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## **Standards for Classifying Geospatial Data: Top-Down Geographical Standards and User-Generated Maps**

Because of the rapid evolution from paper maps to digital cartography, there has emerged a need to create a classification standard for the purpose of accessing geospatial materials. Geographic Information Systems (GIS) emerged in the early 1960's via the Canadian Department of Forestry and Rural Development. The Department created a computer mapping database system for recording geospatial information about soils, agriculture, recreation, and wildlife and this evolved into a computer application used by world government bodies and the private sector. With the evolution of the internet, the use of GIS software has proliferated with the demand for remotely accessible cartographic information.

In 1973, well before the explosion of the internet, a federal task force was developed to study guidelines related to mapping, charting, geodesy and surveying. A report was published that year by the Office of Management and Budget (OMB), the Forest Service, the National Oceanic and Atmospheric Administration, the Defense Mapping Agency and the U.S Geological Survey.<sup>1</sup> The report outlined the many issues that agencies were facing in terms of the classification of cartographic materials. Because no cohesive system had been developed, each agency had developed its own standards, therefore creating a real problem in terms of resource

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1. <http://www.fgdc.gov/library/whitepapers-reports/white-papers/fgdc-history>

sharing, redundancy of information and lack of cohesive quality standards for the retrieval of data.

This had reached a crisis point by 1994, when President Clinton signed Executive Order 12096 which called for the creation of a National Spatial Data Infrastructure (NSDI) with the goals of promoting resource sharing and interagency collaboration.

The infrastructure was charged with providing support for private and public applications of geospatial data for transportation, community development, agriculture, emergency response, environmental management, and information technology. The NSDI required a National Geospatial Data Clearinghouse to be established whereby each agency was required to document all new geospatial data it collects or produces and make that data electronically accessible to the Clearinghouse network. This was implemented to prevent redundancy in data creation and dissemination.

Concurrently, in 1994 The FGDC developed a Metadata standard which was used as the base document for the International Organization of Standards (ISO), which created the official international geospatial information standard in 2003 after a period of study from 1999-2002, when the ISO took on the task of harmonizing the range of formal and defacto geospatial standards.

In 1998 the Content Standard for Digital Geospatial Metadata was established by the Office of Management and Budget (OMB) to support the collection and processing of geospatial metadata.<sup>2</sup> The CSDGM is an extremely granular standard specifying standards for: Identification Information, Citation Information, Abstract Descriptions of Resource, Temporal aspect, Status in terms of maintenance and update frequency, spatial domain (bounding coordinates, G-polygon, g-ring coordinates),

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2. <http://www.fgdc.gov/metadata/csdgm/>

keywords, theme (ie., which thesaurus was used), point of contact, graphic file name, security information (in terms of which level of classification), cross reference, access and use constraints, attribution and accuracy information, spatial data organization information (whether the image is vector or raster graphic), geographical features, map projection name, altitude coordinates, metadata standards and extensions. There are over fifty fields of information to enter, which can be daunting to even the most vigilant classifier. One of the major issues facing data archivists is that classifying data to the extent required by the CSDGM is both tedious, the goals are often unclear, and the work is time consuming (and therefore expensive).

With the advent of more casual classification of information materials in the form of tagging photos and open source platforms of mapping, more and more users are voluntarily adding geographical classification elements to data and images on the internet. Often there is a mixture of data and images from formal sources, (such as the U.S. Geological Survey) with less formal mapping platforms (such as Google Maps, Yahoo Maps, and MapQuest). These platforms are appealing because they allow users to find geolocations easily and access satellite images and view three dimensional geographic views on Google Earth. Global Positioning Systems (GPS) allow people to fairly accurately determine geo-coordinates of their current location which enable them to geospatially tag media (photographs, video, audio recordings and other digital resources) on the fly. This has allowed for an astonishing amount of interactivity and collaboration with readily accessible maps.

Another development is that a vast amount of library material has been or is in the process of being digitized. Entire map collections, old photographs, obscure texts and rare documents are all finding their way on to the web, and the library has become a repository which can be accessed remotely without having to visit the physical bricks and mortar space. This allows for fascinating new avenues of

scholarship and has allowed for an incredible amount of inventiveness and evolution in the realm of information science. Now previously hidden collections are available to new audiences.

