

The Rise of Amateur-Mappers: The Effect of Mashups, Map Hackers, and Google Earth on Traditional GIS

by Jeff Spelman, CAE

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"We're all pilgrims on the same journey, but some pilgrims just have better road maps." —Nelson DeMille

"It is very difficult to make an accurate prediction, especially about the future." —Niels Bohr, Nobel laureate in Physics

"The best qualification of a prophet is to have a good memory." —George Savile, Marquis of Halifax

As an administrator in the ad valorem business for several years, I'm always on the alert for emerging trends, changes in the wind, or new practices that could affect our profession. Recently, I saw the future. A new property owner came into the office. He was flush with dollars from the sale of a property in Santa Cruz, California, overlooking Monterey Bay. He was ready to roll over his real estate windfall into what he hoped would be a castle-like structure in Oklahoma.

He was well-armed for an assault on the local residential housing market. He had a long-time interest in real estate, a great deal of experience in reading maps during his military career, and a high level of computer literary skill. What he carried in a small file folder, however, was what impressed me the most—a series of maps he had developed by merging Google Earth and information from Web sites like Zillow. With these maps, he and his contractor had planned the placement of his new dream home on a parcel of land he had chosen. He had even positioned the house so it would face west, toward his former state, while still enjoying a view of beautiful Oklahoma blackjack oaks.

This Californian's visit was a moment of epiphany for me—I felt I was glimpsing the future like Tiresias, the ancient blind prophet immortalized by T.S. Eliot in his 1922 poem, *The Waste Land*. (Tiresias saw the future, but no one believed his prophesies.)

The Californian visitor's success in making his own personalized maps reminded me of my grandfather, who used to walk from his hardware store across the town square to the Cimarron County courthouse in far western Oklahoma



This is a simple mashup providing a location map for visitors to the Oklahoma Tax Commission, Ad Valorem Division office. It was prepared using the Oklahoma County Assessors' office Web site and recent aerial photographs.

to buy a county plat map. The map, which was prepared by the local abstract company, was produced on one of those foul-smelling, ammonia-based blue-line printers. As a kid, I remember him camped at his oak rolltop desk late at night, pouring over his plat map to determine whether any good wheat fields near his farms were for sale. Sometimes, with a yellow pencil he would color in all the school land up for lease near the big ranches in the county near the Colorado border.

With readily accessible Web sites, however, my California visitor, had gone far beyond what my grandfather was able to do with his plat map. He had created a *mashup*, combining Web sources to develop an aerial map of his new acreage that showed the property boundary lines. In addition, he had obtained latitude and longitude locations almost as accurate as a professional survey and conducted enough Web-based research to have a good idea of general market conditions in the area.

What I thought was astonishing was that he had done this work, educated himself, and become an informed buyer

and knowledgeable taxpayer without visiting the county assessor's office or talking to a local real estate professional. In his search, he completely bypassed the county assessor, usually one of the best sources for mapping and real estate information.

What my California visitor did is happening all over the world now as amateur mappers devise new personalized products for their own use. This *amateur mapper* has now become a potent force that county assessors will have to confront in their future assessment and mapping efforts. This trend is a clear example of what social scientists call the *democratization of knowledge* through Web resources.

In an article for *GeoWorld* (2006), Jeremy W. Crampton, a professor at Georgia State University, heralded the rise of "mashups and map hacks." He called these new Web-savvy users, who meld government and private-sector map and Web resources into an entirely new product—a new, significant challenge to the future of traditional GIS.

