

Using Maps to Promote Health Equity

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How the Web Was Won Web-Based GIS Tools for Health Advocacy

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Contents

Introduction	1
Evolution of Web GIS	2
From “Black Box” to “Democratization”	2
Four Eras of Web GIS	3
The Power of Web GIS for Advancing Health Equity	6
Broader Access to Data and Maps	6
Availability of Research and Analytical Tools	7
New Forms of Power, Shared Understanding, and Collaboration	8
Tempered Optimism	11
Case Study: HealthyCity.org	11
Spiky Town: Los Angeles County	12
The Sponsoring Partnership	13
Design Decisions	15
First Generation—Healthy City 1.0	17
Rapid Growth in Data and Functionality—Healthy City 2.0	18
Moving Toward Two-Way Information Flow: Healthy City 3.0	19
Evolutionary Growth Strategy: Future Developments in Healthy City	21
Lessons and Implications	22
What Are the Site’s Purpose and Theory of Change?	23
The Editorial Role of a Sponsor	25
What Adoption Strategy Does a Web GIS Site Follow to Make Sure It Gets Used?	26
Thoughts on Data and How to Get It	27
Sustainability	28
How Open Should Web GIS Be?	30
Whence Google?: The Future Environment for Web GIS	31
Realizing the Potential Power of Web GIS	31
Attachment A: References	i

INTRODUCTION

By using mobile phones, people now can locate themselves instantly on a virtual map and search for nearby items of interest—restaurants, Starbucks Coffee, good parking. Compared to what was possible just a few years ago, this is pretty amazing stuff. But what if you wanted to find, for example, which neighborhoods in your community had the highest rates of lower-income Latinos with diabetes or children living in poverty? What if you wanted to map the flow of foundation grants to various regions or neighborhoods? Then, what if you also wanted to find, and contribute to, that information through your cell phone?

“Wherever you go, there you are,” as *Buckaroo Banzai* and Buddhist sages tell us. For too many people around the world, however, the inverse is true—wherever you are determines where you can go. Place matters to our life chances far more than whether we can find good coffee. Our prospects for enjoying clean air and water, healthy food, freedom from violence, and opportunities to learn may be tied more closely to where we live than any other characteristic. Place is where the intersection of race, class, and power is shown in starkest relief.

Advocates, planners, and funders are increasingly using GIS (geographic information system) mapping to analyze a host of issues. Civil rights lawyers, environmental justice activists, and community organizers are using maps to anchor dialogue with community members, adding residents’ on-the-ground knowledge to “official” data; they also are using these maps to make their case to policymakers and judges. For these purposes, the advent of web-based GIS tools presents great potential power for good. Analysis and presentation of data in a form that once required the deep resources of a university or larger media organization can now be done by virtually anyone with a computer and the ability to access and crunch the many public sources of data.

The challenges in realizing this potential will be less in the technology and more in coming up with a strategy to ensure web GIS is actually put in service of community organizations and the low-income and vulnerable people they serve.

Our focus in this paper will be on web-based tools that are aimed at the broad public (“open circuit”) and intended to support civic engagement, policy change, and collective action, regardless of the legal form of their sponsors. Accordingly, we will not spend significant time discussing Internet or intranet sites for government or other groups that restrict access, such as web-based government-sponsored or private sites for coordination or internal planning. These tools are powerful and can bring the same benefits for health advocacy (or, perhaps more correctly, health policy decisions) as those we describe later in this paper, but they are not as visible to observers as they are to the authors and should be the subject of other papers. Similarly, although it may seem obvious, we will concentrate on web-based GIS that is interactive (meaning users can at

least choose which variables or geographies to display from even a small range of options). We will not focus on the offline or self-contained use of GIS to inform or support advocacy (typically by researchers, public interest lawyers, policy analysts); these will be the subject of other papers in this collection.

We will review the evolution of web-based GIS technology; discuss the potential benefits web-based GIS can bring to health advocacy; examine in depth the creation and phases of development of HealthyCity.org, a web-based tool to support information and referral service and policy advocacy; and conclude by drawing lessons and implications, outlining key dimensions of web-based GIS that may help readers evaluate and compare different resources, and raise questions about the future of web-based GIS as an advocacy tool.

EVOLUTION OF WEB GIS

From “Black Box” to “Democratization”

In the simplest sense, GIS software is a tool for analyzing and displaying geographic data in a graphic format. GIS was long the domain of experts such as geographers, cartographers, engineers, and planners and part of mainframe computer systems—the proverbial “black box.” As GIS software, such as MapInfo and ESRI’s ArcView, was deployed on personal computer desktop environments during the 1990s, it became more accessible to a wider user audience.

With the widespread availability of GIS, researchers from a variety of fields—from housing and transportation to environmental studies, public health, and political science—began to utilize GIS to analyze data with a spatial component. Besides simply taking advantage of richer analytic methods, GIS users began to recognize the opportunity presented by increasing access to data about communities and regions. At the same time, some social theorists were critical of GIS because it can reinforce social inequalities and dominant social values at the expense of marginalized communities (Pickles 1995). In reaction to both the promise and critiques of GIS, researchers identified efforts in what came to be known as PPGIS (public participation GIS) during the late 1980s and early 1990s (Obermeyer 1998, Carver 2003, Howard 1998, McGarigle 1998).

PPGIS efforts clearly democratized GIS data and analysis to broader groups of users and beneficiaries. This trend toward “disintermediation” continued with the advent of the World Wide Web in the 1990s, which allowed for an even broader dissemination of geographic data and analysis through Web GIS (Rattray 2006).

Four Eras of Web GIS

We can identify four broad stages of development in web GIS over the past fifteen years. Although not mutually exclusive (and the years shown are approximate), identifying these eras provides background on how web GIS has progressed in both utility and functionality.

➤ Data Download (1994–1996)

The first era coincides with the early stages of the World Wide Web, which was largely text based, consisting of little graphics and having relatively slow download speeds. Although there was little if any GIS presence on the web during this time, several websites made geographic data available that could be downloaded and brought into GIS software to map. An important component in democratizing GIS in the United States came in 1990 when the U.S. Census Bureau released the first TIGER (Topologically Integrated Geographic Encoding and Referencing system) files, providing a readily accessible, free nationwide map base. This allowed for a wide range of users to engage in geocoding data and thematic mapping of data in various geographic levels such as census tracts, cities, and counties. Previously, users would have needed to obtain physical media to access these data.

Another example from this era is The Right-to-Know Network (www.rtk.net), which provided access to environmental and mortgage-lending data with geographic markers in a text format.

➤ Static Maps (1994–1999)

As the web became more graphically oriented, GIS users began to use it to disseminate maps, creating online atlases of maps they had created in GIS software. In the form of images that could be downloaded, but not manipulated, these static maps allowed researchers and advocates to demonstrate how GIS could be utilized to analyze spatial patterns of social phenomena. An early example of this includes the Atlas of Canada, which launched its first Internet version in 1994.¹

➤ Interactive Mapping (1999–2004)

Although the display of static maps did not end with the previous era—and in fact continues today—it became clear to both web and GIS developers that the interactivity of the web allowed for GIS data to be served interactively as well. Instead of web users being beholden to what data and maps GIS experts put online, users would be able to query and view data on maps on the web. This required GIS companies to create

¹ See <http://atlas.nrcan.gc.ca/site/english/aboutus/index.html> (Accessed March 19, 2009).

software to query and serve geographic layers and data over the web. ArcIMS (an Internet map server developed by ESRI) and AutoDesk (created by the makers of AutoCAD software) were early versions of map server software.

One of the first projects to experiment with this technology was Neighborhood Knowledge Los Angeles (NKLA) (<http://nkla.ucla.edu>). Initiated in the mid-1990s, NKLA arose from struggles against neighborhood disinvestment and slum housing in Los Angeles, California. A team of researchers at UCLA, led by Neal Richman, discovered that local government possesses property-level data that could serve as early warning indicators of neighborhood deterioration and created NKLA to make it accessible to other researchers, advocates, and community residents. Receiving support from the U.S. Department of Commerce's National Telecommunication and Infrastructure Agency, NKLA was one of the first websites to provide free access to an integrated property database that allowed for complex querying and mapping for groups working to improve their neighborhoods. Over time NKLA added a number of demographic, housing, and social variables to the property data (Pitkin 2006, Local Initiative Support Corporation 2002, Lindenbaum 2006, Pitkin and Rattray 2002).

