Web-Based GIS Applications for Planners:
A Practical Reference

Compiled and Edited by
Aslı Göçmen and Adam Levine

Extension Report 12-02
Department of Urban and Regional Planning
August 2012
Introduction

The convergence of Geographic Information Systems (GIS) and online technology has led to a proliferation of easily accessible yet surprisingly powerful web-based mapping applications. These tools can help planners visualize, analyze, and share information on a wide range of topics. While these capabilities were previously reserved for highly skilled GIS technicians, today, any practitioner with access to the internet can easily produce attractive, informative maps on a wide range issues related to housing, transportation, the environment, and more. This document provides a practical overview of useful web-based GIS applications.

This resource is tailored to the needs of planners and those in planning-related professions. Although online GIS and mapping applications can support a seemingly endless variety of topics, the field of planning has a special relationship with the display and analysis of spatial information. Planners must be able to convey where and to what degree their plans will affect the built environment and conduct analysis on spatial information – tasks intrinsically suited to the use of GIS and mapping tools.

The tools included here are classified by the scope of their application as either national/international, Wisconsin-specific, or innovative tools designed for other regions. Descriptions of each application include the website at which the tool can be accessed, the name of the provider, the field of planning the tool addresses, a description of its functionality, an explanation of how to use the tool, and the data source the tool uses. Finally, a matrix at the end of the document shows export options and other considerations of the tools described here. We hope this information will facilitate the use of these tools and shed light on their applicability and credibility in professional and research-based contexts.

We hope you find these tools useful and enjoy exploring the exciting diversity of online GIS and mapping applications!
Section 1: National and International Applications

The applications in this section are designed for either national or international use. While some highlight specific cities or regions, others can display information for any given location.
HUD Community Planning and Development (CPD) Maps

Website:  
http://egis.hud.gov/cpdmaps/

Provider: U.S. Department of Housing and Urban Development (HUD)

Category: Housing

Description: This site provides access to information related to the consolidated planning process and housing needs assessments. The application allows users to view existing HUD grant programs, including CDBG, HOME, HOPWA, and ESG activities. Available data layers also include a wide range of indicators related to community and economic development.

How to Use: The “Guide Me” wizard that appears on the main page helps users access and display desired data layers. Follow the prompts to add desired information to the map. Be aware that this guide includes many optional categories. Click the “Finish” button to view the map.

Users can add additional data layers using the “Map Selection” icon at the top left of the screen. This drop down menu displays all available data layers. The globe icon next to each data layer allows users to manipulate the display of that layer. The instructions tab at the top of the “Guide Me” wizard provides more detailed instructions on the use of this application.

Data Source: U.S. Department of Housing and Urban Development

Note: HUD provides access to many other programs and more information through its eGIS Portal at http://egis.hud.gov/. The CPD mapping application is just one of many web-based GIS tools HUD provides.
Zillow

Website: www.zillow.com

Provider: Zillow

Category: Housing

Description: Zillow provides information on sales price, asking price, and characteristics of homes in a given location. This application interfaces with other online tools such as Walkscore and Google Streetview to provide a more comprehensive picture of homes’ value and amenities. Zillow also uses a proprietary formula to provide an unofficial estimate of the value of a given address. This “Zestimate” gives homeowners “a starting point in figuring out the true value of a house.”

How to use: Enter address, neighborhood, or city into address bar at the top of the homepage. Click any property on the resulting map to view available information.

Data source: County housing information
**H+T Affordability Index**

**Website:**
http://htaindex.cnt.org/map/

**Provider:** Center for Neighborhood Technology (CNT), a national, interdisciplinary think tank focusing on urban sustainability.

**Category:** Housing and Transportation

**Description:** The H+T (housing and transportation) affordability index calculates the average cost of both housing and transportation within a given census block. Using this combined value, CNT defines an affordable neighborhood as one in which housing and transportation costs make up less than 45% of area median income. The mapping portion of this application displays side-by-side maps showing the distribution of affordable housing using standard indicators compared with the H+T affordability definition.

**Data Source:** American Community Survey 5-year estimates. Household variables (household income, household size, number of workers) averaged at block group level, neighborhood variables (residential density, job density, block size, transit connectivity, commute time) provided at census block level.

