

# healthyGIS

ESRI • Summer 2008

GIS for Health and Human Services

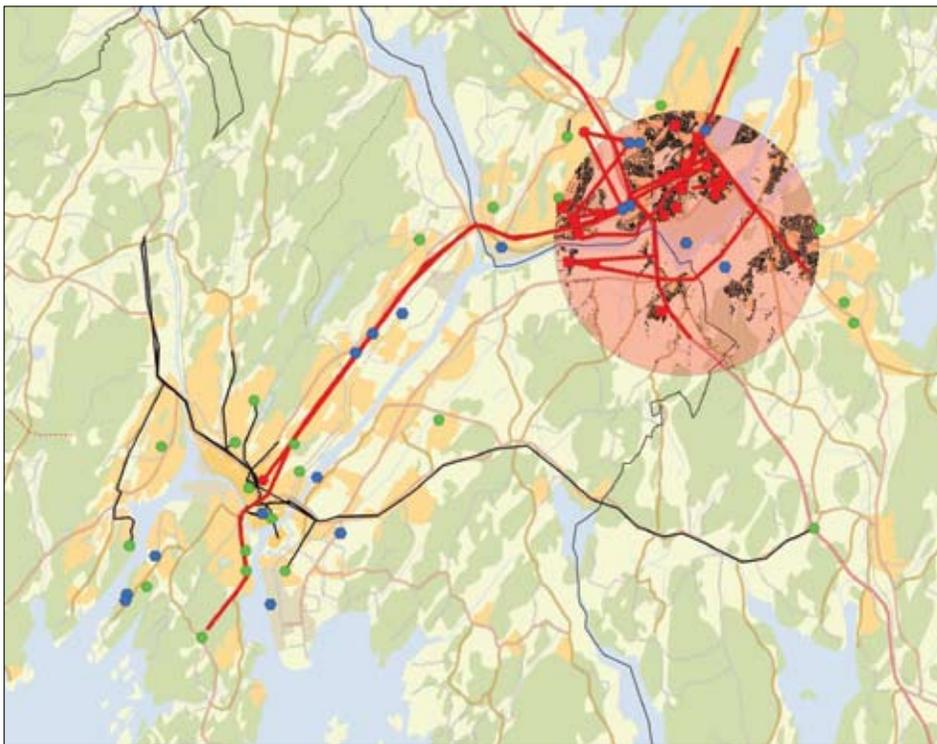
## Spatial Analysis Gives Insight into Source of Legionnaires' Disease

By Arleen Engeset, Key Account Manager, Geodata AS, and Tore Jensen,

Technical Specialist, Geodata AS

When a hospital in Norway alerted national health authorities about an outbreak of Legionnaires' disease, authorities reacted quickly to find the disease source. They used geographic information system (GIS) technology tools for data mapping, time series analysis, and visualization to analyze more than 50 cases of the infection. Although infected patients were

scattered over a large area with no places visited in common, the tools provided by ESRI's ArcGIS software helped reveal a unique and unusual source of dispersal for the bacteria—a commercial air scrubber that released infected water droplets into the air. Geodata AS, ESRI's distributor in Norway, provided consulting services for mapping and finding the probable



An analysis of a three-kilometer buffer from the air scrubber (blue symbol in the middle) shows Legionella patients residing within the buffer (red boxes) and infected patients who live outside the buffer (red dots) and traveled through (red line) the buffer zone. Green dots show infected patients who live outside the buffer zone and have not traveled through it.

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source of the outbreak based on GIS analysis.

Legionnaires' disease is a severe form of pneumonia caused by the *Legionella pneumophila* bacterium. The bacterium is most commonly transmitted by airborne droplets from contaminated water sources, such as cooling towers used in industrial systems, and is not readily transmitted from one person to another.

The Legionella epidemic took place in May 2005 in the neighboring municipalities of Fredrikstad and Sarpsborg. Together, the two cities form the fifth-largest urban area in Norway, with a total population of about 121,000. The outbreak was one of the biggest health crisis situations that Norwegian municipalities had dealt with in recent years.