Similar projects developed across the country, many associated with the Urban Institute's National Neighborhood Indicators Partnership (www.urban.org/nnip). Eventually national platforms of interactive mapping appeared, including government sites such as the Environmental Protection Agency and the Census Bureau and nonprofit efforts such as KnowledgePlex's DataPlace.²

➤ Web GIS 2.0 (2004–Present)

The latest stage in web GIS development is one incorporating the web 2.0 functionality of expanding scalability and access to user-created content. Interactive mapping sites such as NKLA experimented with this by allowing users to upload and map data to a limited extent. In 2002 the team that build NKLA launched Neighborhood Knowledge California (NKCA) (<http://nkca.ucla.edu>), which featured advancements in interactivity such as allowing users to upload and map their own datasets against the NKCA data and to specify the data ranges they wanted to map, rather than only choosing from predefined options (an important capability given the many varied definitions of "poverty" used by different public programs, for example).³

² See, for example, <http://epa.gov/enviro/emef/>; http://factfinder.census.gov/jsp/saff/SAFFInfo.jsp?_pageId=thematicmaps&_submenuId=maps_0; www.dataplace.org/.

³ For example, NKLA allowed users to upload and geocode addresses of community assets and nuisances, functionality expanded on by its sister projects Living Independently in Los Angeles (www.asklila.com) and Neighborhood Knowledge California (nkla.ucla.edu).

Healthy City (www.healthycity.org), which we discuss in-depth in the next chapter, launched in 2003, initially providing interactive access not only to demographic information, but also to extensive data on the location of assets serving communities, such as nonprofit health and human services programs, private and public schools, parks, fire stations, and the like.

Two other notable projects arising in this era are DataPlace and Policy Map. DataPlace (www.dataplace.org) was unveiled in 2005 by KnowledgePlex, formerly an initiative of the Fannie Mae Foundation, to offer policymakers, practitioners, and researchers easy access to data and maps on a wide range of housing and demographic indicators for geographies across the United States. DataPlace was one of the first websites to provide free access to a detailed national map base tied to a range of social indicators with powerful analytical tools such as customizable maps, charts, tables, and rankings. PolicyMap (www.policymap.com) is a national online mapping tool launched in May 2008 by The Reinvestment Fund (TRF), a not-for-profit leader in the financing of neighborhood revitalization. PolicyMap provides free access to public data and standard maps, tables, and charts but also provides advanced tools—such as customized maps, proprietary data, and data uploading—on a subscription basis.

Despite their innovative contributions to the field, as of this writing the DataPlace and NKCA and NKLA web sites have been down for quite some time, ostensibly for maintenance. This raises the issue of sustainability and financial models, to which we'll return in the concluding section. It should be noted, however, that those three sites depended solely on grant or sponsor revenue, whereas HealthyCity.org and PolicyMap.org have earned revenue strategies, although quite distinct in their approaches.

Trends toward open source GIS and application programming interface (API) tools⁴ that allow mapping applications to be distributed on numerous web pages (e.g., the “mashup” technology of Google Maps) have accelerated web GIS 2.0 functionality. Over time, continued development of open source GIS, Google Maps, or both should greatly increase the accessibility of web GIS, reducing or eliminating price barriers, spreading innovative approaches, and making it likely that health policy advocates and others will be able to use well-developed free or low-cost web GIS systems out “in the cloud” without having to find the level of programming expertise that web GIS sponsors such as NKCA, Policy Map, Healthy City, and others have required.

⁴ An application programming interface (API) is a pathway that enables programmers to use or call on a software program's functions and commands, so that they can write programs that work well with the other program.

THE POWER OF WEB GIS FOR ADVANCING HEALTH EQUITY

With roots in PPGIS, this strain of web GIS has shown promise in helping advance social change as proponents have identified a wide range of uses and applications for web GIS in a variety of sectors, from community development and housing to criminal justice and conservation (Lindenbaum 2006, Local Initiative Support Corporation 2002). Public health also has begun to take advantage of web GIS to explore a range of health issues, as researchers have been exploring how it might help in addressing health concerns (Croner 2003, Maclachlan et al., 2007). The following are key advantages that web GIS offers practitioners, researchers, and community groups.

Broader Access to Data and Maps

First, and probably most obvious, the web opens up new opportunities in disseminating data and maps that demonstrate geographic distribution of health indicators and outcomes. Data that formerly would have been accessible only in printed material or through using complex GIS software are now available to novice users around the world at any time of the day through the World Wide Web. Websites such as the World Health Organization's public health mapping site and cancer mortality maps and graph site provide access to a range of historical, geographically diverse health data to anyone with an Internet connection.⁵ What previously could have taken hours and even days to assemble in term of maps and data can now literally take minutes or even seconds.

The wider availability of data clearly provides advantages to data users, but the efficiency of the web is also advantageous for data providers. As one observer notes, there can be attractive economies of scale in web-based dissemination of geographic information, especially if deployed through flexible, interactive applications. By building database-driven web applications with a modular programming approach, system developers can take advantage of reusable application components and create more extensible applications (Rattray, 2006, p. 31)

The capacity of web GIS to allow for broad sharing of data across platforms points to the promise of "interoperability, whereby geospatial data distributed anywhere on the web can be searched, located, retrieved and compiled" (Croner 2003, p. 64).

Whereas GIS data were historically difficult to share across platforms, the web allows for much wider dissemination, usually at relatively fixed costs of web servers and development.

⁵ www.who.int/health_mapping; www3.cancer.gov/atlasplus/index.html.

Availability of Research and Analytical Tools

Beyond making geographic data more widely available, the web has the potential to greatly expand access to the analytical power of GIS. It can make the data understandable to people of varied backgrounds and levels of education and expertise. It has been observed that “Experts in statistics can read tables. They don’t need graphics.”⁶ Policymakers, public interest lawyers, health professionals, advocates, organizers, and community members, whatever their level of education, are rarely experts in statistical methods. Moreover, the audiences they are trying to reach and influence likewise will respond better to maps than to data tables.

Further, looking at static maps is one thing, but being able to *create* maps through interactive mapping tools on the web is quite another. Well-designed web GIS sites allow users with no experience with GIS to render their own maps that explore spatial patterns of health and social outcomes along geographic lines. Placing various geographic layers together—known as “conflation”—can be a particularly useful tool for exploring various outcomes together (Croner 2003). Even for the geographically semi-literate, it can reveal spatial patterns that might otherwise go unnoticed by policymakers. It can be akin to putting on 3-D goggles. Also, as brain research tells us that vision is the dominant sense, that people are wired to notice patterns, and that information delivered visually is much more likely to be retained and used, GIS can aid the understanding of even the most sophisticated readers of statistical tables and enable them to communicate their insights with a wide range of people.

For community residents and advocates, in particular, web GIS provides access to powerful research tools that they otherwise would not have. Even with advances in usability of software, increased processing power, and falling prices, it likely would not be feasible for community groups or even well-resourced advocacy organizations to try to build resources like PolicyMap, DataPlace, HealthyCity.org, or Google Maps (powerful, but relatively shallow at present). Publicly accessible, sponsored, and (mostly) free sites such as these can enable countless communities to access data and map resources in their neighborhoods quickly, easily, and at no cost to them and offer advocates and service providers the ability to use high-quality, well-designed, reliable platforms for uploading data of their choosing and mapping that data against a wide range of demographic data, area resources, and other variables. Interactive web GIS sites with preloaded data, for example, allow community groups to focus on getting and presenting data to advance change, rather than having to build a system themselves. Web GIS, therefore, comes closest to the PPGIS dream of “GIS for the masses.”

New Forms of Power, Shared Understanding, and Collaboration

Web GIS provides opportunities for breaking down power dynamics and increasing shared understanding and collaborative approaches across sectors. When community groups come to public meetings armed with maps showing spatial disparities in health, for example, it can put them on an even playing field with public officials, who in turn are more likely to work with the advocates to address them.

The complexity and high cost of traditional GIS made access to geographic data and analysis prohibitive for the vast majority of advocates, setting up an “expert vs. non expert” hierarchy in which the ability to address geographic disparities depends on access to GIS tools. The compound effects of increasing power, decreasing cost and expanding availability of web-based GIS help break down this power imbalance.

