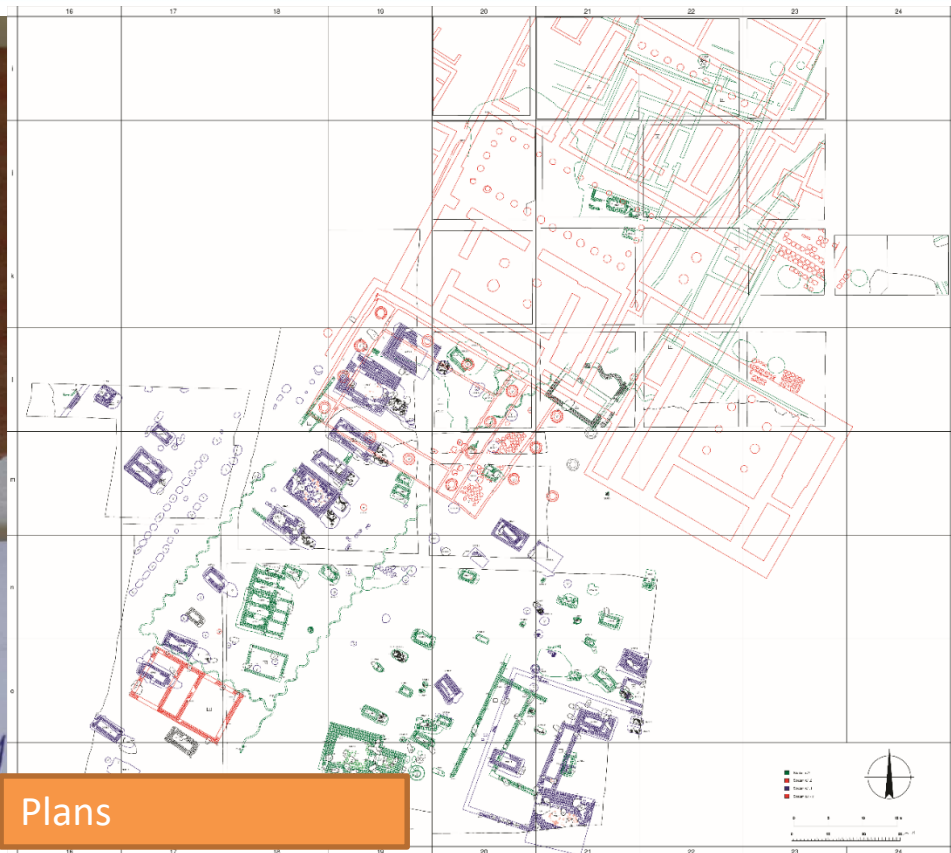
Abfragen

- Duplikate suchen zu ...
- Nummer_Q
- Nummern_Q_2
- Tabelle1 Abfrage
- Abfrage1
- Kreuztabelle

Formulare

- Bildpfad Unterformu...
- Eingabe
- Fundst_Bild
- Fundstellen

Z	
1226	
1643	
1644	
1645	
1646	
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1667	



