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Geospatial Data Collection Policies, Technology and Open Source in Websites of Academic Libraries Worldwide

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ABSTRACT

The proliferation of geospatial data demands the engagement of information organizations, such as academic libraries, for their management and diffusion.
The purpose of this paper is to reveal issues related to the development of geospatial collections and explore their efficient use as required by the current information environment. Thus, a research conducted on 363 websites of academic libraries worldwide and 136 websites maintaining geospatial collections were identified. The research questions were formed based on international bibliography and we applied a content analysis method for data extraction. Findings show a significant activity of academic libraries in providing GIS services in accordance with high rates in user education programs, creating the use of geospatial collection and Geographic Information Systems (GIS) services more effective. Nevertheless, through their websites we obtained poor response to communicate geospatial collections policies. The majority of the academic libraries surveyed in this study provide commercial software to their users for managing data on a local level, while the minority of library patrons are able to use geospatial data via remote access. This paper explores aspects of development in geospatial collections in academic libraries that have not been adequately raised. Additionally, we provide an overview of geospatial collections worldwide.

INTRODUCTION

Academic libraries have reached a crossroad in terms of collecting, evaluating and managing resources (Borin & Yi, 2008). Changes occurring in technology, budgeting, scholarly communication and publishing have changed and redefined libraries' collections (Nabe, 2011). At the same time libraries as dynamic organizations, are trying to expand their services in a global level, to meet the growing needs of their users.

Collection development based on locally produced scientific data creates new challenges for librarians such as building or strengthening their relations with faculty and research centers/laboratories in the academic community; effective collection development will expand the services that can be offered by the library (Newton, Miller, & Bracke, 2010). Geospatial data are also included in the enormous amount of data produced in different fields of what is called "Big Data". Geospatial data are statistically significant since their quantitative nature and results point towards qualitative significance as they represent almost 80% of public sector information.[1] Furthermore, production, procurement, and updating costs for geospatial data are high while the annual public expense for activities related to these in U.S. exceeds $4.4 billion (Koontz, 2003).

Academic libraries in the past played a significant role in the campus wide organization and accessibility to geographical collections (Larsgaard, 1998). It was the ARL (Association of Research Libraries) GIS Literacy Project in U.S. that enabled the widespread diffusion of digital geographic information in academic libraries through technological support and librarians' education (Howser & Callahan, 2004). Geospatial data are unique and their process requires advanced, sophisticated software and hardware. The creation of a strong written policy can be an assisting tool for the librarian in the collection of data produced by scientific personnel and stakeholders in an institution. This management practice aims to the formulation of a digital geospatial collection and GIS services. In this context the development of a research data collection created by an academic institution - with the inclusion of geospatial data - is a standard practice for some libraries or a strategic

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[1] Institute for the Management of Information Systems "Athena" Research Center. Public data, open data: introduction. http://geodata.gov.gr/geodata/images/geodatagovgr_info_en.pdf.

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goal for others. Many librariegebs, in order to accomplish this goal are using open access channels. Additionally, their collection development is based on approved written policies, generated as a result of the in-depth study of the organization (e.g. Queensland University of Technology, Brisbane Australia).[2] Thus, new grammar for information management is generated and new opportunities are created for providing services aiming to adjust libraries in the new information environment along with meeting the growing needs of users.

As Stephens (1997) argues the World Wide Web is an attractive mean of enhancing the service capabilities of academic libraries. It is also an uncharted service landscape presenting significant challenges in the development of effective services and resources.

The purpose of this paper is to explore whether in today's information society in which geospatial information is essential for citizen's everyday life, libraries with geospatial collections have adopted some key factors for promoting the geo-information through their websites to their patrons. In the context of this research these factors are: geospatial collection development policies, technological infrastructure and GIS services, remote access, user education and the use of open-source software.

To answer the above, we conducted an initial research to websites of academic libraries with geographical collections serving departments where geographic information is essential to the educational and research process.

Our research is different from other similar research both in terms of geographic coverage, and the examined factors that, according to the relevant literature, affect the development and utilization of geographical collections while they offer services for a more efficient user access. Our research is quantitative and the findings will update the current information for geospatial collections worldwide.

One reason why we conducted this research study is that even though Greece provides open geospatial data of the public sector[1], a variety of limitations have prevented Greek academic libraries from achieving similar growth in GIS services with other academic libraries abroad (Vardakosta & Kapidakis, 2011). We expect our findings to assist researchers into further investigation of the examined factors and contribute to the formulation and creation of an effective tool for librarians and other stakeholders who work on the development of these collections. In our paper the reader will find a section with definitions of the topics of interest, the conceptual framework, literature review including past studies on the subject, the methodology applied and the data collection process. Our findings, a discussion and conclusions, and future works are found in the last section of the paper.