Time was of the essence to prevent more cases, but multiple and complex questions needed to be answered before the contaminated source could be identified. How many people were infected? Where did they live, travel, or work, and what were the most likely sources of infection? Control of the situation depended on the speed at which these and other questions could be answered, mapped, and analyzed.

Data collection methods conducted by health department personnel included interviews with infected patients and investigation of potential sources including 23 companies with cooling towers. Data collected for mapping in ArcGIS

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## Spatial Analysis Gives Insight into Source of Legionnaires' Disease

ArcInfo included

- Infected patients' places of residence
- Locations of cooling towers and other possible sources of infection
- Infected patients' movements over a 12-day period (280 routes)
- Wind and weather conditions

"GIS was helpful for this task, because digital mapping presents large data volumes in a simple and well-ordered manner, which is critical for the actual analysis itself," explains Øivind Werner-Johansen, director of health for the city and municipality of Sarpsborg. Other data included basemaps at a scale of 1:250,000 and demographic layers. The ArcGIS Tracking Analyst extension provided tools for analysis of time series data such as patient movement and wind patterns.

Next, case rates and risk ratios among people living within various radii of each potential source were calculated. The analysis was standard buffer/overlay analysis using buffer increments of 500 meters combined with the use of Tracking Analyst to show wind speed and direc-

tion. ModelBuilder contributed to this process by providing a template for running the buffer increments. The highest risk factor was found for those living within one kilometer of a commercial air scrubber, an industrial pollution control device that uses water to clean dust particles from the air. Inspection of the scrubber confirmed the presence of the infectious bacteria.

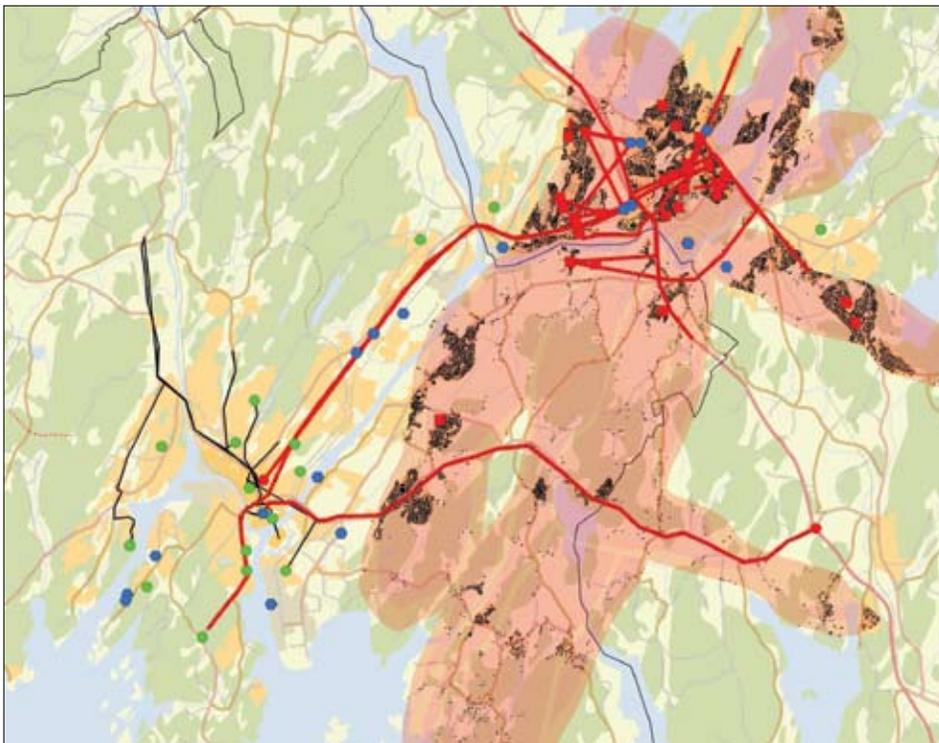
"The visualization that the digital map made possible is unique, and its contribution to the many decision-making processes we went through is beyond question," says Svein Rønsen, chief medical officer of the city and municipality of Fredrikstad. Both Werner-Johansen and Rønsen emphasize that effective municipal contingency plans and established joint procedures were critical for the efficient crisis management around the Legionella outbreak. The addition of GIS analysis helped solve the problem.

