Classical Archaeology in the Digital Age. The AIAC Presidential Panel

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Fields of Research and Forms of Knowledge Processing

During the 19th century, especially in the 2nd half, we see the emergence of complex fields of work, which in turn were anchored as disciplines at the universities, museums and other institutions:[1] Classical archaeology, „Bauforschung" etc. The emergence of these disciplines is related to the emergence of new large-scale excavations such as those at Olympia, Pergamon etc. The knowledge of these excavations had been stored with specific forms of knowledge processing: Libraries, archives (scholars' discounts, excavation documents etc.), corpora, photo archives, analogous publications, museums and collections of plaster casts. Until today, archaeological fields of activity have become more and more complex, a result of the emerging importance of the natural sciences. There are excavations (documentation of architecture, stratigraphies, tombs etc.), prospections/surveys (inspections, test excavations, collections of pottery), analysis of finds/findings (e.g. pottery analysis), photogrammetry (e.g. buildings), chronology (different science and art based methods of dating objects), climate and landscape history (geology, geomorphology, hydrology) and anthropological investigations (skeletons; food pattern; diseases; genetics [living environment; affinities]).

The research projects generate a lot of different data: Primary data (photographs, aerial pictures, bitmaps, films/videos and metadata such as geo-referenced satellite photos, LiDAR scans, data bases, 3D-reconstructions and models, vector graphics, small and large format scans and drones.

The Problem of Long-Term Preservation

Archaeology is hugely dependent on a differentiated documentation of its research, because the research results are largely destroyed by an excavation, that means, once lost documentation steps cannot be repeated. This problem is posed in a completely new way in the digital age. Also a still increasing amount of data (dynamic data, static data, open data) gain a unique character with a high potential to preserve.

This results in the problem of long-term preservation of data. There are different levels: The first level can be described as a logical level that means questions related to the intellectual conception and purpose of a project: How do I create data, how do I document it, what data should be archived first?

The consequences have to be reflected: Transparency & documentation of data. Finally semantic interfaces have to be discussed (interfaces with a clearly defined structure defined by an international nomination body). A different level is the

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application level: What software do I use? What guarantee do I have that the software will continue to be developed in the future? What happens if the manufacturer goes bankrupt? Consequences are: if possible no proprietary software; instead open source-software with published program codes and data formats and the definition of technical interfaces.

A last level is the physical level, that means the question of a stable media transfer in a technical-mechanical sense and a business process that describes the way from the excavation site to a data centre, taking into account the availability of media such as external hard drives.

The consequences are the guarantee of media availability, usage and transfer that means creating infrastructures supported either by universities, large research centres or networked initiatives.[2] That is related to the definition of minimal standards:[3] the creation of a uniform, modular and comprehensive systems that can be used in various projects with different questions and the avoidance of individual systems that are reinvented, tested and financed by projects and that are unusable after the end of a project ("undocumented, archived on a CD-Rom"), the long-term development of software, hardware, personnel and financial structures, whereby the data of a project are also secured beyond its end and remain accessible/usable.

However, it would be wrong to conceive such systems solely as an archiving, visualisation and management tool of data. Rather, these systems express a general interest in research that does not exclude the study of individual groups of materials, but understand contexts as an overriding basis to scientific knowledge. The added value lies in the combination of sensible and logical units, which are extracted and linked together in automated processes.

Current Research Interests: What is Archaeology, and more Specifically Classical Archaeology today?

Classical archaeology has two origins: Art history and fieldwork.[4] The contemplation of contexts is sometimes e.g. in Germany integrated in larger research groups discussing such concepts as e.g. space, cultural contacts, migration, economy, oblivion and memory, landscape, power, innovations, religion, gender etc.[5] And there are anthropological questions about the history of humanity as a whole. Many research projects have a geographical or region-related research focus (e.g. the Mediterranean Sea; the Black Sea). This results in intersections with disciplines such as ethnology, anthropology, social sciences and historic sciences, but also natural sciences.

Consequence of the information technology: development of interdisciplinary systems that remove the dispersion of information according to analogous order criteria (library, photo gallery, archive, excavation files, publications of large excavations, etc.).

