

# Spatial Organization and Semantic Modelling of Historical Data: The Case of the French Scientific Mission, 1828-29

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## ABSTRACT

This article presents the methodological framework and the first results of the research towards the spatial organization and semantic modelling of the work of the French Scientific Mission (1828-1829), the first systematic mapping of the Hellenic State. Ultimate goal of this research is to create an integrated spatial database that incorporates the geographic information from the historical maps enriched with multimedia and texts from the published work of the Mission. For this, the technological approaches suggested by the Semantic Web have been followed introducing the concepts of semantic interoperability and geographic data models in the management of historical data. Eventually, the historical map becomes the medium on which the historical data are organized as well as the narrative medium that conveys the historical knowledge to the wider public illuminating the status of the Hellenic State at the time of its establishment, from a spatial point of view.

## KEYWORDS

Data, Georeference, Historical Maps, Humanities, Interoperability, Semantics, Spatial, Storytelling

## INTRODUCTION

Historical maps are an important and fascinating component of Cultural Heritage. They are synthetic representations of space and representative artifacts in terms of the cultural, political and scientific framework in which they were created (Simon et al., 2010). Historical maps depict the level of geographic knowledge, ideology and geopolitical interests of a specific time period (Jenny and Hurni, 2011). Maps were created in order to support the space management strategies but also to frame human studies: they have been a basic tool for research for centuries illuminating any spatial aspect. Historical maps convey valuable spatial information, sometimes unique and not available in other archive sources. Among other, they document the spatial and temporal evolution of the geographic entities and phenomena constituting historical time series of documents. Their study can reveal the relationships between geographic entities, their changes and the reasons for them, sometimes far more easily than digging in text archives.

The wide availability of high-resolution historical maps and the relative ease with which they can be digitized have made them subject to new scrutiny (Dym and Offen, 2012). There are numerous applications that make use of old maps in order to extract historical data as well as to support spatial

DOI: 10.4018/IJCMHS.2019070103

analysis. For example, Pinho and Oliveira (2009) that examine urban morphology or De Boer (2010) that suggests the creation of virtual historical landscapes using historical maps. The joint knowledge of cartography, history, and GIS results to numerous historical GIS applications (e.g. the Great Britain Historical GIS and the National Historical Geographic Information System of U.S.A.). Digitized historical maps also provide an innovative platform for literary studies (Offen, 2013). An example is the Map of Early Modern London<sup>1</sup> where historical information is displayed by selecting points of interests on maps. They are also major components in cultural heritage platforms for visualizing cultural content such as the Electronic Cultural Atlas Initiative<sup>2</sup> where users can search for cultural artefacts applying spatial criteria.

In order to best exploit historical maps and the unique wealth of information they carry, it is necessary to model both taking into consideration that users can: a) have direct access to them in a comprehensive and dynamic way; b) apply various criteria such as historical toponymy, spatial coordinates or geographic relations (e.g. settlements near rivers, isolated settlements, etc.) in order to request the desirable datasets; and c) compare and re-synthesize data correlating it with other historical databases.

The scope of this research is twofold: a) to model historical geographic data in an interoperable way fulfilling the aforementioned considerations; and b) to experiment with new methods spatially oriented in order to convey historical knowledge to the wider public of different interests (cultural, educational, and historical). The necessity for the above emerged from the study of a unique source of historical information not digitized until now and unknown to the public, the maps and reports of the French Scientific Mission (1828-1829) that was sent to Greece in order to survey the territories and record the available resources of the Hellenic State that was about to be established. The huge work of the Mission, including eight volumes of texts, maps, landscape views, drawings and other, gives a detailed picture of space, settlements, road network, infrastructure, flora and fauna etc. recomposing the historical landscape of that time. The goal of the research is not only to create a historical database out of the Mission's published work but also to organize these data in a spatial context and to standardize those semantically addressing the lack of relationships between sources of historical information and supporting synergies between various relevant applications. Even though there are some applications for the semantic modelling of historical knowledge (Meroño-Peñuela et al., 2014), there is not a joint approach for modelling historical and geospatial data following a web semantic approach, something that this research wishes to fulfill.

The theoretical framework of the research comes from the Spatial Digital Humanities, a sub domain of Digital Humanities that studies space (both geographical and conceptual) using a wide range of technologies from Geographic Information Science (Bodenhamer et al., 2010), with focus on the modelling, visualization and analysis of space, the spatial behavior and the spatial relationships between entities and phenomena or events (Jessop, 2007).

## BACKGROUND

### Historical Maps and Geographic Information

According to the time period they were created, historical maps have more or less some common characteristics such as an undefined or approximate reference system, an uncertain metric content and a semantic content difficult to interpret (Guerra, 2000). Georeference, the mathematical process by which the internal coordinate system of a map image is converted to a known coordinate system (e.g. of a modern map) by using common control points, comes to address these issues. By georeference, the map's internal geometry is restored, the relationship with current base maps is established and the geographic information that the map carries is geometrically correct and ready to be extracted and modelled. The information (e.g. location, place name, coordinates) available after the process of georeference improves search and retrieval of maps and related documents, with spatial criteria.

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