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**The SyMoGIH project and Geo-Larhra:
A method and a collaborative platform for a digital historical atlas
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The aim of this paper is to highlight the need for digital atlases in historical research and to present the data model and the collaborative platform we have developed in order to produce a historical geographic information system (HGIS), the Geo-Larhra, which is suitable for producing a new digital historical atlas.

1. Background and purposes

At its beginning the project explored the possibilities of integrating geographical and historical data into the same digital research platform. Several reasons fuelled this project. The main issue that arose was how to obtain base maps to represent a specific historical time. Traditionally, printed historical maps and atlases provide spatialized maps usually connected with relevant historical dates. This chronological selection documents major historical events for a specific geographic area (e.g. the political borders of European Countries after the Congress of Vienna, 1815). More rarely, maps are provided by century (1600, 1700, etc.) and significant elements in the chronological development or specific changes in tight spaces do not appear. Moreover, there exists a limited range of digital historical maps, particularly with regard to freely accessible shapefiles (commonly used geospatial vector data format), and they often do not take into account the diachronic changes in political or administrative territories. The conclusion was clear, the advance of digital history needs a project for realizing a new digital historical atlas, enhanced by researchers working collaboratively in a coherent, easy-to-use environment.

Drawing on different successful experiences in historical atlases (e.g. A vision of Britain through time, Euratlas, Digitaler Atlas zur Geschichte Europas seit 1500, HGIS Germany, China Historical GIS), we have devised a method for modeling geohistorical data to process the evolution of territories. This work is an application of the SyMoGIH method, the MOdular SYstem for Historical Information Management (Beretta, Francesco / Vernus, Pierre (2012)). Against this background, the historical atlas will be available to historians participating in the SyMoGIH project but it will also be accessible to a larger

public through the web site, www.geo-larhra.org, offering a basic mapping service online as well as downloadable resources. Geo-Larhra includes a gazetteer, a catalog of vector layers plus the digital historical atlas. In this paper we will describe the underlying data model and the principles and workflow of our collaborative approach.

2. Method and data model

To build such a collaborative historical atlas, we needed to develop a generic data model allowing the processing of any type of place and taking into account any kind of temporal evolution due to the toponymical, typological or spatial extent changes. To address the issue of multi-dimensional evolution, the team of the SyMoGIH project has developed a generic data model independent of any research problem [see the documentation on our website: <http://www.symogih.org/?q=documentation>]. In our model, we distinguish between the identification of places and their spatial representation.

The identification of places is carried out in the traditional way using a gazetteer: a place is identified by its name or names, a type and a geographical location in form of a point or a bounding box (cf. Hill, Linda L., 2006). Each place is identified by a uniform resource identifier (URI).

The processing of spatial representation on the contrary is the most novel part of our method : we have introduced a distinction between the form of a place at a given time, that we call a “concrete time-specific form” or simply a “concrete form”, and the more or less accurate geometries (i.e. geo-referenced vector data) representing this form at different scales. The evolution of the place's form is first described and documented by historical information collected collaboratively by the historians participating in the project. The geometries are then produced by the GIS specialists according to the collected information. This modeling process and data production workflow is more flexible and suitable for historical research than the traditional method in GIS, which links data directly to geometries. By using SQL and spatial queries it is possible to output the shape of places and territories at a given date with a temporal scale which is currently accurate to the day. This method leads to a synthesis between combining the traditional practice of historical databases, the use of historical atlases and GIS methods. Geo-Larhra is intended to be a resource to address both of these needs : providing historically accurate base maps and allowing historians to make spatial analysis taking into account temporal evolution.

Our philosophy is based on a collaborative and open approach aimed at enriching and developing the historical atlas. The collaboration of historians and GIS specialists is carried out on several levels : they collect historical and geographical information from sources, maps and historical atlases ; they produce historical data in the collaborative database platform ; they produce geometries using the collected historical and geographical data. Digital maps are finally created and they can be successively added

to, following the same workflow, if new or more precise information is collected. The paper will give some concrete examples of this collaborative approach.



Image 1 : Screenshot of the historical atlas : www.geo-larhra.org

3. The platform

Technological choices for the project encountered strong constraints resulting from the collaborative aspect and the generic system and multiple uses for which it was intended. The software architecture has been constructed using the triptych PostgreSQL, Post-GIS and QGIS. The DBMS PostgreSQL provides several advantages. It is a free and open source, and useful to establish the precise management of users' rights. The PostGIS extension is easily interfaced with other management database tools to query, analyze and visualize data (GIS software, statistical analysis, GIS web server). Geo-historical data are published with the TinyOWS map-server which provide WMS (Web Map Service) and WFS-T (Web Feature Service) in QGIS or OpenLayers.

4. Future prospects

To date, the data model presented in this paper seems to fit historians' needs perfectly. However our team must now improve the ease of use of the platform accessed by scholars concerned by spatial analysis who would contribute to this project. We have already started to publish the gazetteer on the web and we provide some shapefiles, extracted from the historical atlas of the Italian peninsula territories, which was our first data set created according to this method. Our longer-term perspective is to expand the geographical area of the atlas with the help of international partners.

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