The need for better data and analysis is not limited only to those with less political and economic power. We have seen how many public agencies are overwhelmed by the magnitude of their missions and the limited resources they have to adequately serve their constituencies. This dynamic tends to ferment a dysfunctional “culture of futility.” We also have found that political decisionmakers—elected, administrative, and even independent unofficial power brokers—often want to do the right thing but lack the tools or knowledge to do so. Although they have massive agency budgets and political power at their disposal, they often are paralyzed without outside help in deciding how best to use those resources. The same holds true with such powerful, well-resourced groups as labor unions and public interest policy organizations, who may have dozens or even hundreds of employees but not very well-developed capabilities for doing their own data analysis. Web-based GIS can enable them to be more effective and can allow community groups and advocates to communicate their interests with policymakers effectively and from a position of a partner in discovering the essential facts.

➤ Break down unexamined “mental maps”

Visualization of spatial dynamics also can help break down the often biased mental maps stakeholders bring to an issue. Particularly when an issue cuts across jurisdictions, or invokes ethnic and cultural tensions, groups that otherwise should be allies or partners can get caught in a “zero-sum” dynamic, where each group believes their neighborhood or their constituents are most deserving of a solution and so each group pushes to maximize its results, rather than seek a possibly better overall resolution. Web-based GIS can help diverse and often conflicted groups of stakeholders arrive at a common understanding of a problem, which is an indispensable first step to developing shared solutions, especially if the groups involved share in the same process of framing the question and analyzing the issue.

➤ **Align views from grassroots to treetops**

Web GIS also can help bring what residents know about their communities into play to correct or counteract elite or “official” assumptions. To take one offline example, in 2004, when First 5 LA launched Los Angeles Universal Preschool (LAUP), a huge new agency to lead preschool expansion in Los Angeles County, there was a debate over how best to do that and a point of contention was whether and how to expand preschool capacity in dense low-income neighborhoods. Advancement Project and Healthy City mapped the location of 16 “hot zone” neighborhoods, each lacking preschool spaces to serve more than 1,000 4 year olds from low-income families. Mapping the hot zones at least avoided the kind of “my neighborhood is more deserving” cacophony over where to focus that likely would have happened without them. Advocates then became divided over how to respond to that information. Some argued First 5 and LAUP should commit to expanding the number of preschool spaces in the hot zones, whereas others argued that to try to address these needs would be both inordinately expensive and impracticable because of the cost of land and the difficulty of finding suitable sites in densely populated parts of Los Angeles County. Advancement Project and Healthy City took large-scale maps of a hot zone neighborhood in the city of Bell, a predominantly low-income Latino community, to a meeting of residents and facilitated a session in which the residents worked together to mark potential opportunities (and challenges) for preschool sites on those maps. They then brought some of the residents and their input to a meeting of the large group of preschool advocates and civic elites guiding the planning process through the same exercise. This enabled the large planning group to see what the residents knew—that it would be possible and affordable to develop preschool spaces in neighborhoods like theirs. As a result, LAUP targeted \$100 million in funding for preschool facilities in 30 of the highest-need neighborhoods in Los Angeles County. (Note that although the mapping in this case was not done via a website, it was dynamic, not static, and exemplifies the kind of interaction with users that the web GIS sites seek to support.)

➤ **“Chunk” the problem**

This case example also illustrates another benefit GIS can offer. It can be overwhelming for groups to try to grapple with a large and diffuse challenge such as 30,000 4 year olds from low-income families who do not have access to preschool. Mapping, whether through an interactive web GIS tool or offline, can turn that question into “Who exactly are the kids who most need preschool, and where do they live?” That can then lead users to focus on particular neighborhoods, which can focus discussion on what assets are available and generate real options for making change. A shorthand reference for this is “chunking” the problem.

➤ **Facilitate discussion**

However, if not used mindfully, technology tools such as web-based GIS can allow an advocacy effort to become unmoored or estranged from the community members who are intended to benefit. Getting the data and the visualizations right can be demanding, and then when done right, the mapping and analysis can be beguiling. Also, it can be tempting to focus on data from established sources and to look for answers solely within it, rather than taking the analysis as the starting-point dialogue. The demands and benefits of the technology, then, can distract advocates from devoting the needed time and attention to direct engagement with people. There is not a technical fix for this problem, but the risk can be managed if the sponsors of the web-based GIS tools pay attention to it. Marqueece Harris-Dawson, executive director of the Community Coalition, a community organizing group in South Los Angeles, illustrated this concern:

We've shied away from using technology, including GIS, because it's usually been presented to us as a way to avoid talking with people. [Researchers and consultants have told us] "you don't need to go ask people if they have jobs or not, because I can just give you the data and show it to you on this map." We're community organizers, that's the opposite of what we want to do. We want to have technology *inform* our conversations with people, not be used as way to avoid them. Healthy City does that in a way that sets them apart from other organizations that use data.⁷

➤ **Encourage building of coalitions and partnerships**

A common understanding of the extent, and even causes, of social disparities can lead to increased collaboration to find equitable solutions. Moving toward a shared perspective is an indispensable step in the development of any effective collaboration or partnership. Web GIS can provide a focal point to attract potential partners into a discussion and serve as a tool for developing a common understanding of the extent and causes of social disparities. The existence of "durable community partnerships" is a critical component of successful web GIS projects focused on addressing

community needs, as outlined by Rattray (2006). In the case of the NKCA project, diverse groups in housing, community reinvestment, and community research collaborated with each other and with NKCA staff to advance community improvement.

⁷ Marqueece Harris-Dawson in remarks at a conference on GIS mapping on the occasion of the launch of Healthy City version 3.0, June 2008.

➤ Encourage data sharing

Web-based GIS tools also can induce people to share their data. The availability of a live example of how data from other groups is being presented, and of a trustworthy sponsor or sponsoring partnership, can lead organizations such as public agencies, private foundations, and other powerful groups with rich data to come forward to contribute their data to the mix to get the benefit from being able to track their data alongside indicators from other varied sources and take advantage of shared costs. This in turn can lead to more collaborative efforts among groups with related or complementary goals and data. As we describe further in our case study, this has been the case with HealthyCity.org playing the role of honest data broker.

Tempered Optimism

Recent developments in web GIS provide great promise for successfully advancing health equity in ways that previously were not likely or even possible. The sheer public availability of health data, coupled with user-friendly research and analytical tools, make it possible for a much wider body of advocates and constituencies to become involved in policy debates about health equity. By increasing geographic literacy and even allowing novices to become researchers, web GIS can enhance the sophistication of “outsider” community groups in entering the public realm and collaborating to advance social change. Further, web GIS has the potential to advance more equitable and collaborative processes for arriving at important decisions that affect health and social outcomes.

Despite its great promise, it is clear that web GIS will not be a silver bullet in addressing health inequities. The next section of this paper will explore both the promise and limitations of web GIS through an in-depth case study of the Healthy City project.

CASE STUDY: HEALTHYCITY.ORG

A review of the case of HealthyCity.org, a web GIS resource based in Los Angeles, will help illustrate many of the potential benefits and challenges of using web-based GIS tools for advocacy. In our concluding section, we will outline a set of key dimensions of web-based GIS tools that may help readers evaluate and compare web-based GIS tools.

Before proceeding, we must disclose our involvement in HealthyCity.org. Pete Manzo was one of the cofounders of the Healthy City Partnership that created HealthyCity.org more than five years ago and is still a member of that governing group. Bill Pitkin was the principal consultant assisting in the design and construction of HealthyCity.org.⁸

⁸ Both of us are two or three steps removed from the professional positions we held at the time, and we have no financial interest in Healthy City’s future success. We are very proud of Healthy City, though, so we are declaring our bias here.

Established in 2003, Healthy City is entering its sixth year of service. Using a custom adaptation of open source software and the Los Angeles region's most comprehensive database of public and nonprofit resources (schools, parks, community centers, health clinics), HealthyCity.org enables community residents, nonprofit organizations, advocates, public officials, and civic leaders to see and analyze the distribution of critical community assets in relation to essential demographic information, electoral and school district boundaries, and the like.

Healthy City's mission is twofold:

- **1. Connecting people to resources:** To help people seeking services, particularly low-income, underserved families, by improving the ability of service providers to connect them to appropriate resources in a specific geographic area or subject.
- **2. Making data accessible for solving problems:** To facilitate the policy advocacy and data-driven decision making of foundations, nonprofits, public agencies, and elected officials by providing tools for analyzing and visualizing the spatial and demographic dynamics of an area or issue.

Likewise, Healthy City has two primary audiences: people seeking services and advocates, grantmakers, and policymakers seeking to use data to make their case or inform their decisions. In 2008 HealthyCity.org logged in more than 180,000 unique visits from more than 45,000 unique computer stations. A recent survey of Healthy City's user population found a little more than half of these visitors were looking for resource referrals, and the balance were looking for demographic and other asset information.