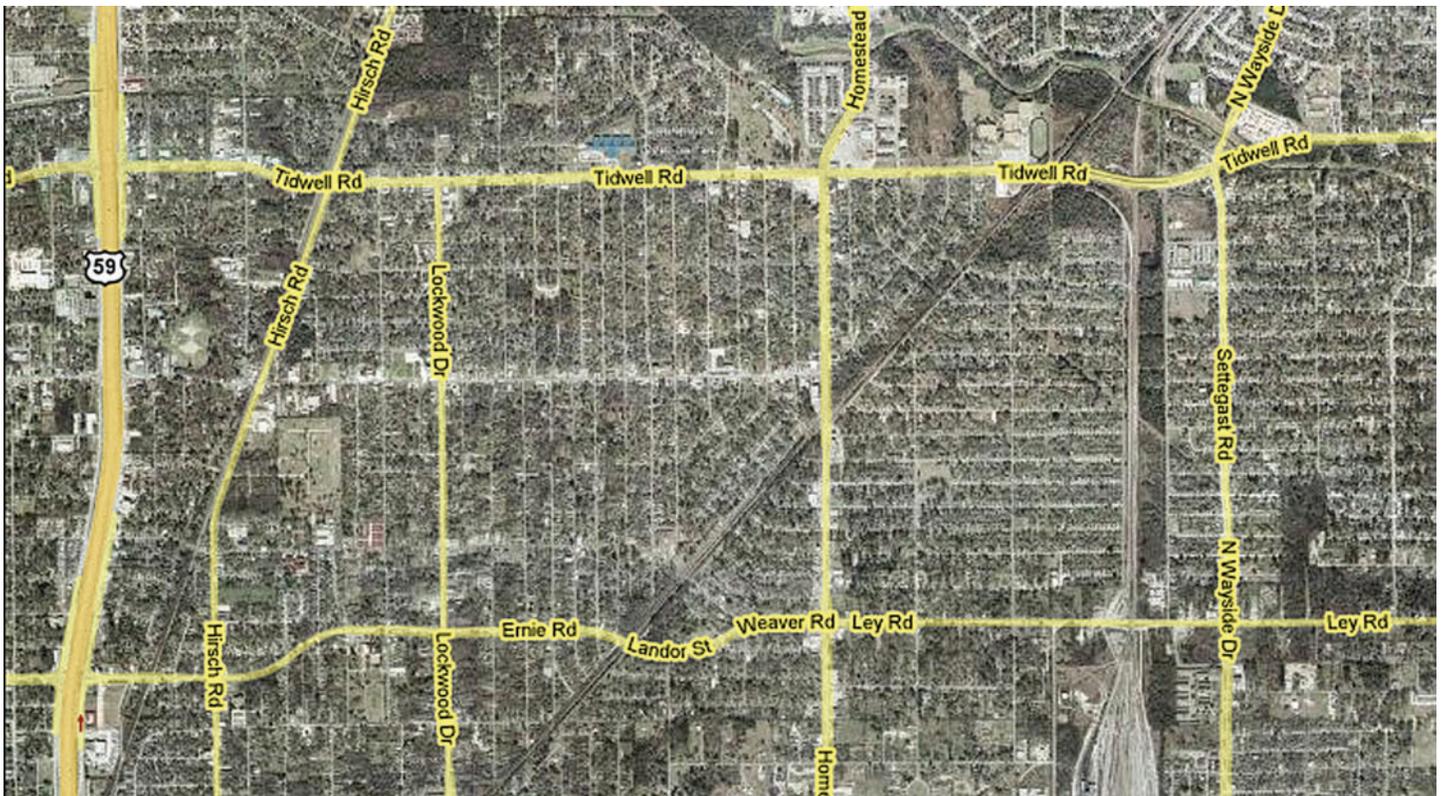
So what is a map mashup? The term *mashup* comes originally from Jamaican Creole meaning *destruction*. In reggae music, a mashup can be an outstanding performance, as in *cool*. In the context of Web applications, it means combining, or mashing together, one or more Web sites to create a product custom designed for the user. A simple example of a mashup is viewable on the University of Oklahoma Web site. It locates sports venues on campus and, with links to Google Earth, allows the user to view a map to find a Wendy's or Arby's for a pre-basketball game sandwich. It is simple, fast, and convenient.

