The ArchaeoGRID e-Infrastructure for Research, Management and Exploitation of Archaeological and Historical Heritage

Giuliano Pelfer, Center for the Study of Complex Dynamics – CSDC, University of Florence, Florence, Italy

ABSTRACT

The development of archaeological and historical research as a multidisciplinary and interdisciplinary activity had as effect the exponential increase of complex set of data and of refined methods of analysis. At the same time the possibility to lost such data permanently, and not only the material remains, for natural catastrophe like floods, fires and earthquakes and for social disasters like economical crises and wars is also increasing around the world. For such it is worthwhile to present and to discuss a proposal of the ArchaeoGRID e-infrastructure that can supply any tool needed for research, management and exploitation of archaeological and historical heritage.

Keywords: ArchaeoGRID, Archaeological Research, E-Infrastructure, Exploitation, Historical Heritage, Management, Research

INTRODUCTION

The project of the ArchaeoGRID e-Infrastructure is an international initiative that provides the possibility to exploit advanced grid computational and storage technologies in archaeology and history for curation and analysis of big amount of historical and archaeological data coming from written sources, field surveys, excavations, and laboratories with a view to research, management and exploitation.

ArchaeoGRID gives the possibility to understand the historical and archaeological knowledge as a commons in the era of digital revolution.

ArchaeoGRID also allows the development and test of data simulation models with many variables and multiple space-time information. Archaeological and historical knowledge building is a collective work performed by the entire community of researchers, and this fits very well with the grid paradigm of Virtual Organisations (VOs) using large and

DOI: 10.4018/ijoci.2014010103
distributed computing and storage resources. Easy access to, and management of large data set and complex software packages, allowed by e-Infrastructure, is hence an asset for the production of archaeologically and historically relevant knowledge. In fact, archaeological and historical data are getting not only larger and larger, but also their complexity and heterogeneity are increasing, implying that the extraction of meaningful knowledge requires more and more computing and storage resources.

Data include contributions from scientific fields as diverse as physics, chemistry, Earth sciences, biology, geography, anthropology and social sciences, as well as techniques developed according to the archaeological methods and theories.

Modern archaeological science depends on large collections of diverse, mundane objects - such as potsherds, stone tools and debris, animal and plant remains - rather than small collections of treasures.

Sites are unique, non renewable resources easily destroyed by erosion or modern land use and data curation aspects are increasingly important. Old collections, original field notes, and reports of previous work have enduring research value. Archaeological and historical data also lose much of their meaning when they are taken out of the original space-time context in which they were discovered.

This spatial and temporal context of modern archaeological research spans from the dig site itself to much larger regions and long time periods.

One of the most important goals of ArchaeoGRID is then the development of digital repositories of archaeological and historical data containing space-time information.

Archaeological data significance and therefore databases organization changes depending on new discoveries, on the evolution of analysis methods and on the theoretical developments. One of the major examples in this sense is given from the carbon-14 dating revolution that forced an almost complete chronological reorganization on the Mediterranean Neolithic civilisations that allowed to recognise the independent development of many of them (Guidi, 2000; Renfrew, 1979; Renfrew, 1991).

Traditional archaeological field and laboratory research was highly individualized.

So, simultaneous access of this huge amount of available data is not easy.

Data can be of different types like separately compiled databases held by museums, governmental agencies, private companies and individuals and can reside on different computer platforms.

Often, data classifications and terminology vary, are regionally and temporally specific, and are inconsistently applied. There are databases containing years of accumulated paper records, voluminous unpublished literature consisting of limited distribution reports, images, maps and photographs embedded in museum catalogues and archaeological reports, both published and unpublished.

Large part of these data are also not in digital format.

Central problems of modern archaeological and historical research concern the understanding of the social and ecological factors leading to global change and to biodiversity crisis.

The integration of the human history and the development of ancient societies with the Earth system evolution implies the knowledge of the origin, growth and collapse processes of past societies and the interactions of the environmental and social processes that have contributed to determine human and environmental dynamics such as the emergence of the city and the state.

The past is the only “laboratory” we have to test our hypotheses and models on the dynamics of social and ecological processes (Cecchini, 2007; Peifer, 2007). Unlike similar initiatives, ArchaeoGRID takes expressly into account time evolution of data in computer simulations performed on grid infrastructures.

**Objectives and Challenges**

The ArchaeoGRID project is based on the adoption of the grid paradigm which allows new ways of sharing resources in an inter/multi-disciplinary collaboration among researchers belonging to
Related Content

Detection of Urban Areas using Genetic Algorithms and Kohonen Maps on Multispectral images

Adaptive Neuro-Fuzzy Control Approach Based on Particle Swarm Optimization
Gomaa Zaki El-Far (2012). *Innovations and Developments of Swarm Intelligence Applications* (pp. 81-98).
[www.igi-global.com/chapter/adaptive-neuro-fuzzy-control-approach/65807?camid=4v1a](www.igi-global.com/chapter/adaptive-neuro-fuzzy-control-approach/65807?camid=4v1a)
Design of Robust Approach for Failure Detection in Dynamic Control Systems
www.igi-global.com/article/design-robust-approach-failure-detection/53723?camid=4v1a

Applications in Operations Research
E. Parsopoulos Konstantinos and N. Vrahatis Michael (2010). *Particle Swarm Optimization and Intelligence: Advances and Applications* (pp. 185-203).
www.igi-global.com/chapter/applications-operations-research/40635?camid=4v1a