Spiky Town: Los Angeles County

Los Angeles County encompasses more than 4,000 square miles and is home to more than 10 million people, including a preponderance of California's poor and immigrant populations. It is the most populous county in the nation, and if it were a state it would rank as the ninth most populous in the union. Although Los Angeles County in itself is the eighteenth largest economy in the world, it also includes the largest number of low-income families of any American metropolitan area, making it the nation's poverty capital. The gulf in resources between the super wealthy and the poor, on one hand, and their physical proximity, on the other, is staggering. Although the county boasts the highest concentration of university graduates in the country, student achievement scores within the county's K-12 public schools fall within the bottom third of national test scores and far short of basic state goals.

Place is very important in metropolitan Los Angeles County. Although it is viewed as being very open and “flat,” thanks in part to topography and the car culture, in actuality the sheer size of the place; the legacy of restrictive zoning, redlining, poorly enforced planning, and building codes; and great disparities in wealth make Los Angeles “spiky.”⁹ As a result, its communities are best understood at a smaller scale. In the policy and political worlds, neglect of community geography was a recurrent problem. For example, representatives of the 15 city council districts in the City of Los Angeles and the 5 county supervisorial districts tended to operate like fiefdoms—representatives tended to let their colleagues manage their districts however they saw fit in return for receiving the same deference. This made comprehensive planning and development policymaking difficult and rare and also served to arbitrarily distribute resources “even Steven” among districts, rather than targeting them most heavily to the most need. These factors are repeated in or reinforced by the further division of the region into 87 other municipalities.

It is perhaps not surprising that Los Angeles city and county government processes are notoriously dysfunctional and inert. Making matters worse, since the passage of Proposition 13 in 1979 (which restricted increases in property tax—a major source of funding for cities), local governments have lost most control over their own financial fates, whereas larger trends such as population growth and immigration, social changes, and devolution at the federal level have increased their burdens. In Los Angeles, for example, the two largest government entities in Los Angeles, the county of Los Angeles and the city of Los Angeles, have gone largely unchanged since the 1960s, despite the fact that the region’s population has more than tripled during that period (and notwithstanding the city’s charter reform in the late 1990s). The resulting scarcity in resources, compounded by their grossly unfair distribution, has caused government performance to suffer and served to discourage or excuse the absence of efforts to bring about more responsive governance.

The Sponsoring Partnership

- The partners who came together to build Healthy City all shared a concern with these dynamics, particularly the grossly unfair distribution of resources and the difficulty of mustering effective civic action.
- 211 LA County’s (formerly INFO LINE of Los Angeles) core purpose was and is to connect people to the right resources that are most accessible to them. 211 LA County had the most comprehensive and detailed database of nonprofit and public health and human services resources in the region. Maribel Marin, 211 LA County’s new executive director, knew that her predecessors had struggled to find a way to provide access to these resources over the Internet and saw Healthy City as an opportunity to do that effectively.

⁹ Apologies to Richard Florida, who popularized the concept of uneven development globally, within nations and within cities, in his book *Who’s Your City?* For some fun and interesting maps illustrating the concept, see http://creativeclass.com/whos_your_city/maps/#Population_in_a_Spiky_World.

- Advancement Project had used maps to win a landmark lawsuit, *Godinez v. Davis*, to stop the state's unfair allocation of school construction funding and was working on pushing the state to determine the full extent of the overcrowding problem statewide and raise funds to build the needed classroom space.¹⁰ Molly Munger from Advancement Project saw Healthy City as an opportunity to continue this work.
- The Center for Nonprofit Management had used maps to analyze the size and scope of the nonprofit sector in the region and sought to begin to map the distribution of nonprofits and philanthropic funding to highlight what it suspected was an uneven distribution of both nonprofit infrastructure and funding. The online nature of Healthy City would make these data and information more widely available.
- The Children's Hospital's Healthy City Collaborative, chaired by Mary Adams, consisted of nonprofit and public agencies seeking high-impact ways to improve the health environment for children. The collaborative was launched in part to celebrate Children's Hospital's 50-year anniversary. The more than 30 leaders of nonprofit and civic organizations had identified the need for better data on the fit between needs and resources as a top priority.

A key factor, and perhaps the critical reason this opportunity to collaborate stuck, is that several of the partners had tried to go it alone and failed. 211 LA County had tried to develop a web interface for its resource database for years, Advancement Project had successfully used static maps in the *Godinez* case, and Center for Nonprofit Management had produced an interactive map of nonprofits, but each of them had bootstrapped that work, with some difficulty, and were eager to find expert help and a way to share costs. It is worth underscoring the fact that none of the partners brought a primarily technologic orientation to the project.

Finally, mapping also was simply in the air. Technology advances were making large data gathering and analysis projects, and mapping, much more accessible than they would have been as few as five years prior. As we described previously, the spread of new software meant mapping and data were moving out of the province of well-resourced private businesses and universities. Neighborhood Knowledge Los Angeles, the precursor to Neighborhood Knowledge California, had been launched several years previously and served to provide an example of what might be possible. Indeed, in early discussions, the partners expected that there should be a system like the one they ended up creating and felt for a time that there *must* be one out there in the world. They spent significant time looking for one, and finding none, they set out to build one.

¹⁰ Following *Godinez*, California committed to raising a staggering \$25 billion in school facilities funds through a series of bond measures passed in 2002, 2004, and 2006. To date, California has built or renovated 1 million school spaces. For more about this effort and Advancement Project, visit www.advancementproject.org.

Once embarked on that course, the diverse strengths the partners brought were essential to getting HealthyCity.org off the ground. 211 LA County played a central role in providing data on the location and availability of education and health and human services data; Advancement Project opened doors to many government agencies and brought expertise in public datasets on K–12 schools; and Children’s Hospital and the Center for Nonprofit Management were helpful in reaching a large number of health and other nonprofits and in providing IRS Form 990 data on nonprofits and access to data on health indicators. The continued involvement of the partners has been important to improving the tool and expanding its reach throughout Healthy City’s three iterations over five years.

Critical to the success of the project, the group retained expertise to manage the development and implementation of the tool. The partnership hired UCLA’s Advanced Policy Institute (now the Center for Neighborhood Knowledge) to help develop the functional specifications and build the site. Bill Pitkin and Yoh Kawano of API had designed NKLA and brought deep knowledge of what could be done technically, what users would want, and how usable the site would need to be to meet their needs. John Kim was brought on by Advancement Project to manage the project. He did not bring technical expertise, but he did bring a wealth of skills and experience in community organizing and project management. John led the development of the project from a concept through three different generations of the site. Along the way he kept the partnership focused on setting and reaching goals, on constantly considering how the site actually would be used in communities as the key standard for design decisions, and on meeting the commitment to make the site accessible and responsive to community groups.

Design Decisions

Perhaps the first major decision the group faced was whether to risk building a privately sponsored GIS site at all, in light of stated plans by Los Angeles County officials to build such a site. At the time, the county of Los Angeles was involved in a major push to better coordinate the work of all the huge departments responsible for providing health and human services, and the Urban Research department in the county’s office¹¹ had produced some excellent static maps to support that work. The group decided that for its purposes it could not afford to rely on such a prospective county effort. For one, there was no guarantee that such a site, if built, would be well designed for use by nonprofits and civic sector advocates, rather than being focused foremost on the internal needs of county departments and their employees. Further, given the potential advocacy power of data and mapping the group desired to see, the partnership was concerned that the county might not grant full access to data or functions of such a site. Finally, the partnership also had doubts that the county would actually follow through. Indeed, the proposed site was never built, and today the new county chief information officer (CIO) and county departments encourage the use of HealthyCity.org.

¹¹ In a spirit of cooperation, Wayne Bannister, who headed Urban Research, provided invaluable early guidance and support to the partnership.

