

# The Future of GIS on the WEB

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**Abstract** - Web-GIS allows the wealth of spatial data to be access and shared among Internet users all over the world. Web-GIS capability to give the basic functions of map view such as zoom, pan, query and analysis allows the systems to incorporate various types of information. In spite of great progress made, in the evolvement of Web-GIS, there are still more issues to be resolved. This paper will present two of such issues, which are 3D-WebGIS and transmitting spatial data on web. Future issues such as public participation, virtual 3D-Web GIS and public participation GIS is also highlighted.

**Keywords:** Web-GIS, 3D-WebGIS, transmitting data, public participation GIS.

## I. Background

GIS on the web provide new opportunities and challenges to many researchers to make a perfect data sharing and dissemination or a fully functional traditional desktop GIS through the Internet.

There are several sample of Web GIS that already exist. Wyoming Internet Map Server (WIMS) [1] is one of example (<http://wims.sdvc.uwyo.edu/wyoims2/wims2a.htm>). It allows users to interactively create maps of any portion of Wyoming and then use the maps to search or make a query of selected data. Another are, <http://www.map.com.my/vmap/> gives an information about hotels, resorts, travel bureaus, air travel ticket agencies, motorcar renting and leasing, restaurants, shopping centers and department stores for Kuala Lumpur. Forest View at

<http://www.ra.dnr.state.mn.us/forestview/fyb.html> enable users to visually extend information from inventoried state lands to surrounding, uninventoried lands; providing a complete picture of the landscape.

Web based GIS has a main drawback which is the low of data transmission. Spatial data consist of very large data size [2][3][4] while bandwidths are limited. It is in need of a more efficient management of data transmission to make sure that the presentation and delivering processes can run smoothly. One technique that has been reviewed by few researchers to speed data transmission process, is the Layer Splitting Technique [4]. A large size layer with many spatial objects can be divided into several parts, and then structured in certain tree indexing structure such as buddy (hash) tree, cell tree with oversize shelves, Hilbert R-tree, KD2B-tree, PMR-quadtrees, R+-tree and R\*-tree [5]. Data indexing not only simplifies the process of retrieving data when user making a query. It also speeds up the process of transmitting data involving query only.

From the review, there are a few techniques that are used to present GIS data on the web. Pre-publishing [6] introduces a technique that can lower the expenditure cost of commercial software and hardware, besides upgrading data transmission capabilities. Xiannong Meng and friends introduced a system known as GIS2WEB [7] that enables data exchange and information sharing between widely used GIS Software and the WWW.

A few commercial product can be used to develop interesting interfaces such as ArcView Internet

Map Server by ESRI, Grasslinks by University of California, MapInfo ProServer by MapInfo and Spatial WebBroker [3]. But, there's a drawback, which involves a very high cost, and it will slow down any process if the demand repeated. As a solution, the use of Map Applet [6] can overcome these high cost problems for interactive presentation of GIS data on web. However, a new problem occurs on how to perform data compression to make it smaller and speed up the transmission process.

The problem on how to deliver 3D-GIS presentation on web is also been brought up by Lamm [8] and Coors [9]. 3D-GIS presentation known as web-3D-GIS gives more interesting impacts compared to normal ways. For example, Avatar [8] a virtual reality system for real-time analysis and mapping on WWW and Web-based 3D-GIS that using several levels of detail [9] for visualization. Combination between Java & VRML in level of details for visualizing 3D-GIS on web still cannot overcome redundancy while transmitting data. The obvious solution is to combine multi-resolution model [10] with levels of detail. Two important aspects that we should focus in web-3D-GIS development are response time and bandwidth.

## II. Future Issues

In future development, we can implement the Hybrid [2] strategies to develop GIS Application on the web. Hybrid is a combination between client- side and server side processing which optimizes the client and server tasks. Beside, the developer can make load balancing to make sure the system allows flexible and powerful analysis. For example, small tasks such as small analysis (zoom and pan), display, map browsing and query input can be located at the client side, while heavy tasks like spatial query, analysis and map drawing are conducted by server.

Another issue is to extend GIS technology and spatial-information to a much broader user group. Calling for public participation allows different department within an organization as well as among organizations to access and share GIS data easily. For example, Zhong-Ren Peng facilitates public participation in the planning and decision making process [11]. That idea will be intensify. In future, 3D spatial data presentation will be used for GIS public participation especially in telecommunication,

urban planning and architecture. All application using the geographical data can use multimedia tools for animation, stimulation and visualization purposes [9]. It makes the discussion among developers and other related organization or person will be done in easy and interactive ways.

However 3DWebGIS for public participation raises the issues of how to compression the large and enormous diversity of spatial data. It will effect the transfer data time. Another critical issues concern about the rendering of time. How to make an effective time rendering? All of this needs to be deliberate in order to develop that kind of application.

In its current stage, fully functional Web GIS like traditional GIS were not developing yet. Traditional GIS functionalities include capture, store, update, manipulate, analyze and display all form of geographically referenced information [12]. Today Web-GIS has only a part of or almost all functionalities the traditional GIS have. The advances of Web-GIS technology are enabling GIS experts and laymen to use and analyze data that reside across the Internet. But still, the problem of data security is a matter of concern. Some data are confidential and should not be changed by public. So developer need to take this matter into consideration in developing a fully function Web-GIS.

## III. Conclusion

It is hoped that the issues raised in this paper will give an insight to researcher in developing a fully functional Web-GIS. The use of the latest technology together with efficient management of data incorporating data security will make Web-GIS an effective tool for all aspect of life.

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