The two experienced disease fighters are pleased that the two municipalities now have GIS-based public-health and disease-control resources available. For small municipalities with few resources, Rønsen and Werner-Johansen

recommend building a cooperative agreement among several local authorities to build GIS capabilities.

Successful use of GIS to resolve the Legionella outbreak also convinced Preben Aavitsland, departmental director, Division of Infectious Disease Control, Norwegian Institute of Public Health, of the benefits to be gained from GIS. Aavitsland describes the tool as being indispensable for reacting to similar situations in the future and advocates further strengthening of GIS expertise among the division's emergency preparedness team. Concludes Aavitsland, "Using GIS, we are able to quickly analyze large volumes of data, the overall picture becomes clear, and the results are easier to interpret."

For more information, contact Tore Jensen, Geodata AS, at [tore.jensen@geodata.no](mailto:tore.jensen@geodata.no) or visit [www.geodata.no](http://www.geodata.no). A journal article on this project was published in the January 1, 2008, issue of *Clinical Infectious Diseases* with the title "An outbreak of legionnaires disease caused by long-distance spread from an industrial air scrubber in Sarpsborg, Norway," by authors K. Nygård, Ø. Werner-Johansen, S. Rønsen, D. A. Caugant, Ø. Simonsen, A. Kanestrøm, E. Ask, J. Ringstad, R. Ødegård, T. Jensen, T. Krogh, E. A. Høyby, E. Ragnhildstveit, I. S. Aaberge, and P. Aavitsland. An abstract of the article is available at [www.pubmed.gov](http://www.pubmed.gov) by searching for Nygard Werner-Johansen.



The footprint plume of contaminated air from the air scrubber was created based on hourly weather data. The result shows which cases are within the footprint (red boxes) and infected patients outside the footprint (red dots) who have traveled through it (red line). Green dots show infected patients who have not entered the footprint plume.

### Software

ArcGIS ArcInfo  
ModelBuilder  
Tracking Analyst

### Participants

Fredrikstad Hospital  
University Hospital of North Norway  
Telelab (bacteria identification)  
Norwegian Institute of Public Health  
([www.fhi.no/eway/?pid=238](http://www.fhi.no/eway/?pid=238))  
Norwegian Institute for Air Research  
([www.nilu.no/index.cfm?lan\\_id=3](http://www.nilu.no/index.cfm?lan_id=3))



## From My View . . .

By Bill Davenhall  
Global Manager  
Health and Human Services  
ESRI

### GIS: Helping Shape Global Health One Nation at a Time, Part II

The adoption of any information technology is ultimately a function of its ability to produce results such as creating evidence, identifying inequities, better informing decision makers, and aiding more responsive actions and interventions to protect human health.

Today, more than 90 national health ministries located across every continent license some type of ESRI technology, from ArcGIS Desktop to the enterprise enabler ArcGIS Server. In developing nations where modern information technology is resource challenged, ESRI software is being deployed in the form of specialty epidemiological software distributed at low or no cost to health professionals through organizations such as the World Health Organization, Pan-American Health Organization, and the U.S. Centers for Disease Control and Prevention.

As GIS technology continues to enjoy wider adoption in health and human service organizations across all types of government and private health care organizations, knowledge about our communities—especially how our local environments impact our personal health—will command greater attention by community leaders everywhere. The ability to respond to emergencies and prepare citizens for disasters such as pandemics cannot be overlooked or under-resourced in regard to information systems.

Global health begins at home. The obligation of nations to help citizens have a safe, healthy passage through life is neither a small nor simple matter. Dedication by health professionals in building effective systems and practices must be supported by evidence and results. It also takes knowledgeable people and progressive technologies to promote confidence in the information that is communicated.