DEFINITIONS

The implementation of standard World Wide Web technologies, digital gazetteers, and special attention to metadata use combined with the extensive distribution of "user friendly" software, expanded the potential for geospatial analysis use by many disciplines (Hill, 2000; Steinhart, 2006). As a result, over the last few years major academic libraries (e.g., Cornell,[3] Harvard,[4] and Stanford[5]) with a tradition in digital collections, have developed collections of geospatial content and interactive services. Thereby these major libraries provide additional services to patrons. Geographical information may exist in an optical form (e.g., maps, remote sensor images, photos, etc.) or in a textual form (e.g., fieldwork descriptions, technical documents and reports) (Borner & Chen, 2002). A geographical collection consists of materials such as books, journals, maps, atlases, aerial photos, remote sensing images, geospatial data, software, etc., all of which involve the study of human impact on the earth. As any success in geographic information delivery and consumption is intrinsically linked to the medium on which it is created and displayed (Hurst & Clough, 2013), so these libraries collect different types of digital data such as aerial views, atlases, data series, remotely sensed images, city foreign maps, topographic profiles, etc. Subject categories that libraries offer to their patrons include both physical and human geography. The most frequently used formats are CDs, DVDs, and raster data but microforms, CD-ROMs and vector data are selected as well (Vardakosta & Kapidakis, 2012).

In the last decades international bibliography demonstrates Collection Development Policies (CDPs) that have been typically characterized as "tools" (Bostic, 1988; Wood & Hoffmann, 1996), "a contract between the library and its users" (Gorman & Howes, 1989), "an educational tool for the new personnel" (Jenkins & Morley, 1999, p. 8), "the vehicle through which the library will achieve its goals regarding provided service," or "the guide to the library sources for the academic community" (Olatunji Olaojo & Akewukereke, 2006) while for Johnson (1994) "libraries without policies are like companies without a business plan." Jenkins (2005) argues that "posting CDP on the library's website is an easy way to make it available".

In the world of digital libraries, a policy is typically described as a condition, term or regulation governing the operation of a digital library or some aspect (Innocenti, Vullo, & Ross, 2010). An important step in data collection (that have been produced by the scientific personnel of the institution in order to organize and develop a digital geospatial collection and GIS service), is the creation of strong written policies.

The use of spatial data is carried out and is completed through Geographic Information Systems (GIS). GIS can be considered as "a technology-based computational system for the collection, management, analysis, modeling and presentation of spatial data for a wide range of applications" (Davis, 2001, p. 13).

Essentially, GIS combine five components: people, data, software, hardware and methods for finding solutions in issues with geospatial content. However, GIS are basically designed for production needs rather than the retrieval needs of a metadata system (Antonelli, 1999). For Adler and Larsgaard (2002) the type of the library (e.g., public, academic, research) is among the elements that defines and differentiates the provided service levels. Boisse and Larsgaard (1995) and Kowal (2002) divide GIS provided services in three levels: a) introductory, b) mediate, and c) advanced; while Howser and Callahan (2004) identify GIS services as: "access to GIS software, scanner, photocopiers, guides, data, and technical support". Furthermore, the same researchers point out that when the above service levels are supplied by libraries, they represent a typical example of successful service implementation. For the needs of the present study the above definition for GIS services was adopted.

Lately, GIS seems to gain ground due to the open-access movement and the open software in the field of information (for access and distribution) (Corrado, 2005; Lewis, 2012). Public sectors around the world organize their services using open systems and encourage their use (de Montcheuil, 2012). Libraries, as institutions of information dissemination and enforcement of new technologies, are leading organizations in the adoption of open systems like: Open Office, or Zotero for bibliographic management; Linux for servers administration; Evergreen and Koha for library's automated system (Ritterbush, 2007; Bisson & Eby, 2007; Chutdov, 2007) or Dspace, Fedora and e-prints for repository's needs (Little, 2013). As developments in information environment direct the library to the role of information retrieval and dissemination facilitator (Wulf, 1995), it should find ways to organize its content in whatever form it might have (Billings, 1997).

Remote access is a new approach to offering services, without local or time constraints, providing the library the ability to control and examine statistical data through policies that will be created. Since remote access is an infrequently discussed factor in literature related to

[2] Queensland University of Technology, Brisbane Australia http://www.qut.edu.au/.

[3] http://calvert.hul.harvard.edu:8080/opengeoportal/ Cornell University. Albert R. Mann Library. Cornell University Geospatial Information Repository (CUGIR).

[4] Harvard University. "Harvard Geospatial Library" http://calvert.hul.harvard.edu:8080/opengeoportal/.

[5] Stanford University Libraries. Stanford Geospatial Center. http://lib.stanford.edu/gis/.