Database

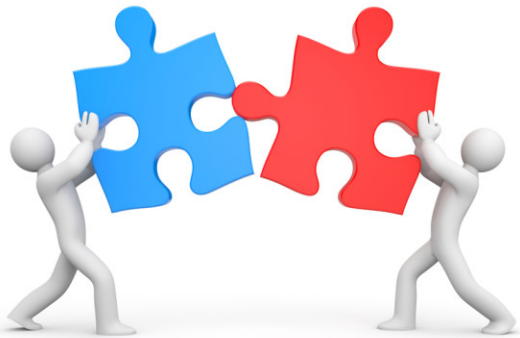
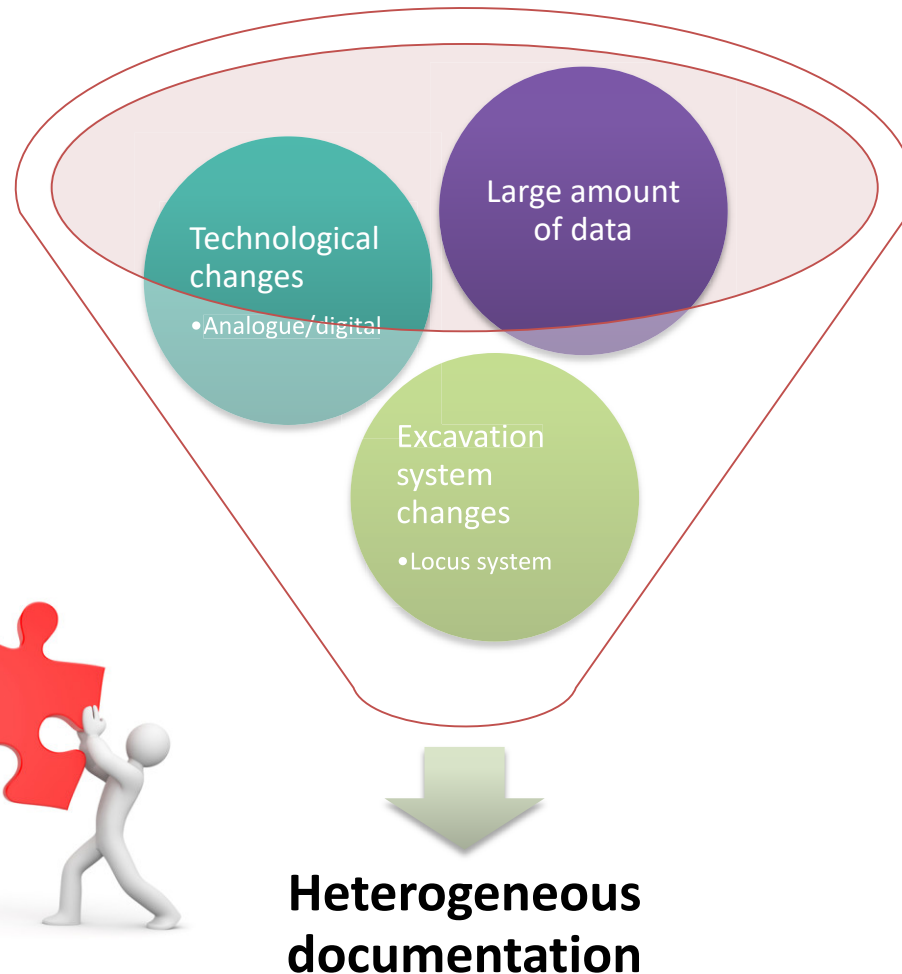
Photos

