

## GIS Information Systems Potentialities for the Study and Conservation of Cultural Heritage

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### Abstract

This contribution shows ARKIS (ARchitecture Recovery Knowledge Information System) potentialities in cultural heritage conservation and diagnostics. ARKIS is a GIS based information System applied to cultural heritage artifacts. The system is capable to georeferentiate heterogeneous data on horizontal and vertical surfaces. The system allows to record any needful data, evaluating deterioration status, planning restoration, and monitoring cultural heritage.

### Introduction

The subjects presented in this contribution are the results of a master degree experimental stage developed within a collaboration from Luigi Campanella, professor in Chemistry for Environment and Cultural Heritage, and Paolo Salonia, from ITABC CNR. The main activity in this experimentation was the utilization of ARKIS information system for some case studies. ARKIS information system has been developed by two researchers from ITABC, Paolo Salonia and Antonella Negri. ARKIS is a GIS based modular instrument, organized in subsets, containing several informative levels, allowing various magnification degrees from geographical to single artifact scale. Descriptive and informative data appear in different layers on geometrical models of the artifact's portions. By clicking on an area of interest it is possible to show tables, database and text files in which related information is organized. Overlay functions are also possible, allowing to visualize and intersect different information for evaluation, interpretation and forecast aims. The system allows to formulate queries and search photographic images and geometric surveys. Other underlying functions are the automatic calculation of areas, perimeters and statistical processing. Hence, ARKIS is definable as an information system for the management of knowledge and diagnostic process finalized to analysis of deterioration status, conservation and restoration planning, and monitoring activity.

### Materials & Methods

The stage activities allowed to test the complete operational data entry cycle in ARKIS system, from geometrical data acquisition to analytical and descriptive data integration. In particular the process has been performed for two case studies in collaboration with Aosta superintendence for Cultural Heritage: Saint Maxim Chapel frescoes (Verrès, Aosta, Italy) and Collegiata di Sant'Orso frescoes (Aosta, Italy). Using ZScan technology (Menci Software, Arezzo, Italy) a geometrical model of Saint Maxim Chapel apse has been developed. ZScan technology allows to create point cloud 3D models along with related colorimetric information (Fig.1). This geometrical model will be exploited for the implementation in ARKIS system for the preliminary evaluation of deterioration status of frescoes on the apse. The restoration work will be managed through the same information system.

Furthermore an integration in the same system of data related to Collegiata di Sant'Orso frescoes has been performed.

## Results

Experimental results are essentially referable to an organization of knowledge process about deterioration status of Saint Maxim Chapel frescoes finalized to future planning activity for the restoration project.

About the second case study, Collegiata di Sant'Orso frescoes, the implementation of the information system performed during the stage has already allowed the definition of restoration program of activities, by means of the deterioration status analysis (Fig.2).

## Conclusions

An integration in ARKIS information system of Saint Maxim Chapel geometrical model and data related to Aosta superintendence for Cultural Heritage inspection activities will be performed. Then it will be possible to plan and manage restoration activities as well as Collegiata di Sant'Orso case study. The experimental results demonstrates that geometrical survey, realized using technologies providing both geometrical and colorimetric data, and the use of data integration environments as ARKIS, represents efficient instruments supporting traditional diagnostic activities. It would be very interesting to add to deterioration analysis information, microclimatic data in ARKIS system. Indeed, relating deterioration data to environmental context it would be possible to evaluate the alteration causes and their relationship with studied microclimate. An integration in ARKIS information system of chemometrical data could be very important for comprehension an interpretation of complex systems like cultural heritage objects and their relation with environmental parameters.

## References

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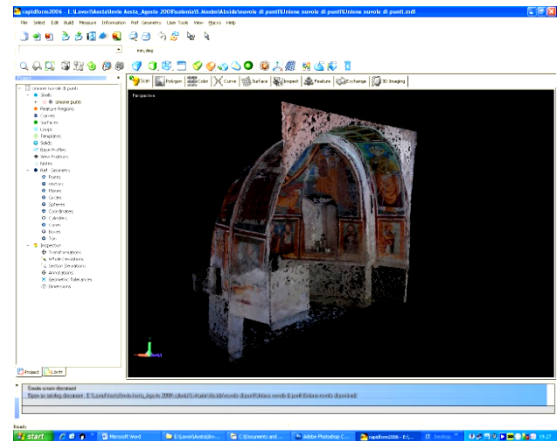


Figure 1: Saint Maxim Chapel apse geometrical model.

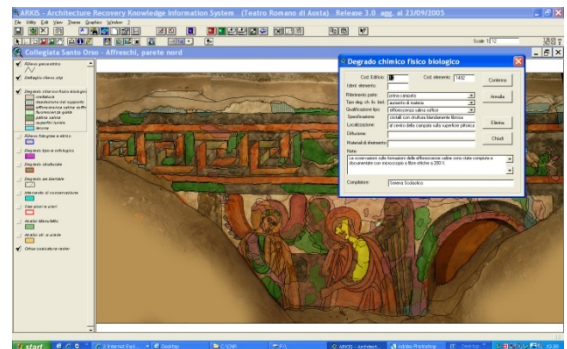


Figure 2: Collegiata di Sant'Orso frescoes in ARKIS information system.