**To Use:** Enter a city, county, or region into the search bar at the top.
Abogo

**Website:** [http://abogo.cnt.org/](http://abogo.cnt.org/)

**Provider:** Center for Neighborhood Technology

**Category:** Housing and transportation

**Description:** Abogo uses the CNT’s Housing and Transportation (H+T) Affordability Index to overlay cost of living information onto a Google Maps interface for individual, user-entered addresses. This tool provides a more comprehensive picture of the cost of living in a given location than just the price of housing. The application uses a color ramp to visualize the total cost of living in a given location. It also provides an estimate of monthly CO₂ emissions a resident of a given location would generate.

**To Use:** Simply enter address in address bar at the top of the home page.

**Note:** In many rural locations, this application displays cost of living information but does not generate the corresponding map.

**Data source:** American Community Survey 5-year estimates. Household variables (household income, household size, number of workers) averaged at block group level, neighborhood variables (residential density, job density, block size, transit connectivity, commute time) provided at census block level.
**TOD Database**

**Website:** [http://toddata.cnt.org/](http://toddata.cnt.org/)

**Provider:** Center for Transit Oriented Development

**Category:** Land use and transportation

**Description:** The Transit Oriented Development Database creates demographic reports for businesses and residents within a defined radius of public transit stations. The developers explain that “available data includes household and demographic data, residence and workplace characteristics, workforce indicators, journey to work information and housing and transportation affordability indicators.” The application allows users to view maps of station and transit lines and generate demographic reports about the surrounding areas. This information is aggregated from various geographic extents to a quarter mile or half mile radius.

**How to Use:** Click “Browse the database.” Select a region from the popup menu on the first screen. After selecting a region, users can view the transit agencies, lines, and stations within the defined area. Select any of the available agencies to view either existing or proposed transit lines.


Clicking the blue box next to a station brings up a box that lists default statistics within a designated radius of that station. Users can select either a quarter mile or half mile radius. This box also allows users to view the surrounds using Google Streetview. Select data to report using the “data” button. Reports can be generated for an individual station or the transit system as a whole.
Website: www.mapnificent.net

Provider: Mapnificent

Category: Public Transportation

Description: This application identifies the geographic extent a passenger can get to using public transit within a specified amount of time from a specific location in a given city.

How to use: Begin by selecting your city of interest from a map of the world on the home page. Next, drag and drop the pin on a specific location. Finally, select the desired commute time using the slider at the bottom of the page. The highlighted areas are those that are accessible by public transportation from the selected origin within the specified commute time.

Data Source: Google General Transit Feed Specification (GTFS), a consolidated database of public transportation schedules and geographic information.

Smaller villages and towns as well as many international cities are not accessible through this application.
**Walk Score**

**Website:** [www.walkscore.com](http://www.walkscore.com)

**Provider:** Walk Score

**Category:** Pedestrian accessibility

**Description:** This application calculates a walkability score for a given location based on the number of destinations (e.g., restaurants, parks, grocery stores) within walking distance. Closer destinations are weighted more heavily than further destinations. Other applications on the site include a tool to analyze your commute and a tool that calculates your housing and transportation costs.

The application also contains a feature that interfaces with Craigslist to identify available apartments offering desired amenities. The filters on this feature include preferred commute time by various modes of transportation, neighborhoods, nearby commercial destinations, and price range. Users can adjust the acceptable range for each of these variables to find ideal housing.

**How to use:** Enter an address into the search bar on the main page. To access the commute analyzer, click on the “Your Commute” tab and enter the address of your workplace. This page also includes the housing and transportation calculator function.

**Data source:** Google, Education.com, Open Street Map, and Localeze, transit agencies
Bike Score

Website: [www.walkscore.com/bike/](http://www.walkscore.com/bike/)

Provider: Walk Score

Category: Bicycle accessibility

Description: Like Walk Score, Bike Score measures how good a location is for biking. The value is calculated based on the bike lanes, hills, destinations, and number of bike commuters in the region – all of which are weighted equally in the algorithm. Unlike Walk Score, however, Bike Score calculates the value for the city as whole.

How to Use: Click on any of the “Most Bikeable Cities” on the main page to view the spatial distribution of bike scores in the area. Six more cities are available under the methodology link at the bottom of the page. The blue boxes beneath the map allow users to view the spatial distribution of the individual variables that combine to form the complete “Bike Score.”

Data Source: City governments, USGS National Elevation Data, U.S. Census commuting data, Street Smart Walk Score
Bike Share Map

Website: http://bikes.oobrien.com

Provider: Oliver O’Brien, University College London

Category: Bicycle transportation

Description: The Bike Share Map shows the level of use of bike share facilities throughout a given city. The map displays real time accounts of the number of bicycles at a given station and the percent occupancy of that station. An animation feature shows the change in system activity over the past 24 hour period. This data provides insight into bicycle transportation issues such as origin-destination, trip frequency, and popularity of stations.