The growth of map mashups has been explosive. According to our review of the www.programmableweb.com site (accessed February 20, 2007), nearly 1,600 mashups have been created since this Web site start tracking them about a year ago. And the creation of new mashups continues: twenty-one were created in the week prior to February 20, ninety-two in the previous month. More than one-third of all mashups involve direct

use of mapping with one or more other databases.

Crampton's article cited several complex examples of this new use of online mapping applications. In one case, a user merged an apartment/house listing, Craigslist, in a major metropolitan area in the southeastern United States with online mapping to develop a series of maps showing rental price patterns across the area. This new product is not one simple map; rather, it is a dynamic site that can be used on an ongoing basis for thousands of new queries about the location and price of apartments.

My own search of the Internet produced an overwhelming array of similar examples of mashups or map-hack products. I found one on teardowns in a metro area, where an appraiser had linked demolition permits with new construction. I found another one with a map that shows movie theater locations with start times; this information can be almost instantly transferred to cell phones, iPods, and other technology.



Collins Software company developed a map of Harris County (TX) integrating Google Maps as the base, and overlaid the Harris County parcel data.

In the map mashup world, the term *map hacker* does not refer to some thirteen-year-old who doesn't venture outside very often, eats lots of cheesy snacks, and works at his computer far into the night. It refers to the melding of mapping resources to produce a new product. (*Mapping Hacks* by Schuyler Erie, Rich Gibson, and Jo Walsh [2005] is a good book on the concept.)

Furthermore, unlike the negative connotation of hacker, this synergistic combination of resources was not unanticipated but actually encouraged by Google and other mapping Web sites. In fact, Google has made its code available, and Crampton reports that at least one software conference has hosted map mashup workshops.

Some far-thinking academics have dubbed this *democratization* trend a new frontier for the Internet. It also has been referred to as Web 2.0, loosely covering the growing importance of blogs, open-source software, and projects such as Wikipedia, the collaborative encyclopedia to which volunteers contribute articles and everyone, essentially, gets to play.

In theory, the final open-source shared product, which borrows from and is dependent on multiple sources, is edited by the free exchange of ideas, resulting in a stronger product. (This theory does not always work perfectly in the short run. The Wikipedia model was challenged during a recent election when political operatives added unflattering comments to their opponent's biography.)

The new development reminds me of a similar *tipping point* when I was with the county assessor's office in the early 1990s. The chief appraiser and I discovered that, for purposes of analysis, PCs could dance circles around the mainframe. Within a few months, we had loaded all sales information on PCs and, over the next few years, completed a great migration all the way from the giant machines to PCs to the accessible laptop. We had seen the technology of the future and felt empowered and liberated. This new mapping resource may be a similar technological breakthrough.

New Challenge to the Assessor GIS

So what is the future for existing assessor mapping systems? Over the last twenty years, local governments across the United States have poured millions of dollars into GIS and the development of digital cadastral mapping resources. Counties in Oklahoma have all installed mapping software, and many have made impressive progress in their mapping efforts.

