

EXCELLENCE
CLUSTER



TOPOI

PROJEKTBERICHT | RESEARCH REPORT

RESEARCH GROUP (A-III)

ARCHÄOMETRIE/ARCHÄOINFORMATIK

**METHODOLOGICAL BASIC RESEARCH IN
ARCHAEOINFORMATICS:
IS STRATIGRAPHY MEASURABLE?**

Research results of the period from
01.03.2008 – 31.10.2012

Members of the research project

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Description of research question, approach and results

Research question

“Is archaeological stratigraphy measurable?” The research question aims to quantify archaeological stratigraphy in order to create digital 3D models for further analysis. The project hence investigates the different parameters for creating these models. At the current research stage it is not yet clear if the chosen parameters are suitable to meet the aims described above.

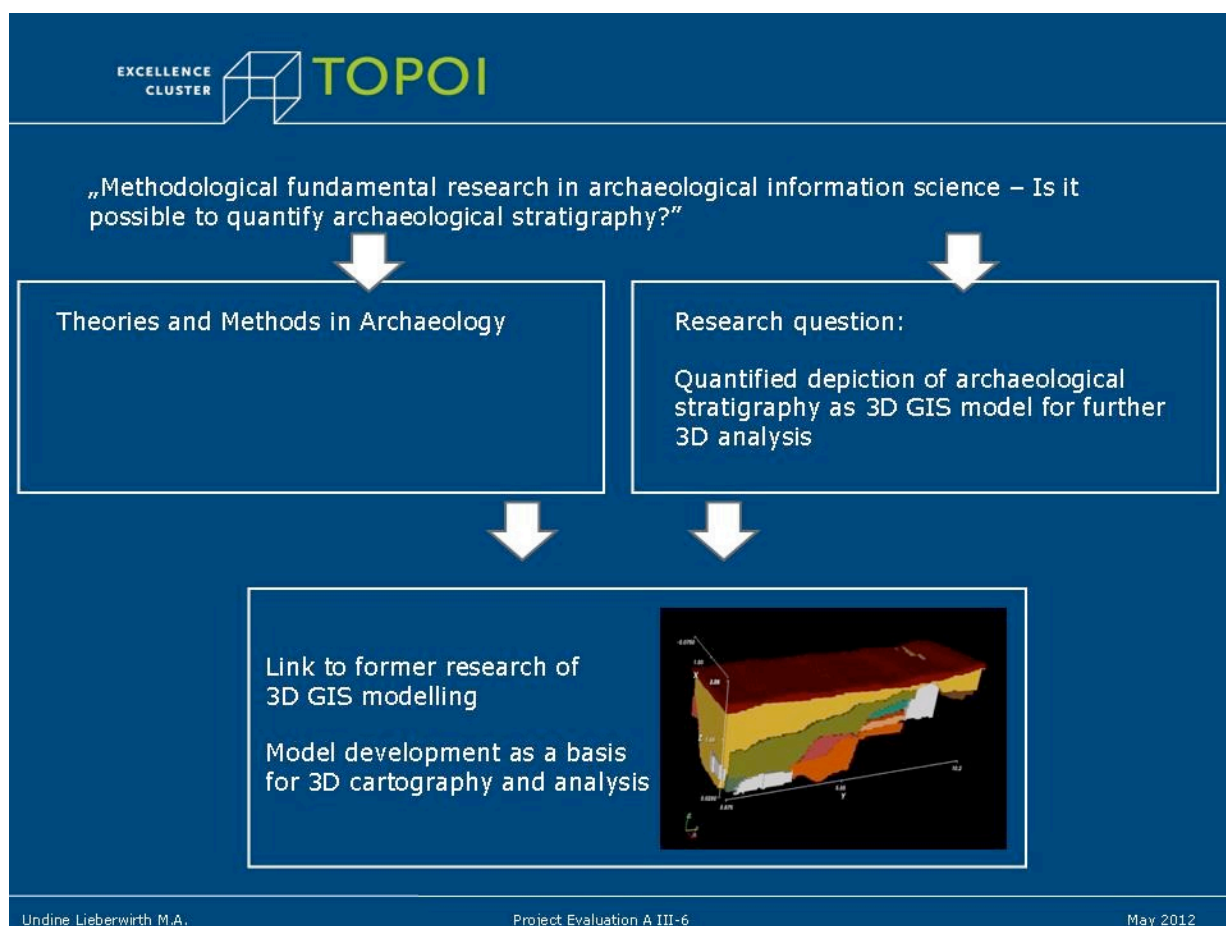


Fig. 1. Research question and methodology, Topoi Project A-III-6.