In my opinion, delivering on the goal of global health requires unrelenting devotion to leveraging today's knowledge and technologies to mitigate the problems we face today. GIS will certainly play a large role in moving communities and their nations forward, and when we move forward, everyone everywhere has a better chance to attain the ubiquitous health that is so needed in the world.

As always, I encourage your second opinion.

Regards,

## What's New in ArcGIS 9.3

ESRI has designed ArcGIS 9.3 to help users be more productive. The new version better meets technical support issues for ArcGIS Desktop, ArcGIS Server, ArcGIS Engine, ArcGIS Mobile, and geodatabase management.

For more information about ArcGIS, visit [www.esri.com/whatscoming](http://www.esri.com/whatscoming).

**ArcGIS Server 9.3**—Here are just a few of the quality enhancements and new features you will see with ArcGIS Server 9.3:

### New REST and JavaScript APIs

These APIs will dramatically simplify your development experience and enable you to deliver fast and user-friendly mashup GIS Web applications. The JavaScript libraries will also let you embed ArcGIS Server maps, geocoding, and geoprocessing services into Google Maps and Microsoft Virtual Earth.

### New Open Geospatial Consortium, Inc. (OGC), Services Support

Additional support for OGC standards including Web Coverage Service (WCS), Transactional Web Feature Service (WFS-T), and Styled Layer Descriptor (SLD) support for WMS provides you with open and more flexible solutions. KML 2.1 support has also been greatly enhanced and will improve your ability to integrate with virtually all the commonly accepted GIS and IT standards.

### New PostgreSQL Support

This gives you the ability to store and manage spatial information in this open source database system.

### New Collaborative Design Activity (COLLADA) File Support

This furthers your ability to interoperate with industry-standard 3D authoring tools for rich shading and texturing effects.

### Improved Performance

On-demand caching and improved caching geoprocessing tools will allow you to create faster mapping services. New image services will let you quickly publish imagery that is optimized for the Web.

## Notable Links

[repository.upenn.edu/cgi/viewcontent.cgi?article=1088&context=spp\\_papers](http://repository.upenn.edu/cgi/viewcontent.cgi?article=1088&context=spp_papers)  
Why Social Workers Need Mapping (Amy Hillier, University of Pennsylvania). This article from the *Journal of Social Work Education* outlines how GIS can benefit social work and social work can contribute to GIS development.

[www.census.gov/geo/www/tiger](http://www.census.gov/geo/www/tiger)  
The Census Bureau's geography migration from the TIGER format to the ESRI format is now complete. The Census Bureau announced that TIGER/Line shapefiles are now available for download at its site.

# Children's Affairs Department Delivers Vital Data to Decision Makers Using ArcGIS Server

By Susan Harp, ESRI Writer

The Alabama Department of Children's Affairs (ADCA) brings agencies and communities together to benefit the lives of children all over the state. Primarily concerned with policies and providing support to more than 20 agencies, the department is using GIS technology on its Alabama Resource Management System (ARMS) Web site. Decision makers in agencies, programs, and communities can get the information they need to evaluate community needs and plan and implement solutions. ARMS uses ESRI's ArcGIS Server to enable sharing of enormous amounts of data on the Web and provide interactive and analytic capabilities to Web site visitors.

ADCA exchanges information with foundations, nonprofit groups, and state and federal agencies and provides information to the local advocates and organizations that actively participate in community programs. The GIS-enabled Web site provides a way for nontechnical users to find and select data and interactively visualize, analyze, query, and map it for use in supporting their programs, grant writing, resource identification, and other activities.

"ArcGIS Server has been crucial to building the ARMS system," says Chris McInnish, dep-

uty commissioner, ADCA. "It's a very powerful piece of software." Initially, 12 state agencies contributed funding in the range of \$20,000 to \$30,000 each. McInnish reports that total costs were \$160,000 the first year, \$170,000 the second year, and \$175,000 the third year.