How to use: Select a city from the dropdown menu at the top of the homepage. To access the animation feature, click “animation” on the toolbar at the bottom and select “start animation.”

Data Source: Participating bike share system websites
NEPAssist

Website: http://nepassisttool.epa.gov/nepassist/entry.aspx

Provider: U.S. Environmental Protection Agency (EPA)

Category: Environmental Planning

Description: NEPAssist is a web-mapping application designed to assist in reviewing environmental issues related to a particular plan or project. The application uses real time data based on the EPA’s GIS database and web services to assist in screening a wide variety of environmental concerns within a defined area of interest.

How to Use: Enter address, ZIP code, city, county, watershed, or a pair of coordinates in the search box to designate study area. The following screen will display a map of the selected area. Users can zoom or pan using the toolbar on the left side of the screen. The dropdown menu on the right side of the screen allows users to select various data layers related to environmental management including location of brownfields, impacted bodies of water, and areas of concentrated air pollution.

Data Source: U.S. Environmental Protection Agency
Open PV Project

Website: http://openpv.nrel.gov/

Provider: National Renewable Energy Laboratory (NREL) – the nation’s primary laboratory for renewable energy and energy efficiency research and development.

Category: Renewable energy

Description: The Open PV Project generates maps displaying the number of PV installations, their cost, and production capacity. The site contains three map views of the data, including choropleth maps at the state and county levels, and graduated symbols representing the number, installed capacity, and average cost of PV installations by zip code. Data used in this application is available for download as .csv files.

To Use: Click any of the scrolling graphics on the right side of the screen. On the following page, select the “Market Mapper” application.

From there, the site contains three map views of the data, including choropleth maps at the state and county levels, and graduated symbols representing PV installs by zip code. To navigate between these views, click on the state or county to zoom in, and the reverse arrow button at the bottom right of the screen to go to the previous view.

Data source: Individuals submissions and state renewable energy programs; verified by NREL staff
# Earthquake Probability Mapping

**Website:**

**Provider:** United States Geological Survey (USGS)

**Category:** Risk management

**Description:** The Earthquake Probability Mapping tool calculates the probability of an earthquake of a certain magnitude occurring in a given location within a specified period of time. The application then generates a map showing the probability of an earthquake occurring within a 50 km radius of the given location.

**How to Use:** The home page of the application asks the user to specify three variables: location, time span, and magnitude. Location can be input as either latitude and longitude or zip code. The time span category asks for number of years. The greater the time span, the greater the probability will be of an earthquake occurring. Finally, the magnitude category asks for the minimum magnitude earthquake that should be considered in the calculation. The lower the magnitude, the greater the probability will be.

**Data Source:** USGS-National Seismic Hazard Mapping Project (NSHMP)

**Note:** As with all probability modeling tools, the accuracy of this application increases with greater time periods. This tool, therefore, should not be used to predict short term probabilities.
Mapping for Everyone – Demographic Maps

Website: [http://mapapps.esri.com/create-map/index.html](http://mapapps.esri.com/create-map/index.html)

Provider: ESRI

Category: General mapping

Description: ESRI provides a simple, user-friendly platform to display select demographic data layers at the click of a mouse. This application allows users to quickly create maps showing a variety of demographic data layers. These maps can be shared as links or embedded in other websites.

How to Use: Begin by entering a location in the first box beneath the map. Next, unselect the box labeled “Hide U.S. Demographics” located under “Select a demographics layer.” Use the dropdown menu at the top right of the map to select the demographics layer you wish to display. Note that the dropdown menu within the “Select a demographics layer” box beneath the map does not affect the displayed information. Zoom in or out to display demographic information at different geographic extents. The application will determine the appropriate extent for a given zoom level.

Finally, resize the map using either the dimensions boxes beneath the map or by changing the borders directly. The final map can be shared as a link or embedded within a website.

Data Source: N/A

Note: ESRI hosts a number of other mapping applications on their Mapping for Everybody site at [http://www.esri.com/mapping-for-everyone/index.html](http://www.esri.com/mapping-for-everyone/index.html). Other mapping options include: proximity to nuclear facilities, severe weather, and global incidents.
How Big Really?