Research methodology and approach

The project focuses on methodological basic research in the field of archaeoinformatics using 3D GIS (Geographic Information System) application and analysis systems.

The final model will contain of voxel, a possibility of graphical depiction of volume objects with quantified attribute information. The voxel model is placed in a GIS-environment with an attached geodatabase. The research project compares two case studies. The studies are two archaeological field work campaigns (Hornsburg 2009, Ostia 2011) undertaken in different regions and different cultural periods. These differences are chosen deliberately since the focus of the research question is based on methodology and if they are applicable in different environments disregarding archaeological periods or geographical regions.

The field work was undertaken by two student groups under the leadership of the project leader. The campaigns were always associated with wider archaeological campaigns in an international and interdisciplinary co-operation.

The project is divided into three parts 'Data Acquisition, Analysis and Development' (see Fig. 2,3). While the first, the field work, deals with the acquisition of quantitative data, the second and third are focused on the post-processing. The first phase contains additionally two methodological comparisons in terms of data acquisition by generating 3D point clouds. 'Case Study 1' compared different types of terrestrial 3D laser scanners (see Fig. 2).

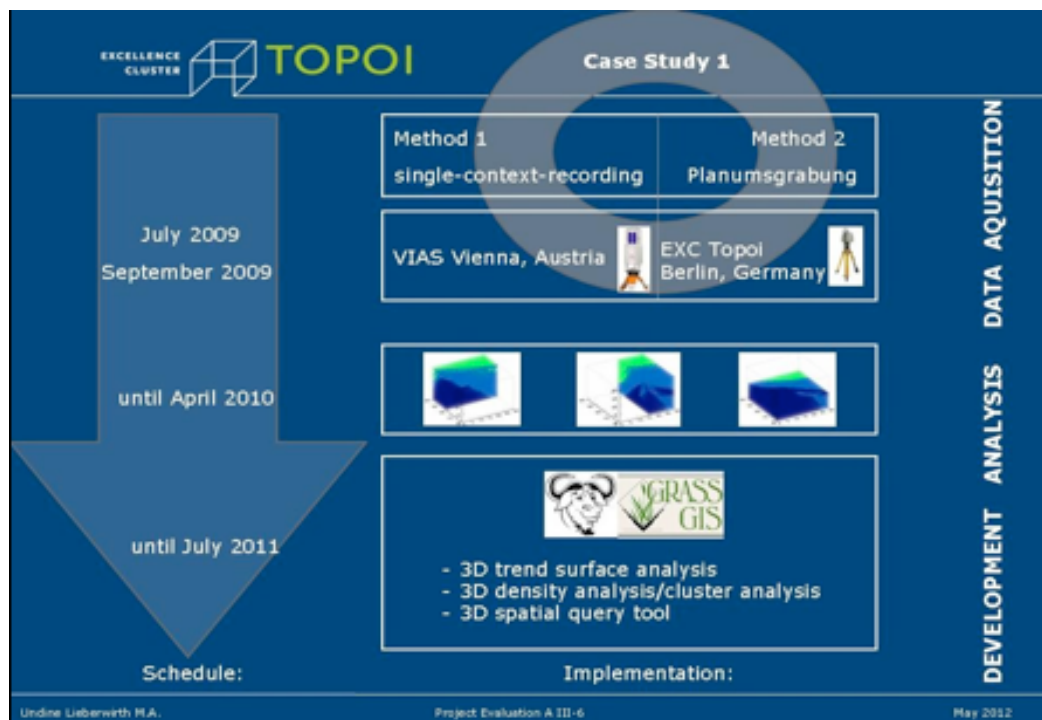


Fig. 2. Case Study 1, Topoi Project A-III-6.

'Case Study 2' compared different hardware and analysis software for generating 3D point clouds (see Fig. 3).