The topic space is one example: Geographical Information Systems[6] enable us to manage sites, to visualise and to publish them.[7] These computer systems for the processing of (geo) graphical information are also important for linking databases with mappings. Research questions that can be answered by using GIS-systems are e.g. the relationship of human – natural environments, territorial analysis, least-cost-path analysis or natural space studies (cultural landscape vs. "utility landscape") and predictive modelling for the evaluation of potentially rich (=worthy) regions. Another expression of space is 3D-models. They can help to reconstruct and understand the effects of physical environments.[8] On the one hand, the possibilities of information technology influence the development of archaeological questions, and on the other they contribute to the further development of complex database systems. From these questions of archaeological/antiquity scientific research, new research tasks and fields are emerging (archaeoinformatics).[9] The interface between archaeology and computer science finds a corresponding and emerging echo in publications.[10] In an increasing number of cases it becomes more difficult to put all information in one book. The databases themselves tend to become publications. Hybrid models have a greater significance;[11] research platforms are sometimes real-time platforms[12] and tend to be multilingual cultural archives.[13] They are more and more related to data-workflows in archaeology with high complex requirements (digital strategy; trained staff and specific archaeological software).[14] All these developments generate new requirements for data quality, e.g. in the form of ontologies or thesauri.[15]

Information technology's problem is: How can I include historical categories/concepts (e.g. time) in an analytic database based on a variety of different data? And are there so far unknown research questions that can be answered only by using databases?

These research questions raise the problem of interoperability, meaning linking different data, so that they are analysed together according to certain parameters and can be used. Again, there is considerable need for research.

Causes are a variety of data formats (primary and metadata), a variety of disciplines whose characteristics continue under the conditions of information technology with the consequence of heterogeneities (building research – Bauforschung, epigraphy, numismatics)[16] etc.

The information technology problem of linking objects and objects is the equivalence detection (record linkage, object identification, entity resolution, reference reconciliation etc.): An object of the so-called real world can be described so differently, that a computer-aided image or text analysis does not recognise that it is the same object. Visual model recognition and automatic recognition of unstructured objects had to be addressed e.g. in the frame of European projects like CLAROS[17] or CARARE,[18] a project for the interoperability of distributed data resources to Europe's archaeological monuments and historical sites with the Central European Digital Library Europaeana.

The information technology problem of linking texts and texts are multilingual texts, the use of the same terms, but still different meanings ("teapot") and automated word and text analysis tools (citations, arguments, etc.).

There is also an information technology problem of linking texts and objects. Object, image, geodata, etc. are relatively unique, that means, you do not have to cut or disassemble them and then rename those parts. Texts, on the other hand, have to be disassembled manually or automatically in order to access sections of texts that are specifically targeted to specific objects.

Linking a variety of analytical databases with corresponding primary, raw and metadata, consisting of texts and non-texts is another problem because of the great complexity of the data. One solution is the further development of internationally available metadata schemas like the DUBLIN CORE Metadata Initiative[19] or CIDOC-CRM, a metadata schema, for the controlled exchange of cultural heritage information used by archives, libraries and museums to improve the availability of knowledge. The author is the International Committee for Documentation of the International Council of Museums = CIDOC – Content Reference Mode.[20] Another standard of a high importance for integrating content, information applications and systems is the Semantic Web – World Wide Web Consortium (W3C).[21]

A different solution for addressing place names and sites can be a gazetteer.[22] A third solution can be subject indexing, content indexing, the use of vocabularies and thesauri. By capturing subject index data various specialist systems are networked together using thesauri and a simultaneous search for the same vocabulary about various specialised systems takes place, e.g. free search for keywords and topics.[23]

Conclusion

IT is one changing factor of our discipline. It opens up new methodological approaches. There are technical questions (standards; infrastructures; long term preservation, long-term interoperability etc.). In data modelling there is the chance to overcome the isolation of viewpoints between individual disciplines. There are new fields of research: e.g. archaeoinformatics. Increased visibility in the WWW in better formulated way: internationality and interdisciplinarity. By using and sharing data, new forms of publications, research platforms and teaching are being facilitated. New models of communication are created. Work groups and resources can organise exchange processes through exchange formats.

But archaeologists and classicists have historical questions. What exactly are the possibilities of such systems? Where are new research tools, questions and possibilities? And where are also the limitations in using codes and numbers? How can I manage the data? The debate about ways of viewing the past by using digital instruments might be an important topic for future AIAC conferences.

Notes

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[1] Marchand 1996; <https://digigeist.hypotheses.org/150> (13.12.2018).