Plans

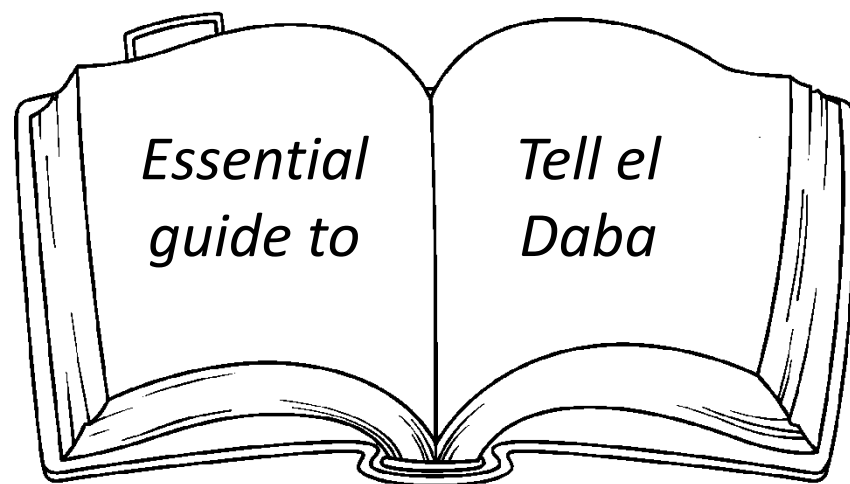
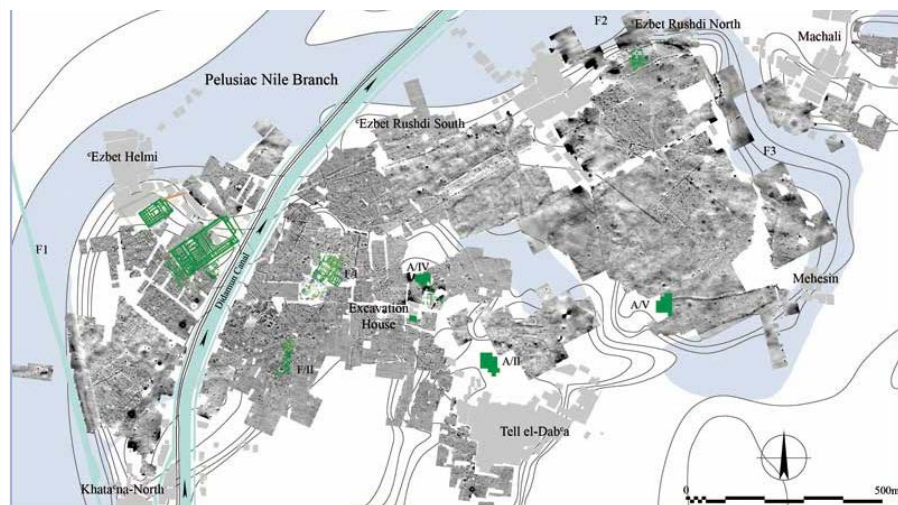
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 Daten Festplatte	19.01.2015 12:29	Dateiordner	
 Datenbank Filemaker	19.01.2015 12:30	Dateiordner	
 Datenbank Katherina	19.01.2015 12:30	Dateiordner	
 Feldphotos	19.01.2015 13:10	Dateiordner	
 Feldzeichnungen&Protokolle	19.01.2015 13:23	Dateiordner	
 FII_FK09	19.01.2015 13:36	Dateiordner	
 Fresken Zeichnung	19.01.2015 13:44	Dateiordner	
 FRESKENARCHIV	19.01.2015 14:00	Dateiordner	
 Freskenkisten	19.01.2015 14:02	Dateiordner	
 FRESKENREKOS	19.01.2015 15:31	Dateiordner	
 Grabung H 2011	19.01.2015 15:45	Dateiordner	
 H 2011	19.01.2015 18:06	Dateiordner	
 Inventarblätter	19.01.2015 18:07	Dateiordner	
 Malerei auf Lehmputz	19.01.2015 18:07	Dateiordner	
 Objektphotos	19.01.2015 20:27	Dateiordner	

- Provide digital long-term preservation of TED resources and make available open access online
- Development of an archaeological data archive at Austrian Academy of Sciences

