INFORMATION SCIENCE PUBLISHING
701 E. Chocolate Avenue, Suite 200, Hershey PA 17033-1240, USA
Tel: 717/533-8845; Fax 717/533-8661; URL-http://www.igi-global.com
ITB15319

This paper appears in the publication,
Integrating Geographic Information Systems into Library Services: A Guide for Academic Libraries
Authored by John Abresch, Ardis Hanson, Susan Jane Heron, and Pter J. Reehling© 2008, IGI Global

Chapter VI

Accessibility:
Critical GIS, Ontologies, and Semantics

Ardis Hanson, University of South Florida Libraries, USA

Introduction

With the creation of the Internet and the continued evolution of technologies in GIS, networking, and knowledge management, access to geospatial information is a critical component of research and practice. Interoperability is the "new paradigm for joining heterogeneous computer systems into synergistic units that facilitate a more efficient use of geographic information resources" (Harvey, Kuhn, Pundt, Bishr, & Riedemann, 1999, p. 213). As geographers reassess the description of geographic methodologies and techniques across different platforms in the online environment, so have researchers in other disciplines assessed the use of applied geographic techniques for a wide variety of analysis. Such efforts have led some researchers to use new descriptive classifications to identify functionalities in the new scholarship, such as in creating new ontologies for GIS (Fonseca, Davis, & Cmara, 2003; Goodchild, 2004; Goodchild & Haining, 2004; Mark, Skupin, & Smith, 2001). This chapter examines the impact of these new ontologies, reviews the impact standards have on access and issues for end-users in accessing geospatial information.

Interoperability and Accessibility

As discussed in Chapter V, geographic information standards apply to the definition, description, and management of geographic information and geospatial services. Although there are numerous reasons why standards are good, we will concentrate on three: to increase the "understanding and usage of geographic information," to increase the "availability, access, integration, and sharing of geographic information," and the "efficient, effective, and economic use of digital geographic information and associated hardware and software systems" (Albrecht, 1999, p. 151). All three are affected by interoperability.

Interoperability allows computers and users to share and access data and operations through information networks. It has been described as a voluntary, "bottom-up" approach where independently deployed heterogeneous systems, data sources, and data models exchange data, process queries/requests, and have a common understanding of the resource and user/system requests (Sondheim, Gardels, & Buehler, 1999).

Portability, a component of interoperability, implies the ability to transport application source code between computer platforms and operating systems, and data between databases. Standard specifications for data and for operations directed to data are necessary to communicate with one another and to exchange and use information, including content, format, and semantics. The U. S. National Institute of Standards and Technology (NIST, 1995) established the Open Systems Environment (OSE) to ensure that differing performance characteristics and capabilities between systems do not prevent portability. There are three fundamental entities in NIST's OSE: application software, application platform, and platform external environment. Interfaces are shared boundaries between entities, defined by functional characteristics. Services are capabilities provided by entities, falling into specific categories, such as operating systems services, human/computer interface services, data management services, data interface services, graphics services, and network services (National Institute of Standards and Technology, 1996, p. 11). Since networks must have a certain degree of structure and stability to be effective, the design of a network is strongly connected to the character of knowledge it is able to transmit (Batten, Karlsson, & Andersson, 1989).

Data interoperability is defined as the ability to access multiple, heterogeneous geoprocessing environments, either local or remote, by means of a single unchanging software interface (Buehler & McKee, 1996). ISO/TC-211 defines two types of interoperability: "Syntactical interoperability assures that there is a technical connection, that is, that the data can be transferred between systems. Semantic interoperability assures that the content is understood in the same way in both systems, including by those humans interacting with the systems in a given context." Research in geospatial interoperability must take into account not only data or structural issues but also semantics.