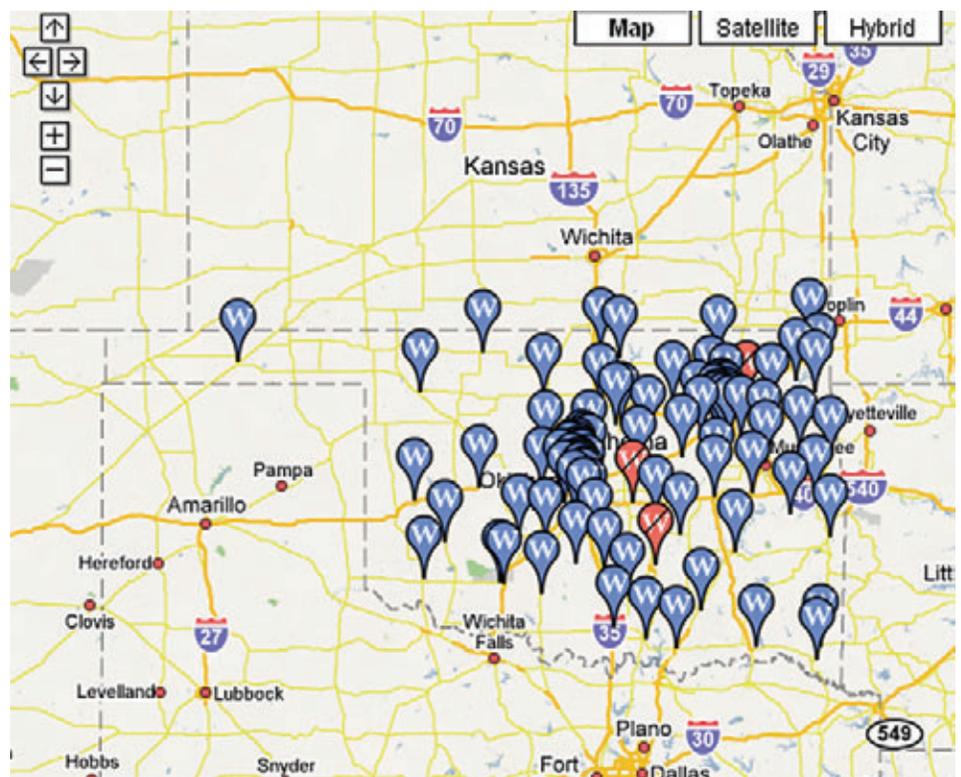
In fact, if my Californian visitor had decided to locate his dream home in a county that has solid GIS resources and a great Web site, the first stop on his mapping project probably would have been the county assessor's office. Oklahoma County, for example, has a world-class Web site. Leonard Sullivan, the assessor, and Mike Morrison, the Webmaster, have developed an assessor's Web site that enables the taxpayer to view properties, prepare custom maps, and do extensive market research. The Web site permits mashups to occur within the context of the county assessor's data and mapping system. If my California visitor's land had been in Oklahoma County, he probably

would have used those traditional GIS resources rather than becoming his own mapper.

From a national perspective, national and local government investment in and willingness to share these GIS resources have been factors in making something like Google Earth possible. (Many of Google's aeriels, for example, come from governmental sources such as LANDSAT and other satellite imagery.)

However, despite years of effort by local governments to build up mapping capability, map mashups are in some ways a direct challenge to the traditional GIS pioneered by local government. With these new products, the county assessor's or appraiser's office is no longer the only game in town. For assessors, who, literally for centuries, back to the Doomsday Survey of England, have been the dominant force in assembling parcel level mapping and the premier producers of cadastral maps, this new paradigm changes many of the old rules.

Is the empowerment of the amateur mapper a threat? Will there be a new world in which local policy makers will



This is an example of a mashup combining map information and the location of Wal-Mart stores in the state.

tell the county assessor who's asking for funding for mapping software or new heads-up digitizing equipment, "What don't you just go whip out a map on Google Earth? Or what do we need these annoying appraisers for? Let the citizens look it up on Zillow."

In reality, it is not likely local government will be run out of town. Every day local government does more mapping, and the traditional GIS world adds new features and becomes more user-friendly and robust. Companies such as Jack Dangermond's ESRI, for example, which has been in the business since 1969, and other GIS companies continue to add sophisticated functionality to high-level mapping products at an ever-increasing and cost-effective rate.

As a member of the Oklahoma GIS council, I hear presentations nearly every month from vendors who come before the council to trumpet new improvements and innovative products. Some of these improvements are simple in concept, such as the method of taking an oblique-angled picture to provide a better image for aerial review, but they still provide significant technical progress toward better mapping. (Google Earth is now adding similar features to its site.)

For the future, at the all-important parcel level—the information about a particular residence or commercial building and its characteristics—I don't foresee much change. Amateur mappers probably will not have the Job-like patience and motivation to track down individual deeds and take the care and effort necessary to decipher legal descriptions written about the time of the second or third Oklahoma land run. The information on an individual parcel is the Holy Grail of GIS, and it is local government's responsibility to map it, keep it up-to-date, and preserve its accuracy and validity for tax records, water and sewer information, E911 applications, law enforcement, economic development, and scores of other uses.

