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WEB SERVICES AND HISTORICAL CADASTRAL MAPS: THE FIRST STEP IN THE IMPLEMENTATION OF THE WEB C.A.R.T.E. SYSTEM

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In the State Archive of Como, Northern Italy, about 15000 historical cadastral maps corresponding to 246 current municipalities of Como and Lecco districts are preserved. These maps belong to different cadastral productions: the Theresian cadastre, promoted in 1718 by Emperor Carl VI and come into force in 1760 during the reign of Maria Teresa; the Lombardo-Veneto cadastre, started in 1854 and completed, with continuous updates during the time, at the end of the century; and finally some maps of 1905 belonging to the New Lands Cadastre, the first national geometric cadastre after Italian unification of 1861. Maps have not only a considerable artistic value but mostly a cultural and historical one, since they constitute a great source to derive an accurate representation of the territory and its evolutions. For these reasons, the old maps represent nowadays a valuable instrument for historians, scholars and professionals working both in the historical research field and in the urban and territorial planning. The project Web C.A.R.T.E. (Web Catalogo e Archivio delle Rappresentazioni del Territorio e delle sue Evoluzioni), sponsored by the Fondazione Provinciale della Comunità Comasca Onlus, has been started to enhance the immense cartographic heritage of the State Archive of Como using the most recent technologies of map processing and web services.

After the maps digitization step, performed by the State Archive in agreement with the interested municipalities, a georeferencing and warping procedure is needed to place the cadastral maps in the actual Italian reference system, thus making it possible to overlap them to the current cartography. Being the most of the maps divided in sheets, that have been surveyed and drawn independently from each other, the preliminary step has been to combine the sheets in a single map by applying to them a roto-translation with a scale variation. The georeferencing of unified maps has then been performed and tested in different software and GIS packages to determine the optimal solution. Finally PCI Geomatica OrthoEngine has been chosen, thanks to its variety of implemented mathematical models and to the possibility of inserting not only Ground Control Points (points of known coordinates, both in the actual cartography and in the historical map, that are used to compute the mathematical model) but also Check Points, points with known coordinates that are not included in the transformation and can therefore be used to check the model accuracy. The residuals of the transformation have then been used to determine the best georeferencing model for each cadastral map, confirming the choice with statistical techniques.

The following step has been the documentation of georeferenced maps in terms of metadata, a series of information needed to precisely identify the data and get information about their content, accuracy, accessibility and usage constrains. Metadata schema are currently defined by national and international standards: at the Italian level, the CNIPA (Centro Nazionale per l'Informatica nella Pubblica Amministrazione) proposed in 2006 a standard which is in agreement with the European Directive INSPIRE and defines a common set of metadata related to all kinds of geographic information used by national Public Administrations. Metadata for the historical georeferenced maps have therefore been compiled according to the Italian standard; last step has been their publication on the Internet through GeoNetwork, an open source web geo-catalogue that allows users to immediately identify a data and derive (from its metadata) information about language, spatial extent, reference system, responsible person or agency, accessibility, possible limitations on the usage, data origin and production process, and other features.

Digitized and georeferenced maps, accompanied by their metadata, can finally be visualized and navigated online through the implementation of a dedicated webGIS. The realization of this viewing service implies the usage of software and tools both from the server and the client-side. Applying FOSS (Free and Open Source Software) solutions, a system with interactive functionalities and able to manage large raster maps has been developed. The entire service is currently in a test phase to verify its fulfilment of specific requests and needs expressed by experts from the State Archive; for this reason it may be possible that new and improved solutions will be introduced in the future.