Next came the critical work of deciding on the purposes and design of the site. The partners convened a series of half-day meetings to outline the audience, data sources, and functionality. Key design decisions included the following:

- **Focusing first on information and referral:** Some in the partnership were most interested in the potential power for policy analysis and others were more concerned about supporting direct service to vulnerable people, but all shared these two concerns, if in varying degree. The partners decided to focus first on making data available to support service to individuals, in part because they felt the available data met more of that purpose than a gaps or policy analysis, partly as a strategy for building a broad user base and partly for political reasons of not posing a potential threat to policymakers right from the start.
- **Adopting an asset-based framework:** Seeking to aid in connecting people to resources, in turn, led the project to adopt an asset-based orientation. Starting with a handful of demographic variables—age, gender, race/ethnicity, income—the partnership looked to map community resources that might serve people, such as nonprofit and public health and human services organizations, parks, fire and police stations, schools, and elected officials and their districts. Even as the number of demographic variables grew more than 10-fold, and as the project came to have access to point data on violent crime, for example, HealthyCity.org maintained this focus on assets.
- **Providing direct access to residents of low-income communities, the intended beneficiaries would not be feasible:** The partners discussed a dream of being able to provide touch-screen kiosks at street level but decided that language and education challenges would simply be too great. Related to this, the partners also recognized that the navigating function served by trained specialists at 211 LA County, or caseworkers at nonprofit service agencies, was vital for health and human services needs.
- **Selecting staff at nonprofit and public intermediaries as the target audience:** In view of the difficulty in trying to connect directly to low-income residents, the partners settled on the next natural target audience, staff of nonprofit and public service agencies who dealt directly with people seeking help—case workers, information and referral (I&R) staff, community health professionals, organizers, and legal aid lawyers.
- **Using partnerships and alliances to access data:** The partners decided not to develop or gather data, but instead to develop partnerships with the best, most reliable sources who held relevant data. This meant assuring data partners that they maintain ownership of their data and could pull their data back at any time and protecting them against copying or duplication of their data.
- **Ensuring that access on the web would always be free:** This may seem like a simple decision, but it meant the partners were committed to raising funds to sustain the site without a foreseeable revenue model. (Healthy City subsequently

developed a significant practice providing tailored research and analysis for foundations and public agencies, and this revenue now largely subsidizes the free site.)

These decisions framed the selection of the data and the functionality of the site. The partners designed the site with the needs of I&R providers foremost in their minds. The group held about 10 meetings to design the purposes and functional specifications of the system. The group also held six to eight focus groups with people from the target audience of intermediaries—workers at health and human services, community development, legal aid organizations—to get valuable information about the data, user interface, and functions.

First Generation—Healthy City 1.0

In October 2003 the Healthy City partnership launched the first public version of www.HealthyCity.org. This “Healthy City 1.0” allowed users to search through a database of more than 18,000 distinct community resources in any geographic region in Los Angeles County and to research and analyze the relationship between the community needs and the distribution of those resources. As described earlier, Healthy City 1.0 was designed primarily to support I&R services at 211 LA County and hundreds of other nonprofits serving low-income and vulnerable people. Healthy City 1.0 asset data comprised three main datasets: nonprofit and public service resources drawn from 211 LA County’s database; nonprofit financial information based on Center for Nonprofit Management’s analysis of IRS Form 990 data; and very extensive, detailed data on schools from the California Department of Education. Healthy City 1.0 featured only six demographic variables. Still, the pairing of a comprehensive listing of nonprofit organizations and community assets with demographic data in a free, public, and interactive setting was the first of its kind in the region.

The partnership put a high priority on reaching out to targeted users to get them to incorporate the site into their work. This marketing strategy was built into the design phase, as the partnership held several focus groups and enlisted more than 30 reviewers drawn from the target audience of people working at organizations providing direct service to low-income people. The group planned and hosted a launch event attended by more than 250 people; following the launch, Healthy City was aggressive about seeking opportunities to recruit users. Healthy City held regular trainings at the Center for Nonprofit Management and arranged on-site presentations to human and social services agencies. Over the course of the first year following the launch, Healthy City made more than 25 presentations to more than 900 people in the target audience—staff of nonprofit organizations providing direct service and referral to other services to low-income and vulnerable people. In its first year, Healthy City logged 30,000 unique visits from 10,000 unique IP addresses, and nearly 1,000 people bookmarked the site.

Rapid Growth in Data and Functionality—Healthy City 2.0

It quickly became clear that policy advocate users wanted more demographic data and increased power to use thematic layers to compare the relationship between a category of assets and people in communities. Although hoped for, it was still surprising to see how many public and nonprofit organizations came forward to ask Healthy City to map their data. To cite just a few examples from the first year after the launch, agencies seeking to contribute data or get help analyzing their own data included the City of Los Angeles Commission for Children, Youth and Families; the Los Angeles Coalition to End Hunger and Homelessness; and the Preschool for All initiative of the local First 5 Commission.

Launched in October 2005, Healthy City 2.0 introduced a number of significant improvements. Among others, version 2.0:

Added approximately 50 more demographic variables, including health and

morbidity information from the California Health Interview Survey (CHIS)¹²;

Offered users increased power to run thematic layers; and added polygons and

mappable layers, for the overlapping boundaries of electoral districts at the municipal, county, state, and federal levels, among other improvements;

Featured a redesigned graphic “skin”;

Expanded pathways for users: whereas Healthy City 1.0 had three “channels” users could go down—Find a Service, My Neighborhood, and Policy Maproom—version 2.0 added a fourth—Data & Charts—to respond to requests from expert users;

Added a powerful new set of functions for viewing numeric data underlying map search results; users could see the data tables in numeric form along with charts showing the breakdown of different demographic indicators and comparing the mapped area to averages for the county overall;

Discovering new data sources and a revenue stream

With version 2.0, Healthy City became much more widely known as a resource for policy research and analysis. Foundations, public agencies, and elected officials began to retain Healthy City for tailored mapping and data analysis with two fortunate results. First, the custom projects Healthy City took on steadily increased the project's data list. In the course of integrating new data to the matrix, Healthy City developed expertise in cleaning and reconciling diverse datasets and came to be seen as a reliable, independent source to hold data for partnerships and coalitions. (Healthy City's director, John Kim, often describes this function as providing a "data sanctuary, a place where different data sets can come together and play nice.")

Second, the revenue from such tailored projects for private and public funders helped to subsidize the maintenance and improvement of the free HealthyCity.org site. By early 2007, a little more than a year after the launch of version 2.0, the project's funding sources had become two-thirds earned, one-third grants.

Bringing production in-house

Less than a year later Healthy City quietly launched a version 2.0+. This version added many more data variables, but the most important feature was invisible. Healthy City 2.0+ had been rebuilt using custom open source programming, and this reconstruction had been done in-house. This marked two momentous shifts. First, it released Healthy City from the burden and constraints of using licensed map bases and database query software. More important, bringing programming capacity in-house greatly increased Healthy City's control over the evolution of the site, and the pace of improvements and upgrades increased substantially.

Meanwhile, the GIS world was changing quickly. When Healthy City first launched, GIS mapping was dominated by ESRI software, mostly for server-client closed networks. "Maps on the web" at that time meant MapQuest or Yahoo!'s early-generation maps. Just a few years later, in October 2005, the same month Healthy City 2.0 launched, Google Maps ended its six-month beta period and became a permanent part of the landscape.

Moving Toward Two-Way Information Flow: Healthy City 3.0

By 2008 GIS had become ubiquitous. Google Maps and Google Maps for Mobile had quickly come to dominate popular understanding of what GIS was and had greatly increased popular expectations about what web GIS should be able to do. At the same

time, the popularity of Apple's iPod and iTunes had raised users' expectations about the look and usability of search options.

Healthy City launched version 3.0 in May 2008 to respond both to these new realities and to increased demands from users to upload their own data, define their own parameters, and draw their own neighborhoods.

These demands from users came from two ends of the spectrum. On the one hand, Healthy City had been approached starting in 2005 by foundations and public agencies to do custom research and to build tailored data and mapping environments, based on Healthy City, to support their specific needs. For example, Healthy City prepared custom maps and built systems to map and analyze grant making for a community foundation, and a coalition of 22 early-childhood funders in Los Angeles, and for a statewide health foundation. On the other hand, users at nonprofits, public agencies, and advocacy groups likewise wanted the ability to use the system to privately map their data; to map regions that may not neatly conform to electoral districts, ZIP codes, or census tracts; and to share maps and information about asset points within their work groups.