Don't sell entities like Google short, however. The future is not clearly written yet. (Remember Tiresias.) At the time this article was being written, Google was trading at over \$485 per share, and with the capability to morph and re-create itself,

the company continues to be one of the amazing stories of American business.

Crampton pointed out that Google could probably buy several GIS mapping companies without straining its checkbook and, if it was so inclined, could even buy ESRI if the owners of the privately held company wanted to sell.

What Does the Future Hold?

The new development of mashups has not gone unnoticed in the governmental GIS world. In her insightful column "Tech Talk" in *Governing Magazine* (2007), Perlman wrote, "Mashup. It could be the next monster app." Her point is that mashups and nontraditional mapping resources are not just for those young, tech-savvy people who are enamored with YouTube and MySpace. Guess what? Governments have caught on, too.

Mapping has always possessed the power to provide the means to make associations, see things in a broader scale, and express ourselves with clarity.

What is most interesting about Perlman's article is her recognition of the use of government agencies using mashups. Think of it like judo: use the strength of a possible opponent for your purposes. Many forward-looking government agencies are starting to use Google Earth and their own mashups to create products for the public.

Perlman provided several examples. Ohio is merging auto crash data with mapping technology to promote driver safety. Drivers can check dangerous intersections near their home by entering their addresses. Boston transit stations, according to Perlman, have mashups that help riders choose the most efficient route. The State of Michigan's Center for Geographic Information has encouraged

the use of mashups to combine disparate sources of data and maps.

What about county assessors? In surveying the Web for this article, we found several county assessors or property appraisers who are IAAO members and who have also practiced mapping judo. Rather than being threatened by the amateur mapping and the trend toward mashups, they have linked their sites to Google Map or similar products, providing taxpayers the opportunity to combine the resources of government with other public or private mapping capabilities. Quite frankly, it is an appealing option. The county assessor can make its Web site more useful and helpful to the taxpayer—no worries about programming or development of metadata, simply link and go.

