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Editorial

The wikification of GIS and its consequences: Or Angelina Jolie's new tattoo and the future of GIS

For better or worse, recent development and applications of geospatial technologies have often been linked to Hollywood celebrities. Regardless of the legal merits, Barbara Streisand's lawsuit against the director of the California Coastal Records project (www.californiacoastline.org) has helped raise the awareness among the general public about the potential invasion of individual privacies due to the increasing use of high resolution remote sensing imageries and aerial photographs (Sui, 2006). Recent stories involving another Hollywood celebrity – Angelina Jolie – signal a new episode in the development of GIS, which I believe deserves more serious attention by all of us in the geospatial community.

1. Angelina Jolie's new tattoo and the wikification of GIS

According to the Daily Mail in the UK,[1] Angelina Jolie acquired a new tattoo on her left arm (Fig. 1). To everybody's surprise, especially those in the geospatial community, the new tattoo on Jolie's left arm shows the latitude/longitude of the places where she adopted her four kids. Obviously, Jolie's fans are not satisfied with simply reading the boring gazetteer information. They want to visualize the geo-referenced information revealed by the new tattoo. Using new mashup capabilities within Google Maps, Jolie's fans were able to use the tattoo information on her left arm to produce a map showing the birth place of Jolie's kids in no time (see Fig. 2). Furthermore, with the help of Google Earth, they were also able to develop a KML to reveal detailed, street-level information using high resolution satellite imageries for these four places to (Fig. 3). These maps were then instantaneously broadcasted to the 100 million users Google Earth has acquired during the past three years.

The resulting map, based upon Jolie's tattoo, is rather simplistic from a professional GIS/cartographic perspective. The significance of the story lies behind the technology deployed, the information used, and the amateur cartographers who actually put all these together. This is a new development for GIS, and the research community is still trying to grapple its meaning and significance.

This new phase of development is the wikification of GIS, which is driven primarily by the massive and voluntary collaboration among both amateurs and experts using Web 2.0 technology. Obviously, the wikificaiton of GIS is part of the explosive growth of user-created content on the web as evidenced by the growing popularity of MySpace, FaceBook, YouTube, and more broadly the reality TV or game/competition programs with increasing user/viewer participation. More broadly speaking, I see the wikification of GIS as a continuation of the earlier successes of open-source software development such as the Linux operating system, consumer-driven business development such as eBay, and the recent user-led knowledge production such as Wikipedia. The core of this new trend lies in web-based mass collaboration, which relies on free individual agents to come together and cooperate to improve a given operation or solve a problem. The business community regards mass collaboration as a special type of outsourcing – often referred to as crowd-sourcing in the business community (Tapscott & Williams, 2006). The cult of amateur has been described as a defining characteristic of this new societal trend (Keen, 2007).

2. Implications for GISystems

Following the conventional definition of GIS (S for systems), a GIS usually consists of four major components – hardware, software, data, and people. The wikification of GIS has clearly been manifested in all these four aspects. The four major functions of GIS – data acquisition, storage, analysis/modeling, and mapping/visualization have been increasingly performed in the wiki spirit.

- *Hardware*. Recent development of grid computing has not only provided the next wave of infrastructure for geocomputation, grid computing actually serves as the

[1] Web URL: http://www.dailymail.co.uk/pages/live/articles/showbiz/showbiznews.html?in_article_id=457034&in_page_id=1773&in_page_id=1773&expand=true

0198-9715/$ - see front matter
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Fig. 1. Angelina Jolie's new tattoo.