Healthy City 3.0 featured a redesigned graphic design, improved menu for defining searches, and redesigned display for search results that showed search terms, a view of data and charts for the mapped area and list of assets mapped in the same window as the map. Version 3.0 also introduced a number of new capabilities including, among others, allowing users to:

Upload and map their own datasets;

Define the neighborhoods they want to map down to the neighborhood or census block—to draw their own neighborhoods;

Export and reconfigure tables and charts, view core demographic and other data for the selected geography in tables and charts, and export and reconfigure the tables and charts;

Save searches;

Create public or private groups to share searches, upload notes, comments, videos, and photos;

Evolutionary Growth Strategy: Future Developments in Healthy City

➤ Expanding service throughout California and beyond

For four years, since the launch of version 2.0, Healthy City had resisted, a strong temptation to expand beyond Los Angeles County. This temptation came in part from the possible availability of funding to build a statewide or even national system, in part from competitive feelings brought on by watching other programs launch national mapping platforms, and in part simply from a desire to share what the Healthy City partnership and staff felt they had learned. Two forces resisting this temptation were the governing partnership's insistence that sustaining high-quality service to Los Angeles County be a top priority and the fact that Healthy City staff time was more than fully committed to fulfilling tailored project obligations and building version 3.0. Another key factor was the foreseeable difficulty in grafting the Healthy City model, which requires a strong local partnership to identify and attract relevant local data and drive adoption of the site. Healthy City considered and rejected the options of building a statewide system and a national system without local partners. Although either could have been done relatively quickly and affordably, the partners were hesitant to invest time and energy in a project that might not have a strong strategy to build the user bases needed to have impact at the community and regional levels.

As of this writing, however, Healthy City is building a platform to provide Healthy City functions throughout California. The strategy for this project is to develop local partnerships to cosponsor Healthy City in two key regions of the state by early 2010 and bring other regions of the state online as partnerships develop in those areas. Healthy City obtained funding from The California Endowment and the William & Flora Hewlett Foundation to underwrite not only the construction of the statewide platform, but also the time-intensive work of developing partnerships with key people and organizations in regions such as California's Central Valley, the Bay Area, and the Inland Empire. The beta version of the statewide system is projected to be launched in January 2010.

➤ New dimensions of assets

Healthy City is exploring new ways of displaying attributes of assets and demographic variables.

- **Service areas:** An important shortcoming of mapping is that the location of assets may not tell you much about their reach or the area they are seeking to influence. Ideally, a system would be able to display the service area for every asset in the database. The challenge is how to obtain reliable information about an organization's service area, rather than how to enter it into the system and display it. Healthy City has developed a reliable method of determining and displaying the reach of nonprofit organizations, using an interview protocol and shape-file drawing tool, that has shown promise in projects involving defined sets of grantees for foundations, for example.

- **Magnitude:** Another attribute users would like to see is some magnitude for assets, whether that is budget size or volume of service provided. Healthy City, like many other GIS services, can display these magnitudes by using graduated sizing and coloring for asset points. To date this primarily has been done online for consulting clients, but this is likely to become available on the public version of HealthyCity.org, where relevant data are available.
- **Quality:** As with magnitude, in some instances it would be important to display a quality attribute for an asset. The difficulty, again, is finding a reliable source of data. For example, foundation staff and I&R professionals have sound opinions about the strengths and weaknesses of the organizations with which they work. Those opinions are not standardized, however, so Healthy City’s current strategy is to allow users to form their own groups and share their opinions with users in their groups. Healthy City is exploring ways to have users openly review assets, but there are a number of challenges to doing it responsibly. (Readers may be familiar with the problem of interested parties submitting “reviews” on Amazon and other sites, for example.)
- **Time:** Healthy City also is looking into developing methods for showing changes in demographics or resource distribution over time, perhaps along the lines of the Trendalyzer tool developed by Hans Rosling of Gapminder¹³

LESSONS AND IMPLICATIONS

The availability of web GIS resources is certain to continue to grow, and the challenge for those who want to support advocacy on health policy or other issues affecting vulnerable people will be determining which web GIS resources may be best for them.

To casual observers, mapping sites may seem alike—they all use GIS and are on the web. However, on closer inspection, they are strikingly different.

- Some are interactive (dynamic), and others are not.
- Some aim to cover a huge area (wide and shallow), whereas others provide deeper information for more focused areas.
- Some are better designed to allow users to choose variables, compare more than one variable or geography, and display summary data or deeper information about data points.
- Some seek only to show preselected information to visitors, whereas others aim to gather information from users in the web 2.0 vein.

¹³ For more information about Trendalyzer, Hans Rosling, and Gapminder, see www.gapminder.org. Google acquired Trendalyzer in early 2007, with the announced intent of making a version of the tool widely available. As of this writing, Google has created a flash-based motion chart available through its Google Visualization APIs (www.google.com/ig/directory?url=www.google.com/ig/modules/motionchart.xml).

- Still others have more detailed offline strategies for reaching people and groups that will actually put the information to use. (Our biases should come through clearly here.)

In this section, we will offer some observations we hope will be helpful to readers in assessing whether a web GIS system would meet their needs and in evaluating specific web GIS sites. We begin with issues of purpose, design, editorial point of view, and adoption strategy. Then we discuss issues involved in accessibility of data, openness, and compatibility of different systems, and we finally offer some concluding recommendations for developing and using web GIS tools to advance equity in health and other fields.

What Are the Site's Purpose and Theory of Change?

In choosing web GIS tools to support advocacy for equity in health or other fields, users should give careful consideration to how a site's design aligns with the uses they need. Most sites will attempt to address multiple audiences, issues, and uses, and this is only to be expected because the ability to offer a multitude of data and ways of arranging it are the beauty of modern technology and kind of the point of using web GIS. The power of web GIS technology and ever-rising oceans of data, however, pose a temptation to try to aggregate and present the whole universe of data. This radical freedom, of a sort, challenges web GIS sponsors to answer questions such as the following:

Who are the users we want to reach?

What do they need to be able to see or say?

Which data would be relevant to them, and which would be a distraction?

What difference do we expect our site to make, and how (i.e., what is our theory of change)?

A core premise of this paper, and of the research program of which it is a part, is that web GIS tools can democratize the power of data analysis, can reduce the barriers faced by community groups, and can help neutralize the power differentials between organized people and organized money and between elite experts (academics, policy wonks, public officials) and ordinary citizens. Although all of the "open circuit" web GIS tools we are aware of are built on this premise, there is a lot of variability in interpreting it. Sponsors of web GIS tools must choose a balance along two spectra (at least): (i) selecting and presenting data the sponsor thinks is useful to users, on one hand, and supporting data upload and selection by users, on the other; and (ii) preformatting functions and queries, for the sake of simplicity and accessibility, and allowing more unstructured, customizable functionality for more sophisticated users. The balance different sponsors choose will depend on their view of the abilities of their target audience (how sophisticated they are in both subject matter and technical capabilities) and on their theory of change (e.g., the site will have impact by boosting the data analysis power of involved actors such as policy advocates, or by helping service providers or

fundlers target resources, or by encouraging community groups to take steps to become more engaged in an issue). In our experience, most public interest web GIS sites cluster around one of the following three types of approaches. The following rough, unscientific typology of web GIS sites may be helpful:

“Have at it!”: Some GIS websites place primary emphasis on presenting as much information as possible to users and inviting them to “dig in!” Examples include DataPlace and PolicyMap and a number of government- and university-sponsored sites. Most of these sites seem to grow out of the urban planning and community development fields. They assume a fairly high level of comfort with technology on the part of users, and the profusion of complex data also seems to presume a high level of knowledge and understanding on the part of users.

“The truth is out there”: In the web 2.0 vein, another type of GIS website strategy is to focus on attracting and supporting mapping by users, rather than aggregating and filtering data and presenting it to the users. These sites place a high value on users’ knowledge of their communities, and they aim to break down the “expert/commoner” dichotomy. Concurrently, they seek to make their sites as intuitive and easy to use as possible. Examples include My Green Map (www.mygreenmap.org), a site that encourages users around the world to tag and describe environmental preservation or remediation projects around the world, built on a platform that mimics Google Maps.

“Songs in the Key of . . .”: Another category of web GIS sites includes those that try to find a middle ground between the prior two types. These sites organize data and functionality around a coherent focus and try to both select data and ways of presenting it that help users with specific interests, on one hand, and offering users the ability to map and analyze their own data and customize results for the geography or interest they choose on the other. Healthy City, for example, focused on resources that serve people of low and moderate income and more specifically on the needs of people serving that population or advocating in their interests. As described earlier, that focus heavily influenced the data Healthy City chose to present and the ways users could choose to add to and view that data. This category represents web GIS tools.

Advocates seeking an appropriate web GIS tool should consider not only a site’s functionality, but also the site’s stance toward the users and the site’s theory of change. The following brief list is meant to illustrate some of the kinds of questions advocates should consider:

Is the scope of information narrow or broad, deep or shallow?: Web GIS sites can present a number of datasets with a global, national, or regional focus. Global and national datasets may lack depth of information that is useful in assessing needs and resources in a local community or at a regional level or useful for analyzing why some regions have different results than others. Increasingly, new web GIS sites are built on Google Maps, which can present pushpins across a very broad geography but not offer a lot of information layers underneath.