THE CHALLENGE



Test Area – AREA (F1) j21



Planquadrate - squares



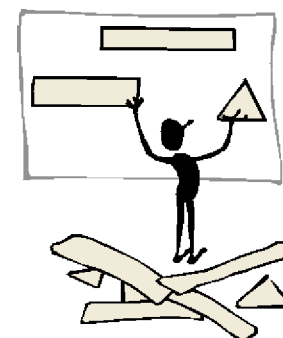
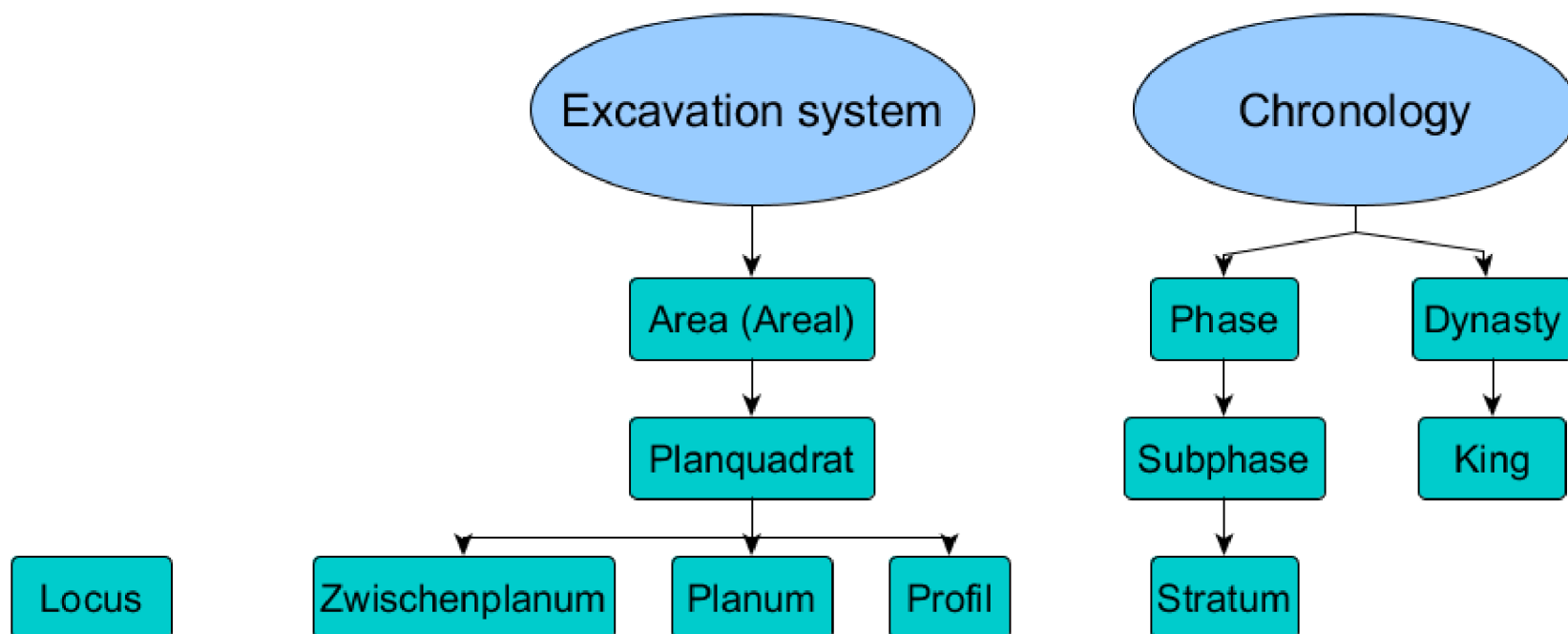
Chronology/Stratigraphy

- Stratum a/1: graves
- Stratum a/2: temple with offering pits (V. Müller 2008), graves
- Stratum b/1: settlement with large villae, cemeteries
- Stratum b/2: villae, with houses of the dead. Alleyways.
- Stratum b/3: villae Egyptian style. Graves & cemeteries.
- Stratum c: Squatter, mass graves
- Stratum d/1: palace (=Villa) 2 phases. Wall painting fragments. 2. gardens. Large cemetery (Schiestl 2009).
- Stratum d/2: Syrian-style house; oldest building of the first settlers.
- Stratum e: settlement for workers (Czerny 1999).