[2] Cfr. e.g. <http://www.rfii.de/download/rfii-fachbericht-laenderanalysen-2017/> (22.03.2021). – Cfr. e.g. in Europe D-GRID (<http://www.d-grid.de>), TextGRID (<http://www.textgrid.de>), WissGRID (<http://www.wissgrid.de>), DARIAH (<http://www.dariah.eu>) or CLARIN (<http://www.clarin.eu>) and e.g. in Germany on a national level <https://www.nfdi.de> (22.03.2021). – Archaeological data centres: eDNA – e-Depot for Nederlandse Archaeology (<http://www.edna.nl>); Archaelogy Data Service (<http://archaeologydataservice.ac.uk>); IANUS (<https://www.ianus-fdz.de>).

[3] e.g. <http://guides.archaeologydataservice.ac.uk/g2gpwiki/> (13.12.2018);
<http://www.dcc.ac.uk/digital-curation/what-digital-curation> (13.12.2018);
<https://www.ianus-fdz.de/it-empfehlungen/> (13.12.2018);
<https://landesarchaeologen.de/kommissionen/archaeologie-undinformationssysteme/downloads> (22.03.2021).

[4] Alcock – Osborne 2007.

[5] <http://gepris.dfg.de/gepris/OCTOPUS?keywords_criterion=archaeology&findButton=Finden&task=doSearchSimple&context=projekt> (13.12.2018).

[6] <https://en.wikipedia.org/wiki/Geographic_information_system> (13.12.2018).

[7] <https://en.wikipedia.org/wiki/GIS_in_archaeology> (13.12.2018).

[8] e.g. http://www.digitales-forum-romanum.de (13.12.2018); <https://latinanostra.weebly.com/rome-3d----digital-maps.html> (13.12.2018); <http://colonia3d.de/colonia3d-home/> (13.12.2018).

[9] Important conferences: <https://caa-international.org> (13.12.2018).

[10] e.g. <https://www.journals.elsevier.com/digital-applications-in-archaeology-and-cultural-heritage/> (13.12.2018); <https://openarchaeologydata.metajnl.com> (13.12.2018); <https://idai.world/what/publications> (22.03.2021).

[11] e.g. <https://arachne.uni-koeln.de/drupal/?q=node/301> (13.12.2018).

[12] e.g. <http://www.agathe.gr> (13.12.2018).

[13] e.g. <http://www.fastionline.org/?lang=it> (13.12.2018); <https://idai.world/what/publications> (22.03.2021).

[14] <http://www.data-archive.ac.uk/create-manage/life-cycle> (13.12.2018);
<http://www.dcc.ac.uk/lifecycle-model/> (13.12.2018).

[15] (new footnote: <http://www.rfii.de/download/rfii-tagungsdokumentation-herausforderung-datenqualitaet-februar-2020-in-hannover/> (22.03.2021); <http://www.rfii.de/download/herausforderung-datenqualitaet-november-2019/> (22.03.2021).

[16] e.g. <http://laststatues.classics.ox.ac.uk> (13.12.2018);
<http://numismatics.org/ocre/> (13.12.2018); <http://www.edb.uniba.it> (13.12.2018).

[17] <www.clarosnet.org> (13.12.2018). The Claros Explorer displays digitized data from various object databases. The author is the Claros consortium. One particular example: <http://www.arachne.uni-koeln.de/drupal/> (13.12.2018) (Project Emagines [DFG]) together with data from the Beazley Archive, the

LIMC (Lexicon Iconographicum Mythologiae Classicae) and the Lexicon of Greek Personal Names in a tabular view, timeline and map).

[18] <http://www.carare.eu/eng> (13.12.2018).

[19] <http://dublincore.org> (13.12.2018).

[20] <https://en.wikipedia.org/wiki/CIDOC_Conceptual_Reference_Model> (13.12.2018); <http://cidoc.ics.forth.gr/> (13.12.2018).

[21] <https://en.wikipedia.org/wiki/Semantic_Web> (13.12.2018); <https://www.w3.org/standards/semanticweb/> (13.12.2018).

[22] <https://pleiades.stoa.org> (13.12.2018).

[23] e.g. <http://www.reteurbs.org> (13.12.2018); <https://www.propylaeum.de/home/> (13.12.2018); <https://zenon.dainst.org> (13.12.2018).

References

Alcock – Osborne 2007
S. E. Alcock – R. Osborne (eds.), Classical Archaeology (Oxford 2007).

Marchand 1996
S. L. Marchand, Down from Olympus: Archaeology and Philhellenism in Germany, 1750–1970 (Princeton University Press 1996).