- **What range of choice does the site offer to users?:** How much flexibility does the user have to select variables and geographies? Is there a limited menu of options? Can users do the following?
- Upload their own datasets.
- Choose thematic layers (e.g., health indicator or health resource data points on top of demographic and other data).
- Define the geography they want to map (down to the neighborhood or census block) and analyze data within a radius around an address or within a ZIP code, city, legislative districts, or other jurisdictions pertaining to that geography.
- View core demographic and other data for the selected geography in tables and charts and export and reconfigure the tables and charts.
- Save searches.
- Create public or private groups to share searches, upload notes, comments, videos, and photos.

The Editorial Role of a Sponsor

Noting the different orientations toward users' abilities and needs that web GIS projects can take highlights the editorial role a site's sponsor plays. Even the most well-meaning sponsors make choices in advance for their users, and users should always be mindful of this unavoidable fact of mapmaking, a point most strongly made by the classic book *How to Lie With Maps*.¹⁴

Playing that role, however, is entirely the point. The (by now) old saying has it that trying to find information on the web is like trying to drink from a firehose. Web GIS projects can provide a valuable service by selecting and vetting data and, in many cases, providing a path within which users are more likely to frame their questions more usefully. Even web GIS projects intended to serve the most sophisticated users (such as academic researchers) aim to deliver data that would take users an inordinate amount of time to obtain in usable form, and in doing so, they build in judgments about the relevance and reliability of the data that users may not be in a position to determine.

Further, when web GIS projects successfully show the value and power of mapping, they can create a virtuous cycle of increasing availability of data. In the Healthy City case we reviewed above, for example, after nonprofits and foundations saw how the site presented data, a steadily increasing number of them came to offer their data.

¹⁴ Monmonier, Mark. (1996) *How to Lie with Maps*, 2nd ed. University of Chicago Press, Chicago.

Just as a sponsor's editorial discretion is unavoidable, the sponsor's credibility also is critical to the success of a web GIS project. If data sources do not feel that their data will be presented faithfully or that their ownership of their data will be respected, they will not agree to let their data be presented. A site sponsor can appear unreliable to users or can be vulnerable to attack by opponents if the sponsor can be shown to present data carelessly or harbor undisclosed bias.

Sponsors of web GIS sites designed to support advocacy especially have some sensitive decisions to make. The more focused and adversarial a site is in its advocacy work, the more difficult it may be to obtain data because of the increased likelihood that policy opponents may control or influence access to the needed data. A site with a more diffuse focus, such as on the availability of health, education, and human services resources serving low-income people, likely will be able to better position itself as a neutral ground for addressing policy debates. The virtues of a narrower focus, among others, are concentration of energy and resources; more clear and measurable goals; and more clearly zealous advocacy, which can be important for stronger relationships with the community served and for attracting private funding. The virtues of a broader yet coherent focus can be a wider range of potential data partners and better odds of obtaining data from public sources because of an appearance of less fiery concern with the broad public interest. Together these virtues increase the odds of gathering critical mass that make the site the natural place for additional data to be mapped and analyzed when new issues come to the fore and open the possibility for the site's sponsor and partners exercising influence alongside of all (or most) of the stakeholders involved in a collaborative process, rather than through opposition. How a web GIS site presents itself is further complicated if the sponsor is part of a larger institution, such as a university, or a civic, economic development, community development, or health and human services group. In the case of Healthy City, anchored in a civil rights organization, at times the Healthy City project staff had to be sensitive to the fact that other programs in the same organization were taking a quite aggressive approach to the same public agencies.

Obviously, there are trade-offs in choosing any combination of these elements—narrow focus or broad focus, adversarial or facilitative stance. The choice a sponsor makes is another important feature users need to evaluate before putting their trust in a web GIS tool for advocacy on health or other issues.

Through What Adoption Strategy Can a Web GIS Site Ensure it Gets Used?

Web-based projects are particularly susceptible to the "Field of Dreams" fallacy, the mistaken assumption that "if you build it, they will come." A central question for any web GIS site is what strategy does it follow to bring people to the site and encourage them to use and contribute to the information provided?

To be effective, a web GIS advocacy project must make connecting to users in communities a top priority, and that priority must drive all aspects of the site's

development. As we saw in the case of Healthy City, an offline strategy for reaching target audiences was critical to having users adopt the site, growing the user base, and continuously improving the site. Healthy City's emphasis on community outreach grew out of the orientation of the founding partners¹⁵ and has been reflected in its staffing structure throughout its more than 5-year history; its original staff members included a former youth organizer as project director and a public health professional with a master's in public health leading outreach, and after six years of operations and three iterations of the site, it has a 3:1 ratio of outreach and assistance staff to technology specialists.¹⁶

In our opinion, particularly if the goal is to support advocacy in support of low-income and disadvantaged communities, neglecting to pursue a strong strategy in the offline, carbon-based world is a serious, perhaps fatal, error.

Thoughts on Data and How to Get It

Depending on the particular data and parties involved, sponsors of web GIS sites are likely to encounter some of the following interesting dynamics when trying to gather and display data. The bottom line of all of these observations is that getting access to data is all about working well with people and keeping their interests in mind (so it may not be a job to leave solely to the techies, at least in the initial stages).

- **The sources best positioned to collect may not be able to produce it:** There is a wide variation of sophistication among public and nonprofit agencies. Some have well-developed systems for collecting and maintaining clean datasets. Others do not know what they have, and when they find it, they are not sure how accurate it is.
- **Data are held by people, more than organizations:** A related observation is that data within organizations are held by individuals who often prize it highly and are hesitant to part with it (in the vernacular, they treat their data like their first-born child). To get the best results, those seeking the data will need to develop some trust or good feeling with the person who holds it, even if their managers have

¹⁵ Advancement Project's Molly Munger is a civil rights lawyer. 211 LA County's Maribel Marin runs an agency that handles more than 500,000 calls for help annually. Bill Pitkin came out of the PPGIS movement. John Kim, the project director, had been a youth organizer in Oakland, and Pete Manzo is a public interest lawyer who at the time ran an organization that aimed to improve the effectiveness of nonprofit community groups. All were concerned with promoting service and social justice first and were only interested in technology as one possible means to that end. In contrast to the technology-oriented approach that might have been taken by a public agency (likely focused on providing an impressive tool to its staff and leadership) or a different nonprofit or private group firmly rooted in technology (likely focused on showing the most cutting-edge capabilities), the partnership designed the site to be used by social service providers and advocates and chose an old school, shoe-leather approach to outreach and building a user base.

¹⁶ As of early 2009, the Healthy City team members featured the following professional backgrounds: youth organizer, public health expert (MPH), licensed clinical social worker, three masters of urban planning, and two database and web design specialists.

ordered them to release the data. Often they will need to see a benefit to their own work, personally, in order for them to cooperate.

- **What looks like resistance may be embarrassment:** In some cases, organizations and people with important data are painfully aware of how incomplete their data are. It may be unreasonable for anyone to expect datasets to be perfectly complete, accurate, and well-ordered, but hesitation or delay in sharing data sometimes arises because the holders do not want others to see the gaps or idiosyncrasies of their information.
- **“Public” data often are not public:** In recent years, agencies at all levels of government have begun posting their data and allowing it to be downloaded, and some are even offering APIs to enable private actors to find innovative uses for it.¹⁷ This is a promising trend. But if a GIS site sponsor approaches a public or nonprofit agency that has not already offered up its data before the sponsor has established some connection and trust, even if by reputation only, the agency likely will refuse. Nonprofits are private organizations and, if pressured, usually take the position that their data are theirs alone, even if they collected the data in the course of doing work with public funds; government agencies can be even less responsive. In theory, sponsors could go the route of a Freedom of Information Act request or some other public access procedure, but the cost and delay can be considerable and can make cooperation in the critical task of cleaning the data and obtaining future updates difficult. In other situations, public agencies may allow sponsors access to their data but not permit the information to be displayed publicly (for example, Healthy City has received point data on violent crime in Los Angeles from the police department but agreed to use that only for offline research and not make it available on the public website).