Sites such as Flickr, Wikimapia and Google Maps allow individual users to geotag various media in what has come to be known as volunteered geographic information (VGI). With the advent of tagging geographical information by informal users comes issues in terms of how to ensure that people enter metadata fields correctly in terms of spatial accuracy. Casual geotaggers can hardly be expected to maintain the granular standards of CDSGM, and VGI and open source maps have certain problems in terms of spatial accuracy and up-to-datedness, especially going into the future. Casual geospatial users often have no experience or training in terms of using metadata standards to classify their material, although some argue that with volunteered geographic information, users are more apt to struggle with the problems of accessing and using a data set to create granular references to geospatial material.<sup>3</sup> Open Street Maps and Google Maps use a much simpler XML data structure than FSGD standards. Data elements are nodes (latitude and longitude) and metadata fields identify location, user, visibility and time created.<sup>4</sup>

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3. Goodchild, M.F. *Spatial Accuracy 2.0* *Proceeding of the 8th International Symposium on Spatial Accuracy Assessment in Natural Resources and Environmental Sciences* Shanghai June 25-27 2008 Retrieved on April 17, 2010 from <http://www.geog.ucsb.edu/~good/papers/453.pdf>

4. Poore, B. and Wolf, E. *The Metadata Crisis: Can geographic information be made more usable?* *U.S. Geological Survey* Retrieved on April 23, 2010 from <http://www.virart.nottingham.ac.uk/GI%20Usability/Workshop%20papers%20pdfs/Barbara%20Poore%20et%20al.pdf>

There is emerging a friction between *standard-driven* and *user-generated* content in the realm of geographical data. Indeed there are those who are outrightly hostile to the new practice of VGI. Andrew Keen in his book, *The Cult of the Amateur*, reacts strongly against this prevalence of user-generated content. He writes, "the free, user-generated content spawned and extolled by the Web 2.0 revolution is decimating the ranks of our cultural gatekeepers as professional critics, journalists, editors, musicians, moviemakers and other purveyors of expert information are being replaced ('disintermediated') by amateur bloggers."<sup>5</sup> Indeed, the same issues hold for user-generated geographical information. If Open Street Maps, Wikimapia and Google Maps exist in the world for free, what will be the motivation of professionals to keep producing atlases? If users are generating cartographic information, why pay someone to do it if the information is "almost as good"?

There is a concern as to whether VGI contributors will follow at least the trends set by other voluntary contributors' defacto standards on open source geographical platforms or Wikipedia "communities." How is the quality of such users contributions to be considered? Clay Shirky, in his book *Here Comes Everybody: The Power of Organizing Without Organizations*, openly embraces this trend in users' contributions to classifying data. However, what if the user has a particular political agenda (perhaps in terms of boundary disputes) or mischievous or even criminal intent in terms of how they project data? Issues in terms of misinformation, intentional deleting of information, entering of "nonsense" data, offensive content, and spam are all issues of concern when dealing with collaborative geographical data.<sup>6</sup>

It will be interesting to see whether user generated geographical information will

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5. Keen, A. (2007)*The Cult of the Amateur: How Blogs, MySpace, YouTube and the Rest of Today's User-Generated Media Are Destroying Our Economy, Our Culture and Our Values*.Random House.

overwhelm professionally established classification standards, or if they can somehow co-exist. Clearly valuable georeferenced material is being created both on official levels and by more casual users on a voluntary basis which is beneficial to everyone, however without some sort of a standard, there is a possibility of a geographical metadata crisis.

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6. Coleman, D.J., Georgiadou, Y and Lobonte, J. Volunteered Geographic Information: The Nature and Motivation of Producers *International Journal of Spatial Data Infrastructures Research*, 2009, Vol. 4, 332-358. Retrieved on April 13, 2010 from <http://ijmdir.jrc.ec.europa.eu/index.php/ijmdir/article/viewFile/140/223>

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