**Website:** [www.howbigreally.com](http://www.howbigreally.com)

**Provider:** BBC

**Category:** Visualization, comparison

**Description:** How Big Really allows users to superimpose the shape and geographic extent of natural disasters, current events, historical places, and other subjects with a defined size and shape over a familiar landscape. This simple visualization tool helps users understand the size of these phenomena by comparing them to a geographic extent with which they are familiar.

**How to Use:** Select an event from one of the various categories on the home page. The most relevant category for planning-related uses is “natural disasters.” Next, enter the zipcode of a familiar place into the address bar.

**Data source:** Images generated from scale illustrations of historical events collected from library and on-line resources.
Section 2: Wisconsin Applications

These applications are specifically designed for use within the state of Wisconsin.
Wisconsin DNR WebView

Website:  
http://dnrmaps.wisconsin.gov/imf/imf.jsp?site=webview

Provider: Wisconsin Department of Natural Resources

Category: Environmental planning

Description: WebView is an interactive map viewer application provided by the Wisconsin Department of Natural Resources. The application allows users to map various geospatial datasets. Categories of available datasets include: political boundaries, land descriptions and cadastral, recreation and trails, transportation, inland water resources, biologic and ecologic information, forests and landcover, imagery and basemaps, and elevation and derived products. In addition, the application allows users to insert text, symbols, lines, and polygons. Data displayed in this application can be exported as an excel spreadsheet or ArcGIS shapefile.

How to Use: The application displays an interactive map on the right side of the screen. Standard navigation tools allow the user to pan or zoom to their desired location. In addition, the “Find Location” tab along the top of the screen allows users to search for a specific jurisdiction or location. The layers tab provides access to all available data sets. These layers can be turned on or off by selecting the box next to the layer. The “Advanced Tools” button at the top toggles between the standard tool bar and more interactive tools.

Data Source: Wisconsin Department of Natural Resources, USGS

Note: The Wisconsin DNR provides online mapping access to many other programs and information layers. All WiDNR online mapping applications can be accessed at http://dnr.wi.gov/maps/gis/applist.html. Of these applications, all except the Boat and Developed Shore Fishing Access Sites, DNR Managed Lands, and Stewardship Grant Acquisitions applications use the same format and navigation tools as WebView. Of these, all except the Air Monitoring Network, Chronic Wasting Disease, and Topographic Map applications include the advanced tools that allow users to download the map as a shapefile.
## Wisconsin Historic Aerial Image (WHAI) Finder

**Website:**  
[http://maps.sco.wisc.edu/WHAIFinder/#](http://maps.sco.wisc.edu/WHAIFinder/#)

**Provider:** Wisconsin State Cartographer’s Office

**Category:** Historic Preservation

**Description:** The WHAI Finder is a free interactive web-based map with access to over 38,000 historic aerial images of Wisconsin from 1937-1941. Each image was digitized and added to the web interface with its accompanying spatial and attribute data. The result is an easy-to-use reference tool, data source, and archive of the first comprehensive flight of Wisconsin in digital form. The images can be downloaded as TIFF images in three different resolutions and added to a GIS, although additional georeferencing is required to perform spatial analysis.

**How to Use:** Navigate to your location of interest using the Location Search on the left side of the screen. Click the select tool to view historic photos in that area. Click on the red dots to view photos.

To view historic photos over the basemap, select “View on Map.” Use the Quick Download buttons to download the map.

**Data Source:** 1937-1941 aerial images
Section 3: Other Places

These applications were created specifically for cities and regions outside the state of Wisconsin. While these may not be immediately useful to local planners and officials, they provide interesting examples of innovative uses of web-based GIS applications.
**SF Park**

**Website:** [www.sfpark.org](http://www.sfpark.org)

**Provider:** San Francisco Municipal Transit Authority

**Category:** Transportation

**Description:** SF Park provides real-time information on availability and pricing of parking in San Francisco. The application also shows the cost of parking in different parts of the city which adjust in response to the level of demand at any given time.

**How to Use:** The homepage displays an interactive map of San Francisco, showing the availability of parking. Users can zoom and pan to a specific location or select by neighborhood. The “rates” button at the bottom of the screen toggles the map view to show the cost of parking in different locations.

