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# OPEN DATA ACCESS AND INTELLECTUAL PROPERTY RIGHTS FOR HISTORICAL CARTOGRAPHY: A GEOSS USE CASE

*LOVISON-GOLOB L.*
*Afriterra Foundation, BOSTON, UNITED STATES*

## BACKGROUND AND OBJECTIVES

The paper focuses on the data sharing of digital historical and georeferenced maps and discusses historical cartography as a use case for the digital rights management of cartographic data. The paper does not discuss issues related to the lack of standardization of the conversion process from paper into digital historical cartography, but discusses the procedure needed to make historical georeferenced maps and records that are held by the Afriterra Foundation available to users through a GEOSS framework and the issues encountered during this process. For the use case discussed in this paper, the underlying principle is making the geospatial data openly available to all users at minimal or no charge. This principle was formulated by the Committee on Data for Science and Technology (CODATA) Working Group (1) and adopted as a principle by the Global Earth Observation System of Systems (GEOSS) Working Group (2). The use case presented here involves historical cartography and makes historical data accessible so as to allow for harmonization across thematic fields and geospatial data sharing across different users.

While the cartographic field is undergoing a technological revolution with a shift from paper-based maps and print-culture constructs to digital maps and virtual-culture constructs, some issues have become increasingly prominent such as: issues of harmonization, geospatial data sharing and the issues related to the access and legal use of cartographic artifacts, including historical maps, their derivatives, and their underlying geospatial data. Harmonization of geospatial data requires that there are standards through which data are converted (from paper to digital formats), georeferenced, exchanged or collected, so to be integrated with other geospatial data. These standards tend to evolve with the time and they may serve multiple purposes or users. Moreover, harmonization may involve datasets that have different geographical spatial references and scales that need to be harmonized (so the need in this latest issues to address explicitly the modifiable area unit problem). The geospatial data sharing is defined here as the ability to share the same geospatial data with multiple applications or users. With few exceptions, geospatial data sharing requires that there is free exchange of geospatial data; that the access is warranted through the web and is secure; that there is a single point of contact where possible; that the official data will be distributed by official outlets and, that a data management model will be adopted to assist local organizations in overcoming their limited resources while making their geospatial data available and in addressing a long term management issues of their geospatial data. The legal framework and economic models seems to lag behind this technological revolution. The presence of a clear legal framework for the adoption of geospatial standards may be fragmented or there is no central national authority that supports, formulates, promotes, assure accessibility and assist in harmonization and geospatial data sharing among subordinate organizations. Other factors contributing to the difficulty in adopting and implementing a clear intellectual property rights policy for geodata may be related to the type of business of the organization (commercial, non-commercial, public, academic or other), the type and format of the geospatial data (map, text, vector-based data, raster-based data, imagery, videos) the distribution network of the geospatial data (network bandwidth, mobile or fix user devices). Further difficulties may be related to the different levels of intellectual property rights associated with each geospatial dataset (for example, the difficulties to sort out the different types of licenses for a specific geospatial data use, different types of licenses for reuse of different parts of the geospatial dataset, and the limited versus unlimited distribution of a geospatial dataset). Based on the different types of intellectual property associated with each geodata, different business models will be adopted according to rules of e-commerce. According to some, it is more important to manage information spatially and less to manage spatial information. From this point of view, a model based on a Collective Management of Copyrights and Neighboring Rights, could be more attractive. In this case, a collective management organization (CMO) such as a Digital Library, aggregates a series of rights held among privates and issues a series of broad common-based licenses to users. Generally, several entities have made significant progress in the field of digital rights management for geospatial data. These groups include the following, among others: the INSPIRE data-sharing initiative that impacts all 27 members of the European Union (3), the European Directive on the re-use of public sector information (4), the Digital Rights Management Working Group that developed the Geo Rights

Management Reference Model--GeoRM -- at the Open Geospatial Consortium (5), the initiative at OASIS (6), the CODATA Working Group, the ISO-TC211 Working Group that has developed a vocabulary to express rights for geographic information –GeoREL -- and the GEOSS Working Group.

Research in the field of digital rights management and intellectual property rights has increased among commercial companies such as Google and ESRI and within social media platforms such as Facebook and Twitter. Crowdsourcing of geospatial data – that is, the informal social networks and web 2.0 technology on which maps such as OpenStreetMap are generated – offers significant opportunities for open access to geospatial data in real time but also creates challenges for the quality of data, sustainability of the operation, and the legal responsibility for the data collected, but this paper will not address these issues.

The benefits of geospatial data sharing and re-use are enormous and proven (7, 8, 9). Studies have demonstrated that geospatial data sharing and re-use are very beneficial to society because of the data transparency, verification, harmonization, and cross-validation, especially when applied to cross-discipline studies and to longitudinal and historical studies.

Sir Tim Berners-Lee – the father of the World Wide Web – is one of the major proponents for open geospatial data. He recently succeeded in convincing the Ordnance Survey (2009) and the United Kingdom Government (2010) to adopt the Open Government license for public, scientific and community-based geospatial data (10).