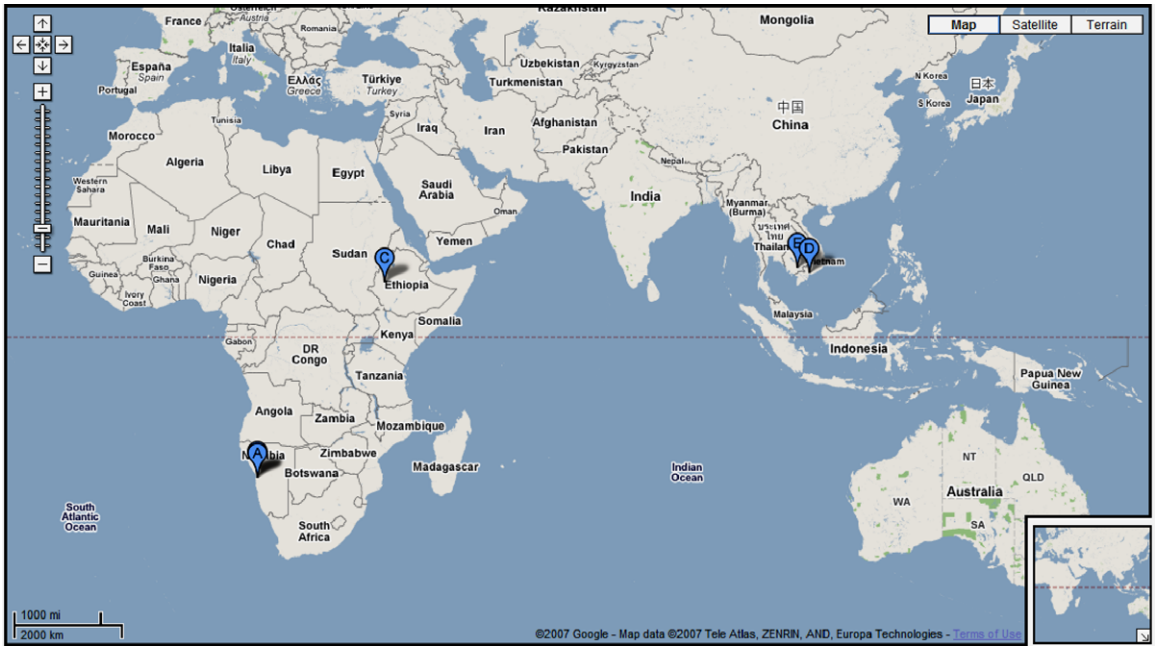

Fig. 2. Display of the birth place of Angelina Jolie's kids using Google map.

perfect, enabling metaphor for the wikification of GISystems from a hardware perspective. Until recently, computer networks in general and the Internet in particular have enabled us to share, exchange, and access information. Yet little progress has been made towards sharing computing power although we know most computers only use about 30–40% of their computing resources at any given time. The goal of grid computing is to make networked computers to share computing power so that they can work "collaboratively" to process an increasingly large amount of information requested by clients (Foster & Kesselman, 2004). The framework proposed by Keith Clarke and his colleagues for a grid-based GeoComputation is a blueprint for the future of GeoComputation (Clarke, 2003; Guan, Zhang, & Clarke, 2006). Together with Goodchild's (2007a) concept of "citizens as sensors," we gain a glimpse of future computing infrastructure for geospatial data handling – a hybrid of vast numbers of computers (linked in the computing grid) and human sensors (linked by Web 2.0).

- *Software*. The wikification of GIS software will continue in the future, following the open source, free software tradition. Open-source is not a new concept in the GIS community. One of the pioneer GIS software – GRASS has been developed based upon the open-source

Fig. 3. KML Mashup of the birth place of Angelina Jolie's kids using Google earth.

tradition (Neteler & Mitasova, 2002). Although the dominant GIS software in the market is still not free, major GIS software developers such as ESRI have begun to release certain modules of their proprietary software in open source. Perhaps more importantly, nowadays most software GIS vendors have designed their products in a way that encourages and facilitates user-led secondary development and customization for specific applications. In recent years, we have witnessed the rapid growth of "free" GIS software contributed by the user community for a variety of applications (www.FreeGIS.org; http://www.zonums.com; http://www.batchgeocode.com). In this spirit, free, open source map server software has become one of the driving forces for the wikification trend in GIS software development (Kropla, 2005; http://www.qgis.org). Google's KML obviously has brought the wikification of GIS software to an even broader community.

- *Data*. Perhaps the most significant development for the wikification of GIS is in the area of data production. Until recently most people have been passive users of the vast geospatial information available on-line. The wikification of GIS is quietly transforming the masses from being passive consumers to becoming active producers of geospatial information – a phenomenon that Goodchild (2007b) calls "volunteered geographic information (VGI)". Along with Google Earth and MicroSoft's Virtual Earth, the past two years have witnessed the rapid growth of an amazing array of web sites that allow users to contribute a diverse range of geographic or attribute information. Some prominent examples include WikiMapia, OpenStreetMap, Mapufacture, GeoCommons, TierraWiki, FixMyStreet, WhoIsSick, etc. Furthermore, the emergence of Web 2.0 makes it possible to GeoTag almost any information that is available on the web, which will contribute further to the exponential growth of geospatial data. Although it remains to be seen how this bottom-up VGI process can be integrated with the top-down SDI approach (Onsrud, 2007), VGI poses a serious challenge to the concept of a one-stop geospatial portal sponsored by the traditional, authoritative government mapping agencies (Goodchild, Fu, & Rich, 2007).
- *People*. So far, most of people doing GIS are getting paid for what they do, but the wikification of GIS is changing that. One of the precursors of people volunteering in an organized manner is the volunteer National Mapping Corps sponsored by the US Geological Survey (USGS) (http://nationalmap.gov/TheNationalMapCorps). Volunteer participants in the National Map Corps have helped collect information that contributes to the US national map. Additionally, the US Census Bureau has also used volunteers to collect census data for the homeless, and Urban and Regional Information System Association (URISA)'s GIS Volunteer Corps has attracted GIS professionals to volunteer their talents help the relief efforts from New Orleans to Afghanistan (http://www.GIScorps.org).

Grass-root organizations such as the Open Geospatial Consortium (www.ogc.org) or Open Source Geospatial Foundation (www.osgeo.org) have established quite elaborate protocols and standards, which will in turn facilitate the wikificaiton of GISystems that benefits all involved.