**Data source:** In-ground sensors wirelessly transmit parking occupancy information to a central data feed at the San Francisco Municipal Transit Authority.
| Website: | [http://envisioningdevelopment.net/map](http://envisioningdevelopment.net/map) |
| Provider: | Center for Urban Pedagogy |
| Category: | Housing |

**Description:** The Affordable Housing Flash Map is an interactive map of New York City that seeks to answer two fundamental questions: Who lives here? And who can afford to live here? In this application, “who” refers to the number of households at different income levels in a given neighborhood. “Here” refers to the user-specified neighborhood of interest. Finally, “afford” refers to the income level that would require less than 30% of monthly income to be spent on housing. Taken together, this application shows income distribution and housing affordability across different neighborhoods in New York City.

**How to Use:** Click on a neighborhood to view housing and demographic statistics in that area. Click on the “Who can afford to live here?” link and use the sliders at the bottom of the page to view how different rent levels affect the potential residents.

**Data Source:** U.S. Census 2000

**Note:** This application offers a creative approach to mapping affordability issues within a city. As is often the case with innovative techniques, however, the Affordable Housing Flash Map exhibits a number of important limitations: (1) The application’s algorithm assumes all households to be comprised of four family members, and does not account for variation in the makeup of households. (2) The application lacks information about actual housing prices in neighborhoods. Instead, users can pick rent prices arbitrarily and the application shows how many families would not be able to afford housing at that price; it shows no information about how many families cannot afford housing at the prices they pay.
## Export options and other considerations

<table>
<thead>
<tr>
<th>Application</th>
<th>Export to .shp</th>
<th>Export as .pdf, .jpg, etc.</th>
<th>Export as link</th>
<th>Export as spreadsheet</th>
<th>Up-to-date data</th>
<th>Location (L) vs. spatial analysis (A)</th>
<th>Potentially slow data speeds</th>
<th>Wisconsin availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>HUD CPD Maps*</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>L,A</td>
<td>x</td>
<td></td>
<td>Complete</td>
</tr>
<tr>
<td>Zillow</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Complete</td>
</tr>
<tr>
<td>H+T Affordability Index</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>A</td>
<td></td>
<td>Limited</td>
</tr>
<tr>
<td>Abogo</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td>A</td>
<td></td>
<td>Limited</td>
</tr>
<tr>
<td>TOD Database</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>L,A</td>
<td></td>
<td>Limited</td>
</tr>
<tr>
<td>Mapnificent</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td>A</td>
<td></td>
<td>Limited</td>
</tr>
<tr>
<td>Walk Score</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>A</td>
<td></td>
<td>Complete</td>
</tr>
<tr>
<td>Bike Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Limited</td>
</tr>
<tr>
<td>Bike Share Map</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>L</td>
<td></td>
<td>Limited</td>
</tr>
<tr>
<td>NEPAassist</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td>L</td>
<td></td>
<td>Complete</td>
</tr>
<tr>
<td>Open PV Project</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td>Complete</td>
</tr>
<tr>
<td>Earthquake Probability Mapping</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td>A</td>
<td></td>
<td>Complete</td>
</tr>
<tr>
<td>Mapping for Everyone - Demographic Maps*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>N/A</td>
<td>A</td>
<td>Complete</td>
</tr>
<tr>
<td>How Big Really?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Complete</td>
</tr>
<tr>
<td>WiDNR WebView*</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td>L,A</td>
<td>x</td>
<td>Complete</td>
</tr>
<tr>
<td>WHAI Finder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Complete</td>
</tr>
<tr>
<td>SF Park</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>L,A</td>
<td></td>
<td>None</td>
</tr>
<tr>
<td>Affordable Housing Flash Map</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td>None</td>
</tr>
</tbody>
</table>

*Other applications from these providers may have different export options and limitations
Acknowledgements

Applications presented in this document are largely adapted from student coursework in Professor Aslı Göçmen’s course, “Applications of GIS in Planning” at the University of Wisconsin – Madison, Department of Urban and Regional Planning between 2010 and 2011. Special thanks to Laura Detert, Jacob Forman, Liz Heyman, Scott Janowiak, Dan Kleinmaier, Amy Klusmeier, Jessica Moths, Austin Outhavong, Jin Park, Sonja Reichertz, Lara Rosen, and Robert Sommers for their contributions. Professor Göçmen and Project Assistant, Adam Levine, contributed additional content and editing. While we made an effort to provide a useful, inclusive manual, we acknowledge that this document may not be comprehensive, and a number of potentially relevant applications may have been unintentionally omitted.

Please direct any questions or suggestions to Aslı Göçmen (gocmen@wisc.edu, 608-265-0789).