The goal of the research work presented here is to develop use cases that provide a model for open access to geospatial data and management of intellectual property rights for historical cartography implemented within the GEOSS framework. The current use case for historical cartography will establish a system component and service that make datasets discoverable through metadata and will also indicate whether the datasets are openly accessible or whether they have usage restrictions.

**APPROACH AND METHODS**

Within the GEOSS Common Infrastructure, the services include the following: system component and service registry, standard and interoperability registry, user requirement registry, best practices wiki, GEO Web Portal, and GEOSS Clearinghouse. The GEOSS Common Infrastructure provides "a place where GEOSS-affiliated resources can be identified, found, and applied directly or in support of one or more Societal Benefit Areas." The nine Societal Benefit Areas are defined as: disasters, health, energy, climate, agriculture, ecosystems, biodiversity, water, and weather.

A key component of the first use case is registering the georeferenced historical maps at the GEOSS Component and Service Registry. Registration is the first step in making data and services accessible to users through the GEO Web Portal. The Geo Web Portal, with its service architecture, is ideal for conducting mash-ups and therefore for visualizing geospatial data, including historical data, across different devices and among different users.

The use case incorporated the geospatial data principles of the CODATA and GEOSS Working Groups – especially, making geospatial data openly available to all users at minimal or no charge. Several agencies in both the United States (NASA, USGS) and in Europe (United Kingdom, Italy) have embraced this policy. The main reason, as discussed in (8), is a belief that open data policy is essential for progress and innovation. However, there is still a discussion on the meaning of non-commercial and commercial geospatial data. According to some authors (11), commercial data providers can be both government agencies and privates in some countries such as Canada, France and Japan, where in other countries, such as the United States, can be only private providers.

First Use Case:

Actors:

1-Data Provider: Afriterra Foundation at www.afriterra.org

2-GEOSS Common Infrastructure (GCI) Registry at http://earthobservations.org

Initial Status and Precondition:

The Data Provider, Afriterra Foundation, has developed the online source – an historical georeferenced map and its metadata -- and is registered as an organization at GEOSS.

Action:

1- Proceed to the registration of a system (component) or URL that provides access to information.

[The "component" resource is classified by the Societal Benefit Area, its supports, its type (activities), and the timeframe of the information availability. Each system is related to one or more Societal Benefit Areas.]

2- Proceed to the registration of one or more service interfaces for each system (component).

[Each service is described and linked to a GEOSS-listed standard or special arrangement (community of practice). If a standard or special arrangement is not present, the user may nominate one directly in the Standards and Interoperability Registry. ]

Data Policy:

1- In keeping with the CODATA/GEOSS principles, the approach is to make geospatial data – an historical georeferenced map and its metadata -- openly available to all users at no charge, but with expected acknowledgements.

2- Data will be available with minimal time delay through the establishment of previous agreements on the access and use of geospatial data. Users receiving the requested data will fill in a form aimed at providing feedback for geospatial data, metadata, and GEOSS products and services.

Post Condition:

1. Generated system component of historical maps.

2. Service to be generated.

Once the registration has been completed, the system and service information can be discovered through the GEO Web Portal and searched through the GEOSS Clearinghouse.

**RESULTS, CONCLUSION AND FUTURE PLANS**

The registration of historical georeferenced maps to the GEOSS Common Infrastructure (GCI) allows users to identify, retrieve, and visualize other components and/or services that are available at the GEO Web Portal. The CODATA and GEOSS principles were followed in developing the use case for the discovery of historical datasets within the GEOSS Common Infrastructure. Afriterra Foundation was registered as the Data Provider at the Common Infrastructure Registry. A 1722-map by Guillaume De l'Isle titled "Carte D'Afrique dressée pour L'usage du Roy par Guillaume Delisle Primier Georgraphe de Sa Majesté de l'Academie Royale des Sciences a Paris Chez l'Auteur sur le Quay de l'Horloge du Palais avec Privilege du Roy " was selected. For georeferencing was applied an affine transformation and used ESRI ArcGIS software. The georeferencing introduced a significative amount of error in the raster dataset, given the historical nature of the geographic coordinate systems. The preparation of the use case highlighted the need to create a new Societal Benefit Area to encompass historical maps and historical geospatial records. This new Societal Benefit Area might be described as "Cultural Heritage." The concept of cultural heritage can be associated with the concept of cultural landscape as the "combined works of nature and of man" described by the World Heritage Convention of 1992 as well as with the concept of historical maps and records as already included in the " World Heritage recommendation concerning the protection of moveable cultural property" of 1978. Much more work needs to be done regarding the identification of the characteristic properties of the different cartographic documents and their schemas within the GEOSS framework, in order to support discovery, analysis and decision support services. One of the benefits of the use of historical cartography within the GEOSS framework is to use the historical georeferenced map though integration with potentially other datasets. Several issues remain to be discussed and solved such as the ones related to the adoption of specific legal and e-business models, and how to continue to promote geospatial data sharing among different organization that sometimes do not have a well-defined geospatial data management policy, or where access and usability of geodata is difficult.

Discussion about use cases involving historical cartography will continue at the ODAIPR workshop that is scheduled for the ICC 2011 Conference.

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