MB	v.Chr.	ÄGYPTEN RELATIVE CHRONOLOGIE	TELL EL - DAB ^{CA}					ALLGEMEINE PHASEN
			STADTZENTRUM (Mittleres Reich) 'Ez. Rushdi	NEUES ZENTRUM MB-Bevölkerung	ÖSTLICHE STADT	NORDÖSTLICHE STADT	PALASTBEZIRK 'Ez. HELMI	
			R / I	F / I	A / I-IV	A / V	H / I-VI	
SB I	1410	Dyn.						
	1440	AI						
	1470	XVIII H TIII					Bimsstein c	C / 2
	1500	TII ITI AI					Fresken d	C / 3
MB II C	1530	AHMOSE		EROBERUNG VON AVARIS			e / 1	D / 1
	1560		ABGETRAGEN		D / 2	D / 2	e / 2 - f	D / 2
	1590	XV HYKSOS			D / 3	D / 3	g - h	D / 3
MB II B	1620		ABGETRAGENE a GRUBEN	a / 2	E / 1	E / 1		E / 1
	1650			b / 1	E / 2	E / 2		E / 2
	1680			b / 2	E / 3			E / 3
MB II A-B	1710	KÖNIG- REICH AVARIS --- NEHESI	ABGETRAGENE a VORRATS- GRUBEN	b / 3	F			F
	1740	XIII		EPIDEMIE c HIATUS	G / 1-3			G
	1770			d / 1	G / 4			G / 4
	1800	ISO		d / 2	H			H
MB II A	1830	A III	b / 1	d / 2a				
	1860		b / 2	d / 2b				
	1890	XII S II S III	c / 1-2 Stes Jahr S III d	HIATUS				I
?	1920	A II	e / 1-4					K
	1950	S I	f					L
	1980	A I	?	e / 1				M
MB I	2000	XI		e / 2-3				N
	2050	X	?					N / 2-3
					AUSDEHNUNG DER SIEDLUNG			

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Making order



Locus -> Thesaurus

Abbruchreste	Bank	Cellatrennwand	Friedhofseinfassung	Gezira (Gesira)
Abfall	Baugrube	Dachversturz	Friedhofsmauer	ghost wall
Abfallgrube	Baumgrube	deberi	Füllerde	Grab
Abfallhaufen	Bauoberfläche	Dekompositionsschicht	Füllung	Grabbau
Ablagerung	Bauopfer	Depot	Funadamentgraben	Grabfüllung
Ackerscholle	Bauschutt	Depression	Fundamentgrube	Grabgrube
Altar	Bauvorgangsrelikt	Detail	Fundamentsand	Grabkammer
Amphorenbestattung	Bauvorgangsrelikte	Drainage	Fundamentsohle	Grabkasten
Anbau	Becken	Einbau	Funde	Grube
Anhäufung	Begehfläche	Einfassung	Fußboden	Gründungsgrube
Ansammlung	Begehungshorizont	Einfriedung	Fußbodenpflaster	Gründungsoffer
Asche	Begrenzngshürde	Erdaushub	Fußbodenreste	Haupthorizont
Aschenanhäufung	Begrenzungsmauer	Erdbrocken	Gasse	Hofmauer
Aschengrube	Besiedlungshorizont	Erde	Gassenbereich	Holzkohlenasche
Aschenhaufen	Blumbeet	erdige Schicht	Gassenhorizont	Holzpfostenloch
Aschenlinse	Boden	Erdoaket	Gassenrinne	Horizont
Aschensandgemisch				

