Digital Prehistoric Mining Archaeology

The goal of Digital Humanities is the application of information technology methods in the humanities to create digital resources, to analyse, integrate and further process them as well as to provide means of preserving them for long term usage and archiving.

In the domain of Prehistoric Mining Archaeology there are currently two projects at the University of Innsbruck that target these goals. One of them is an Open Research Data Pilot Project from the Austrian Science Fund ("Open Research Data for Prehistoric Mining Archaeology") and the other is a project to develop an Austrian Science Fund application that's main goal is to use semantic and geoinformation methodologies to integrate data relevant for Prehistoric Mining Archaeology in order to advance the research through analysing and further processing the integrated data ("Information Integration for Prehistoric Mining Archaeology"). We want to present these two projects and their linkage to each other.

The goal of the Open Research Data (ORD) for Prehistoric Mining Archaeology project is to make archaeologic data created in the project "Prehistoric copper production in the eastern and central Alps" open and reusable for the scientific community investigating mining, technology transfer and trade connections in prehistoric times. Metadata will be created leading to a mining sites inventory that documents prehistoric sites, structures, stratigraphic units and finds and relates them to the investigations that have been performed on them and the conclusions that have been drawn. Since the starting point of the research data creation is the documentation created for the Federal Monuments Office, which has to be provided for every archaeological investigation in Austria, the methodology developed in this project will be applicable for all archaeological investigations within Austria. Methodology and the workflow will be published in an open and reusable format as well.

The methodological approach will use the "FAIR Guiding Principles for scientific data management and stewardship" as a general guideline to make data Findable, Accessible, Interoperable and Reusable. Metadata for the project data will be created through the application of the CIDOC CRM metadata schema, an ISO standard for Cultural Heritage Information and SKOS, a standard for thesauri, classification schemes and taxonomies. The generated metadata will be in a network data structure and exported to hierarchical and tabular formats representing sites with their geographic locations, temporal and typological assignments and links to the research activities and documents.

The technical implementation will deposit the original Austrian Federal Monuments Office and archaeometric analysis documentation in a repository after file formats have been checked for their long term archiving suitability. The repository assigns Digital Object Identifiers (DOIs) as persistent identifiers and thus makes the research data citable. Metadata will be created using semantic and geoinformation technologies and ingested in repositories, portals and openly accessible triple stores to increase dissemination and usability. The benefit for the international research community is the possibility to analyse sites of prehistoric mining and metallurgical activities in an harmonised reproducible format and investigate research questions on an Alpine and European scale that are not addressable with current documentation standards.

Based on the data and formats created in the ORD project the planned project "Information Integration for Prehistoric Mining Archaeology" will propose an approach to create a semantic network of existing information relevant for the domain including excavation and prospection documentation, remote sensing data, scientific analysis and data created from legacy sources.

This will be attained by building an ontology for prehistoric mining archaeology and the use of semantic web and geoinformation methodoloies to create a semantic network of information. The project will provide tools for data analysis and visualization of the semantic network in its spatial context explicitly aims at including these tools in the archaeological workflow. We will test them in an archaeological campaign to identify prehistoric mining sites and in the archaeological analysis workflow the network and tools will be used to identify patterns of archaeological evidence related to prehistoric mining activities to help answer specific mining archaeology research questions. In particular these questions relate to the spatiotemporal spread of prehistoric mining technology over the Eastern Alps, the spatial distribution of prehistoric ore extraction, beneficiation and smelting sites in a mining district and bronze age metal trade and transport routes