U.S. Space and Rocket Geospatial Training and Application Center, based in Alabama, helped get the project started by identifying and bringing together groups to work on the project. ADCA worked with Teledyne Solutions, Inc., to collect and compile the data and develop report modules. ESRI business partner SICS Consultants, LLC, provided mapping and interface development services. Supporting hardware is hosted through an interagency agreement with the Alabama Criminal Justice Information Center.

ArcGIS Server allows data owners to maintain and protect their own data with a permission management structure that grants entry to the data owner, a defined group of users, or the public. An easy-to-customize browser window supports the creation of menus for navigating, combining information, and producing useful maps and reports that users, including legislators, community-based volunteers, and teach-



Agencies interested in statistics on juvenile court adjudications can download summary charts from the ARMS Web site.

ers, need for activities such as advocacy.

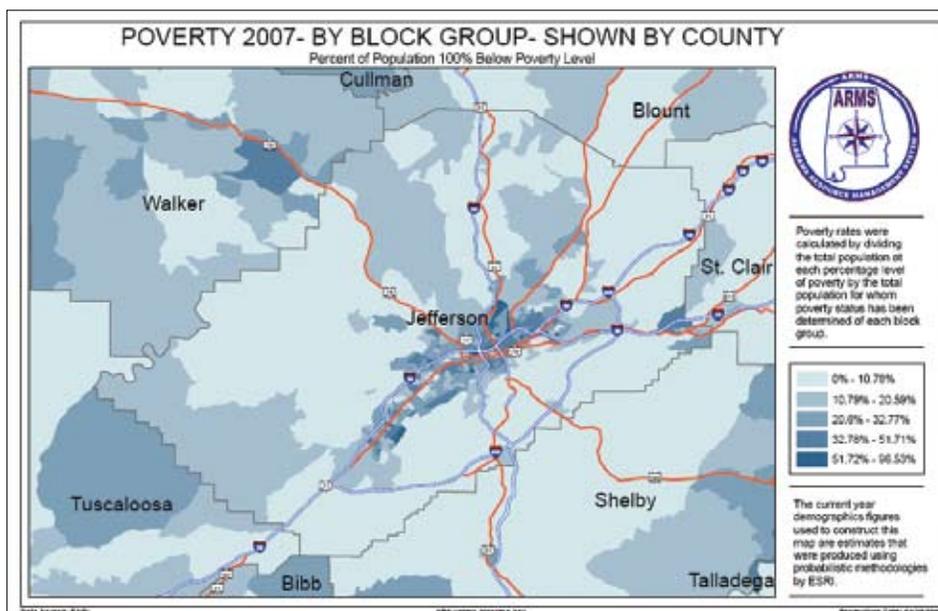
ArcGIS Server also helped solve ADCA's biggest challenge of finding an economical way to manage and share vast amounts of statistical, resource, and funding data in varied formats. The number of map layers has grown to 66,000.

"We have twelve hundred maps just on high school graduation rates for one year," says McInnish. "We are talking tens of thousands of layers of information we need to push out to people. To do that, we needed ArcGIS Server and had to take some very creative ways of looking at things."

Creative thinking came into play when McInnish asked Steve McKinney, president, SICS Consultants, to find a way to extract information relevant to poverty and child services from ESRI's ArcGIS Business Analyst datasets. Business Analyst provides GIS functionality combined with high-quality imagery and demographic, business, and street data that is more commonly used for market research and analysis. SICS worked with personnel from ESRI's Data and Commercial Services and Professional Services groups to identify, extract, and refine relevant social services information available in the ESRI 2007/2012 demographic and Community Tapestry market segment datasets.

In addition, new sources of relevant data were located in various state agencies whose information had not previously been associated with social services or spatial representation.

"Social services data contains a lot of attribute data with very little geographic representation," says McKinney. "This means a lighter load on



A thematic map on poverty levels, available on the ARMS Web site, makes data accessible and provides a visual format for agencies to use in reports and analyses.