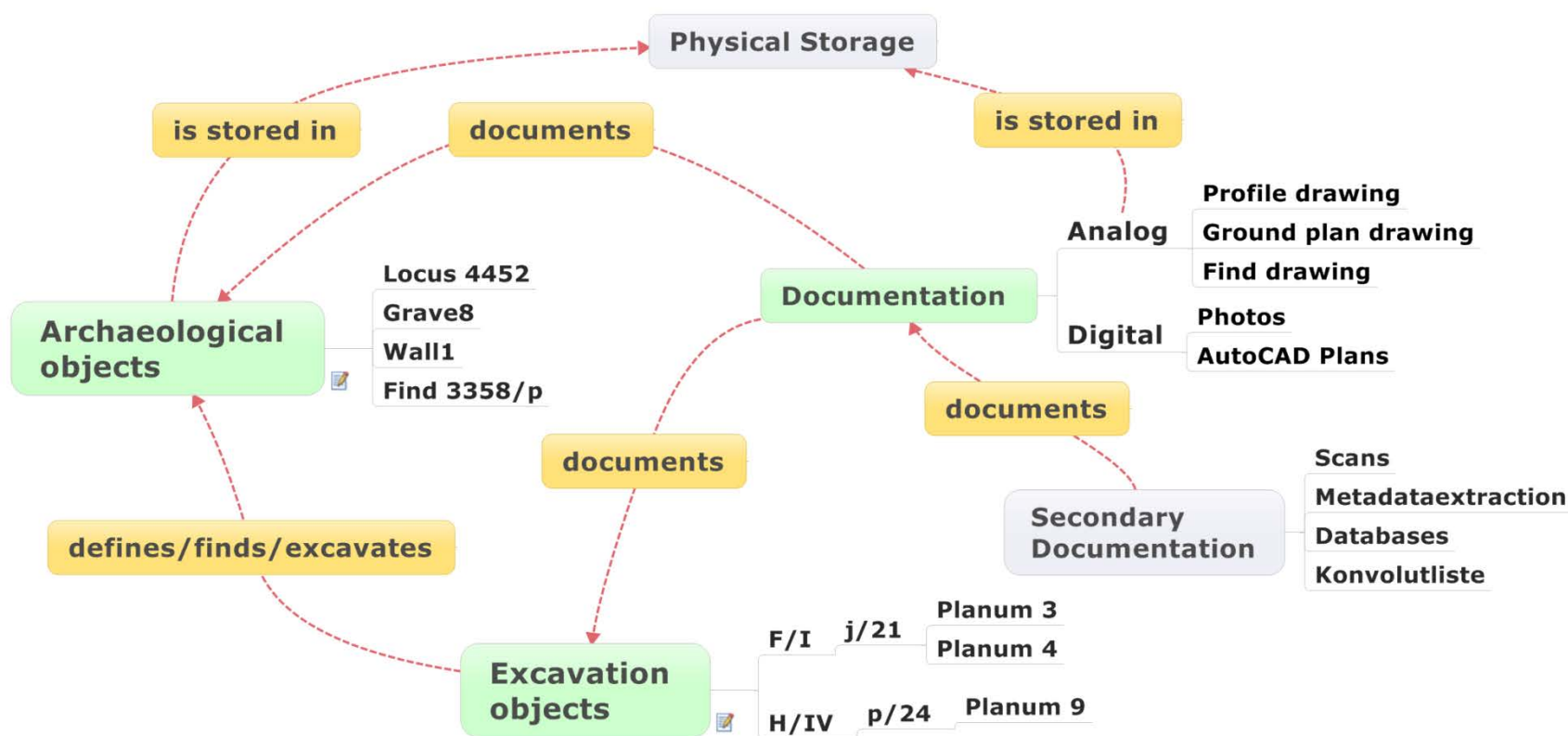
Order 1	Order 2	Order 3	Order 4
Archaeological Object	Architecture	Architectural element	Synonym
			Vault/Gewölbe
			Gewölbeschar
			Column/Säule
			Säulenbase
			Ofen
			Becken
			Bank
			Door