When seeking access to data held privately, sponsors likely would be best served by approaching data sources like partners in the project, assuring them that the data partners retain all rights (such as they are) to their data and that they can pull their data back at any time. Healthy City follows this approach and has found that making potential data partners comfortable is indispensable, and that over time, many data partners who initially restricted visibility of their data moved in the direction of full access.

Sustainability

The future of community-focused web GIS faces a challenge common to just about any public interest venture: How can it be sustained financially over time?

Many of the early innovative projects were supported through philanthropic funds, but maintaining those resources can be challenging. Foundation support is notoriously

¹⁷ See, for example, “iGov,” an article describing increasing use of APIs by government agencies to encourage outside users to customize information for different regions and audiences (*The Atlantic*, Jan/Feb 2009 (www.theatlantic.com/doc/200901/technology-government)).

inconstant¹⁸. Most individual donors may prefer a more direct connection to impact than a web resource may be able to offer; and government funding, although somewhat less subject to short-term shifts in priorities, often comes at a high cost in terms of reporting requirements and caps on indirect costs. Two of the most prominent, well-developed web GIS resources in the nation, Neighborhood Knowledge California and DataPlace, have both been down for many months as of this writing.¹⁹ Both of these projects had auspicious beginnings, with significant financial backing from deep-pocketed funders. Although their absence could be a result of factors other than financial woes, their apparent inability to continue raise questions about relying solely on philanthropic support.

Earned revenue most likely would be an important factor in any sustainable public interest web GIS project. Some projects are exploring subscription-based strategies to earn revenue. PolicyMap, for example, provides a basic level of mapping service free of charge but offers capabilities such as saving search results and uploading and mapping the user's own data only to fee-paying subscribers. It will be interesting to see whether subscriptions will be a significant source of funding and, even if so, whether subscriptions will be the most important source of earned revenue. Healthy City has been successful so far in earning consulting revenue from providing technical assistance to foundations and public agencies. This contract revenue helps fund the maintenance and improvement of the free HealthyCity.org publicly accessible site and, importantly, that also underwrites providing the same level of functionality to free users that Healthy City uses for its consulting clients.

However, the quest for earned revenue raises several tensions that sponsors must manage. Public interest web GIS sponsors must balance, among others, (i) providing good value to paying customers; (ii) supporting community residents and advocates with powerful functionality that is free or subsidized to an affordable price; (iii) keeping faith with current and attracting future data partners, who typically are unpaid (as yet); and (iv) abiding by their licensing agreements and fee schedules with proprietary providers of demographic, geographic, and other data. Finding the right balance of service to users, paying or not, and the right mix of contributed and earned revenue will not be easy.

¹⁸ This is a result of a number of factors such as the belief widely held by foundations that a grantee with a well-executed strategy should be able to attract other funders to replace initial funders; the dominant practice of restricting the use of grant funds for specific purposes, which often must be new or distinct in some fashion (thus constraining the use of resources to maintain and update existing operations); and a preference on the part of many foundations to be part of creating something new.

¹⁹ The final draft of this article was prepared in June 2009. DataPlace and Neighborhood Knowledge California have been inaccessible since February 2009, if not longer.

How Open Should Web GIS Be?

A key question the web GIS field will need to address is what are, or should be, recommended practices regarding openness of programming, geo-coding, and data accessibility?

The values of the open source movement are increasingly influential, and their impact is perhaps greatest in people's growing expectations that they should be able to access data from those who have it and see and manipulate the code from those who offer access to data through GIS. For advocates concerned with improving health policy, openness and access to health-related data (with adequate protection for the privacy of individuals) is a strongly held value, and a similar ethic sometimes holds in the research community. The public health research and policy worlds are fairly small communities, populated by people with similar credentials and methods of practice. Sponsors of future "open circuit" web GIS sites on health or other public interest data should be prepared to respond to demands for access to their data from people from different circles who may not share their understanding and customs regarding data sharing. (For example, at the May 2008 NetSquared²⁰ conference, admittedly a self-selected group of technologically sophisticated people, several participants asked Healthy City why it would not throw open access not just to its programming, but also to its data²¹.)

The rapid growth in the power of technology, not just open source values, also has created increasing expectations that different programs, websites, and systems should work well together. This expectation is strong and will only grow. Truly common data standards and full interoperability are probably too much to hope for, but we should see a continued trend toward greater compatibility among different web GIS tools, whether through APIs, widgets, data collaboratives²² and common standards, and more. Challenges this trend will confront will include how to convey indicators of the source, reliability, time range and geographic aspects of data pulled from different websites and projects and how to extrapolate valid comparisons. (For example, imagine the issues involved in seeking to put data on disease morbidity from a national map base platform from one year together with data at the municipal or neighborhood level from a different year.)

²⁰ NetSquared is an annual competition for web-based design of tools for social benefit sponsored by TechSoupGlobal (formerly Compumentor); a full description is available at www.netsquared.org/about.

²¹ Healthy City's response was that most of the information is owned by its data partners, so it had no right to give access directly to those data, and that it is open to working with new collaborative partners and may be willing to share code with trusted partners but not the entire world.

²² For one promising example, see the Open Indicators Consortium led by William Mass and George Grinstein from University of Massachusetts, Lowell (<http://weblab.cs.uml.edu/ivpr/micoviz>).

Whence Google?: The Future Environment for Web GIS

As open source GIS, on one hand, and Google, on the other (much bigger) hand, continue to develop their powers, the focus for web GIS sites will shift more toward strategy and to how a tool connects with users and away from an occupation with technical innovations. “Google will put us all out of the technology business, eventually,” John Kim, director of Healthy City, has observed. That may be a good thing, if it means advocates can spend more energy analyzing data rather than building systems. For sites that would offer more intensive functions and deeper data, open source GIS may be a better bet than Google, as yet. Sponsors may not want to rely on a user interface or functionality that Google could change at any time, for example, especially given the importance of usability that is well tailored to a particular audience.²³ Open source GIS solutions likely still will require web GIS tool sponsors to have access to a fair amount of technical sophistication, but open source GIS innovations should become more widely dispersed and availability of outsourced expertise or services “in the cloud” should increase.

Another important factor will be mobile technology. Outside the United States, more people access the Internet through their mobile phones and other handhelds than through desktops, laptops, or netbooks, and accessing the web through mobile technology is a growing trend in the United States, too. This opens some great possibilities for two-way data flow (crowd-sourcing, web 2.0).

Realizing the Potential Power of Web GIS

Web GIS tools have tremendous potential to advance equity in health and other fields. Web GIS can help community members, and advocates, planners, funders, and others working with them, to add residents’ on-the-ground knowledge to “official” data and to make their case to policymakers and judges. Web GIS can help level the playing field by democratizing access to data and allowing analysis and presentation of data in a form that once required the deep resources of a university or large business or media organization. Web GIS can help diverse and conflicted groups of stakeholders arrive at a common understanding of a problem, which is an indispensable first step to developing shared solutions. As we described previously, web GIS has the power to help break down unexamined “mental maps” that people bring with them, align the frame of vision of elites with those of grassroots community members, parse complex problems into manageable chunks, support facilitated discussions, and encourage development of coalitions and partnerships.

²³ Among other more geeky reasons, some sponsors may balk at the fact that currently Google does not allow continuous zoom, which limits the ability of users to choose exactly the scope they wish to see.

For these and many other reasons, the advent of web-based GIS tools presents great potential power for good. Whether this potential is realized for a particular community or issue, however, will depend much less on technology than on how people in affected communities are involved. No matter how powerful or pretty they may be, web GIS tools that do not have well-developed strategies for engaging community members and advocates will be, in our view, largely useless. The values, orientation, and credibility of a web GIS project's sponsor will be critical factors in developing and implementing a successful strategy. For example, a web GIS sponsor who wants to be most helpful to groups advocating for health equity would need to place a high priority on developing authentic, trustworthy relationships with those groups. Such a commitment likely would show in the design of the site and the selection of staff who can both meet the requirements of highest quality data analysis and visualization, on one hand, and work closely with advocates and community members with very disparate skill levels on the other. They will need to be experts in technology who are in the people business, not people who are experts in the technology field.

Finally, finding a mix of services and revenue that enable them to sustain their work over the long term likely will be a challenge for even the best-designed public interest web GIS projects. Advances in technology may drive down the costs of software and hardware and perhaps even of data acquisition, but the indispensable asset for web GIS advocacy projects will be the kind of people described here. Although each such person may not be overly expensive, the path to greater impact runs through adding more of that human capital, which builds in a lower margin on earned revenue and adds a cost factor that philanthropic and government funders scrutinize closely.

Attachment A: References

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