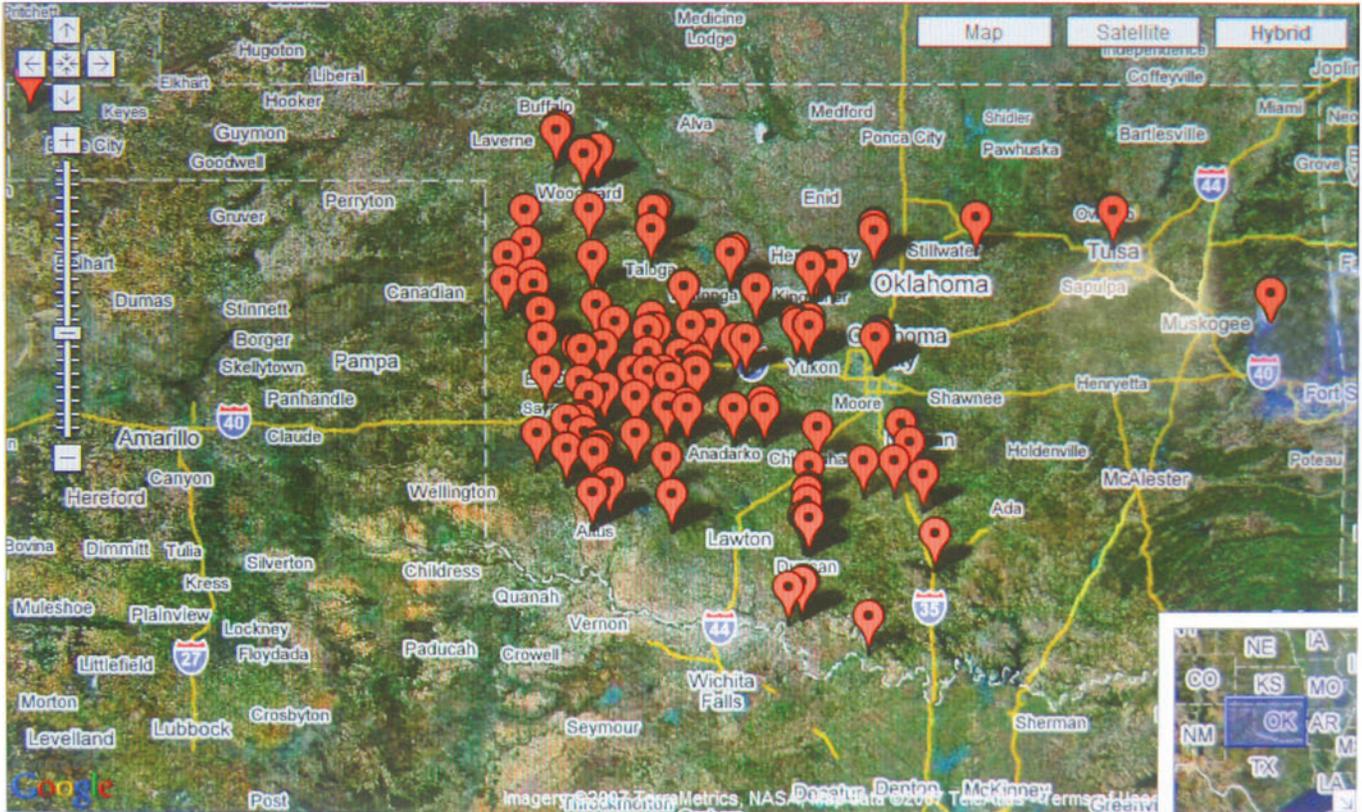
However, I can predict with a high degree of certainty that in the near future a city council or county commission will be forced to debate whether or not it has in effect condoned undesirable or even immoral activity because some amateur mapper has used a government map as a base for a mashup that links people who are overweight with a list of 24-hour doughnut shops. Geo-web GIS is an issue that will be redefining itself in the future.

What Are the Cautionary Notes?

What should county assessors do with map mashup products applied to the assessment process? What if a map mashup makes the case for an assessment reduction? Should the county assessor take the material at face value? Of course not. The same caveat that exists for all aspects of the Web exists for mapping. There is a great deal of crazy stuff out there; that's the price of Web democracy. In this new age of free-flowing information, users are on their own to sort it all out and apply their best judgment to disparate viewpoints and perspectives. My California visitor could have added or edited part or all of his material, but my grandfather could have done the same thing on his blue-line plat map.

Map mashups are a new set of products that have tremendous potential. Maps have always had the almost magical pow-

Oklahoma Historic Places Map



http://www.blogoklahoma.us/features_historic_sites_in_Oklahoma. It uses mashups to access sites using overlays from the Oklahoma Historic Places Database over Google Maps images.

er to see from a heavenly-like perspective the shape of things to come: areas of potential future development, relationships between such disparate things as property value and crime or property value and proximity to mass transit resources. Mapping has always possessed the power to provide the means to make associations, see things in a broader scale, and express ourselves with clarity.

Yet, it is a vision with a cost. Predicting the future often involves the power of the creative imagination far beyond simply looking at a catalog of map lines, topographic information, and property boundaries. These new products should be viewed with a broad perspective and also be allowed to compete in the free marketplace of ideas. Just as my grandfather used to see possibilities, discern patterns, and avoid problems with his blue-line plat map, the new mashups can do the same a thousands times over.

Sometimes I wonder how much my grandfather, an amateur mapper in his

time, could have accomplished with a Google Earth mashup at his disposal instead of his yellow pencils. I think of him peering at the thin blue lines illuminated in the pool of light from his desk lamp pondering the future like some ancient prophet. And somehow I'd like to believe as he looked toward the future that he could have predicted and taken some comfort in knowing that almost fifty years later his grandchildren would still own part of the land he mapped and schemed and saved to buy so many years ago. ■

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