Collecting fields to describe analogue and digital resources

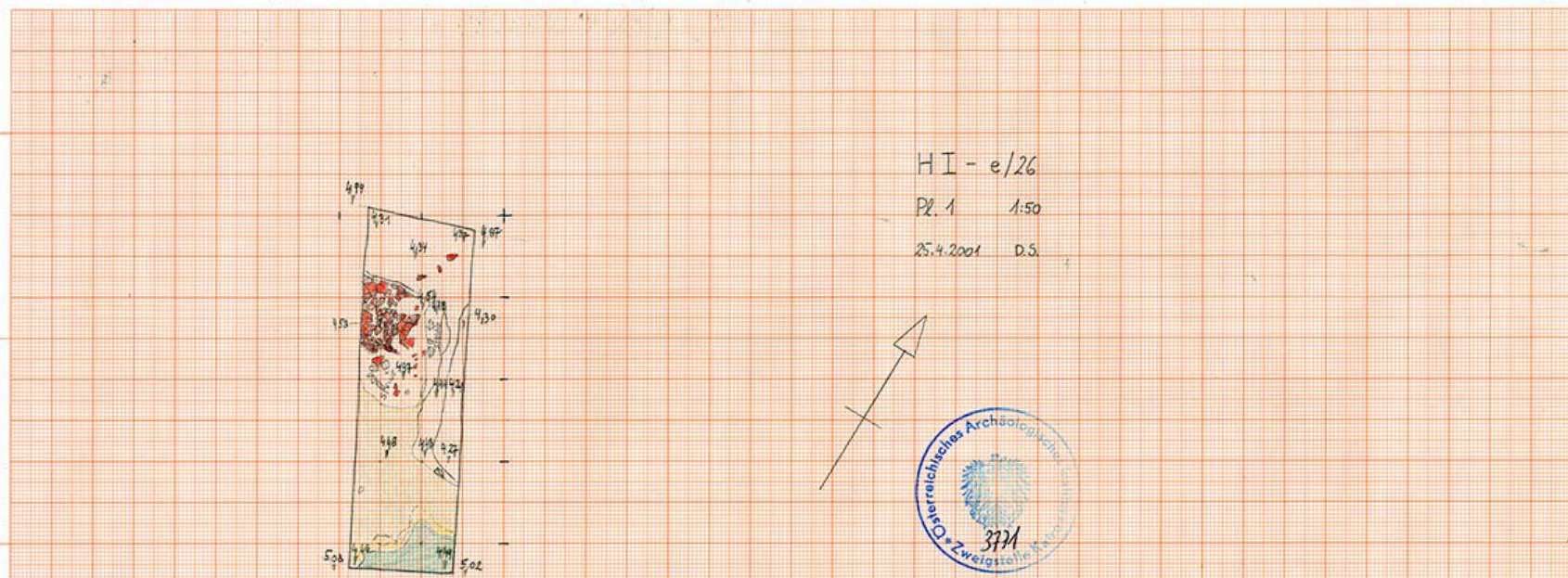
ÄUßERE MERKMALE		
General	ID	
	Sub-ID	
	Title	
Technical aspects of the carrier	Format	
	Original/Kopie (ist es)	
	Original/Kopie (gibt es)	
	Erhaltung	
	"carrier" size	
	"carrier" typ	
Content	keywords	
Storage	Standort	
	Aufbewahrung	
	Legal aspects	Organisation
		Institute
		Contact
		Project number(s)
Reference	Other carriers	scan/born-digital
Bearbeitungsstand	gescannt	
	digitalisiert	
	interpretiert	

CIDOC CRMarchaeo

Excavation obj. – archaeological obj.