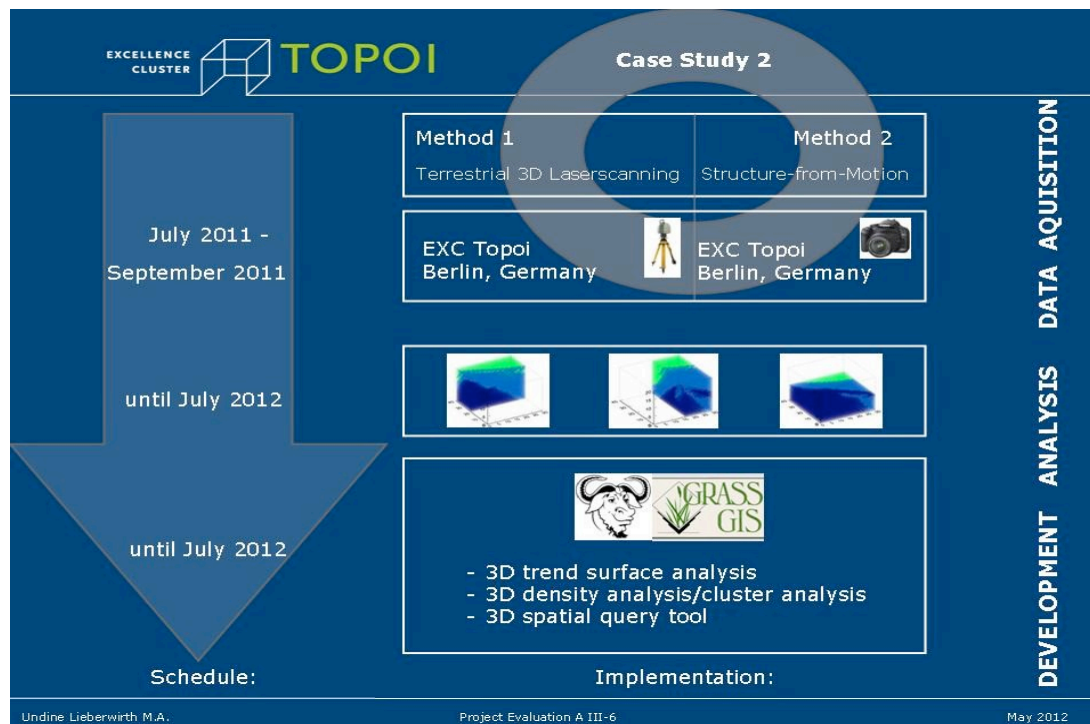


Fig. 3. Case Study 2, Topoi Project A-III-6.

Results

Interim Results:

At the current research stage (see Fig. 3) we can conclude the following results:

- The excavation workflow is applicable disregarding cultural period and geographical region.
- It is possible to generate quantified information of archaeological stratigraphy using different parameters.
- Concerning the applied software, it is possible to calculate voxel models for further statistical analysis.
- However, it is not yet clear whether 3D statistics can be applied at these models.

The interim results has been partly published and discussed in a greater research environment between colleagues from the field archaeoinformatics (CAA Conference 2010, CAA Conference 2011), the field of pedology (Dr. Philipp Hölzmann) and geophysics (Burkart Ulrich).

Discussion of the results in the light of current research

Based on former research (<http://undine-lieberwirth.info>) in 2006 it is the aim of the project A-III-6 to improve the potential of 3D GIS (Geographic Information Systems) applications in post- excavation analysis in archaeology.

Meanwhile, there have not been many imitators in the field of archaeology or cultural sciences although all applications run in a free and open source environment. The latter requirements were and still are essential for this project since 'Open Data' and 'Open Access' are important keywords for research in the Excellence Cluster Topoi.

Concerning the technical terms, the project's results so far have been already caused intensive discussion in terms of data acquisition of 3D point clouds. These results and discussions let already to an improvement of FOSS (Free and Open Source) solution for data acquisition and documentation in archaeology and cultural heritage ([BundlerTools](#)).

Highlighting the analysis and development phase, voxel models are still the geometrical solution for depicting volume objects but the application of spatial statistics in their 3D space has not yet been developed.