3. Implications for GIScience

The wikification of GIS is perhaps one of the most exciting, and indeed revolutionary developments since the invention of the technology in the early 1960s. The robust trend towards the wikfication of GIS not only dramatically changes the technology and its applications, but also raises a series of new basic GIScience questions, and at the same time revitalizes some old GIScience questions that were posed during the age of Web 1.0.

It is interesting to notice that the US University Consortium for Geographic Information (UCGIS) pioneered the practice of GIScience in the wiki spirit as its entire research agenda is based upon a synthesis from contributions by each of its member institutions through an open call for white papers to define its research priorities in 1997–1998 (www.ucgis.org). Although page limit does not allow me to discuss the full implications of wikification for GIScience as defined by UCGIS, suffice it here to highlight the implications for GIScience as defined by the Varenius Project (http://www.ncgia.ucsb.edu/varenius/varenius.html).

The Varenius project defines GIScience as having a tripartite focus – cognitive models of geographic space, computational implementations of geographic concepts, and geographies of the information society (Goodchild, Egenhofer, Kemp, Mark, & Sheppard, 1999). Much progress has been made in all three of these GIScience areas during the past 10 years, and yet the wikification of GIS has put a new twist on the Varenius research areas.

The new world of volunteered geography as embedded in user-created content (maps, photos, blogs, videos, etc.) has provided a vast amount of materials to study the cognitive models of geographic space across geographic, social, economic, cultural, and demographic boundaries. In particular, I believe that we are now better equipped to study the formal models of people's common sense in geographic worlds – what Egenhofer and Mark (1995) called naïve geography. Furthermore, due to the fact that most of these activities are happening over the web, we may also be able to address many of the theoretical questions Couclelis (1996) posed for the naïve geography of cyberspace.

Dangermond (2007) commented that the information available over the entire World Wide Web could be georeferenced or geo-tagged in the near future, and that fully georeferenced or geo-tagged world is approaching us far much faster than anybody ever predicted. The ramifications of this phenomenon should not be ignored, as the questions stemming from it are mounting. For example, what kinds of new geographic concepts are needed to better understand and analyze this fully georeferenced world – both real and virtual? Do we need better, more robust models of geographic representations? How about new data mining techniques? Are existing GIS tools suitable for conducting analysis for this new geo-tagged world of both spatial and non-spatial information? In addition, one consequence of the growing wikification of GIS is the increasing use of the spatialization methods for visualizing non-spatial information (Skupin, 2004; Skupin & Fabrikant, 2007), which will, in turn, create a demand for better computational methods to implement geographic concepts that are scalable and interoperable across multiple computing platforms.

As for the themes related to the geographies of the information society, the volunteered geographic information will intensify the need for research in the tradition of public participation of GIS (PPGIS) (Sieber, 2006), but with a much enlarged "public". Will this new radical form of public participation in GIS lead to more democratic practices, or will it create a tyranny by the majority? Privacy and liability are obviously two primary concerns for VGI, but I see equity as another important issue that can potentially crush the whole paradigm of crowd-sourcing as a business model for GIS. Is the altruistic wikification process a passing fad, or is it a sustainable way of practicing GIScience? What are the motivations and incentives for people to engage in producing VGI? Who will become the winners and losers of this volunteer world? Is the wikification process enlarging disparities in society by allowing the favored few to exploit the mediocre many, or will it eventually narrow the digital divide and produce digital dividends for all? All of these questions need intense, critical scrutiny as we are marching swiftly into this wiki world.

4. The media and message of neogeography: geography without geographers?

Back in the pre-Google Earth time, Goodchild and I speculated that GIS was rapidly becoming part of the mass media using the nascent evidence available then (Sui & Goodchild, 2001). Based upon that the proposition of GIS as media, we were able to link GIScience studies with McLuhan's law of the media, which considers modern media as modifiable perceptive extensions of human thought (Sui & Goodchild, 2003). Indeed, the launching of Google Earth and Microsoft's Virtual Earth validated our speculation (Ball, 2005; Sui, 2005). Supported by a Geo-Wiki corps (Cowen, 2007), NavTeq's "map reporter" program offers further evidence that GIS and media has been seamlessly merged.

With the increasing participation of citizens, the world of media in general, and the world of journalism in particular, have been dramatically transformed. Journalism is increasingly practiced without journalists, because technologies have literally converted any interested layperson into a journalist. The accelerating wikification of GIS has also promoted the emergence of what Turner (2006) calls NeoGeography. As demonstrated by the Angelina Jolie

story, the NeoGeography is practiced by the masses using the latest Web 2.0 technologies. Similar to what is happening in journalism, we are witnessing the emergence of a new geography without geographers. Due to the potential overarching ramifications of these developments, I hope CEUS readers will start contemplating some larger issues related to both the media and message of NeoGeography.

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