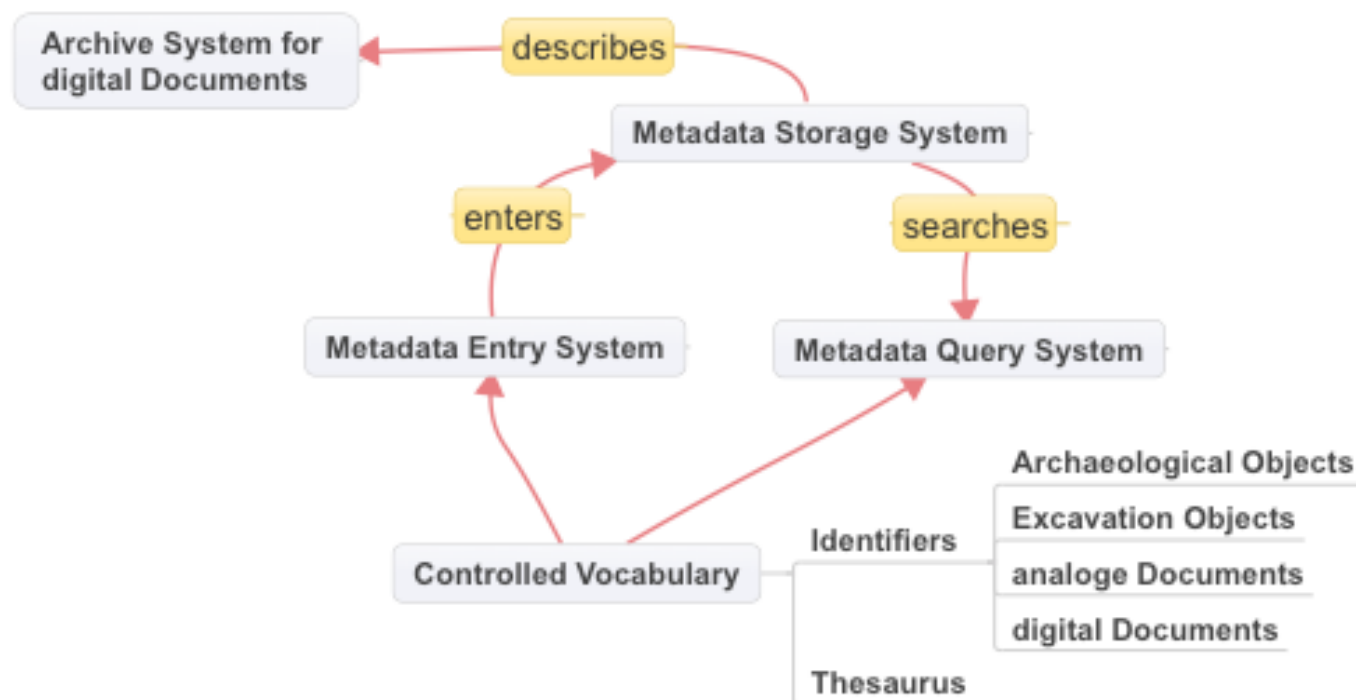
Test data – field drawing



Filename	Scan_Titel	Scan_Date	Creator	Equipment	Resolution_dpi	Dokument_ID	Mappe	Dokumen tentyp	DT_Abk	Dokumenten_ Detailtyp	DDT_ Abk
TD_H- I_e26_Planum1_ TD_FZ_3771	TD_H- I_e26_Planum1	15.04.2016	Natalie Monschein	EPSON expression 10000XL	600	TD_FZ_3771	HI_e/26 Pl. Feldzeich Det. Prof. nung	FZ	Planum	PL	
Inventar	Inventar_Sig	Datum	Jahr	Saison	Monat	Zeichner	Zeichner Monogram m	Copyright	Maßstab	Typ	Fundstelle
3771		25.04.2001	2001	F	April	Dieta Svoboda	DS	ÖAI	1:50	Millimeter papier	TD
Areal	Planquadrat _Schnitt	Planum	Locus	Profilrich tung	Stratum	Excavation obj ID	Arch_objekte ID	Feldbeobachtung_ Aufarbeitung	Blattvermerk	Scanver merk	
H-I	e26	1				TD_H-I_e26_Planum1_2001F		Feldbeobachtung			

- **What questions do we want to answer with our Metadata**
 - Retrieve all documents for an **excavation object** (e.g. Site TD ,Area F/1, SQUARE j/21, Planum 3)
 - All documents for an **archaeological object** (e.g. grave 5 and walls in Site TD - Area F/1 - SQUARE j/21 - Planum 3)
 - Retrieve all documents with **archaeological objects of type** (e.g. grave, wall , pottery,)
 - Which relations between documents, excavation object and archaeological objects do we record?
- **How to create identifiers for (... in what context is a name unique) :**
 - Documents
 - Archaeological objects
 - Excavation objects
 - Physical storage
 - Files

System architecture



Independent system components (Ideally open source system)
open interfaces between components

Thank you for your
attention!