# Philadelphia-Area Residents Are Getting CONNECTed through GIS

By Megan Heckert, Avencia Incorporated, and Shelton Mercer III, the Mercer Advisory Group

the spatial engines and more load on the databases managed by Microsoft's SQL Server."

To resolve this issue, SICS worked with the ESRI Professional Services Group to develop an efficient way to manage connectivity between ArcGIS Server and SQL Server. The solution, built using ESRI's ArcObjects in conjunction with Microsoft Visual Studio's ADO.NET, establishes real-time connectivity between ArcGIS Server and SQL Server 2005. (McKinney notes that he sees improved ESRI/Microsoft connectivity supported in his beta version of ArcGIS 9.3.)

The ARMS Web site allows visitors to search for and download more than 1,500 maps from an archive, build maps, search a resource list of social services, access county census summaries, and submit new resource information to ARMS. Registered agencies can log in to their accounts and access shared resources.

"The system is a good example of integrating and representing large amounts of disparate data for social services through GIS and will provide a reference point for the social services community nationwide," concludes McKinney. "It has changed the way state agencies are looking at their data. They are more aware of the value of place in collecting data as well as analyzing it."

In 2007, the ARMS team won an Innovative Alabama Governments Award honorable mention. For more information, contact Chris McInnish at [chris.mcinnish@dca.alabama.gov](mailto:chris.mcinnish@dca.alabama.gov) or Steve McKinney at [steve@sicsconsultants.com](mailto:steve@sicsconsultants.com). To see ARMS in action, visit [arms.alabama.gov](http://arms.alabama.gov).

The Delaware Valley Association for the Education of Young Children (DVAEYC, [www.dvaeyc.org](http://www.dvaeyc.org)) has created a geographically enabled and interactive health and human services directory, CONNECT211 ([www.connect211.org](http://www.connect211.org)). The Web site is a visually coherent arrangement of the region's social services, providing a comprehensive, georeferenced database of child care programs in the Philadelphia area.

DVAEYC is a regional affiliate of the National Association for the Education of Young Children (NAEYC), with a mission to improve educational opportunities for children in southeastern Pennsylvania. The CONNECT211 Web site makes the database accessible to people who use it to perform basic analyses of program locations and assess the extent to which different areas might be saturated or underserved. The search feature enables social service professionals to make child care referrals that make geographic sense for the parents.

One of the challenges of preparing the application was to make its functionality robust and sophisticated enough to serve the needs of social workers and case managers while also being simple enough for the public to use with ease.

The current version of CONNECT211 (originally developed under the name CONNECT Services) expands the scope of the system to include more than 7,000 entries for agencies in the health, family, education and employment, and food and shelter sectors. According to CONNECT project director Shelton Mercer (president of the Mercer Advisory Group and former DVAEYC chief information officer), "The goal of the design was to marry a powerful application engine with a visually appealing, familiar end-user interface. We've achieved that goal and continue to refine CONNECT by gaining feedback from focus groups and individual users."

At the same time, DVAEYC and United Way of Southeastern Pennsylvania (UWSEPA) ([www.uwsepa.org](http://www.uwsepa.org)) made a formal teaming agreement that brings greater resources and reach for CONNECT.

The Mercer Advisory Group and ESRI business partner Avencia Inc. collaborated to grow CONNECT into the most comprehensive resource of its kind in the region. Web site visitors can query, map, display basic information, and generate turn-by-turn directions from a robust

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The CONNECT211 home page provides choices for searching for a combination of health, family, education and employment, and food and shelter resources.

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## Philadelphia-Area Residents Are Getting CONNECTed through GIS

dataset of more than 12,000 entries in five counties including Philadelphia proper.

The CONNECT211 Web site, built by Avencia Inc., leverages ESRI's ArcIMS, ArcSDE, and ArcWeb Services technologies to enable users to locate services based on service type and geographic location. ArcSDE and ArcIMS technologies provide server access to the database and Web-enabled services. The application, based on ArcWeb Services, was set up as a managed service, which means application data is hosted and maintained by ESRI. This ensures that the application is running and data is current, saving on management costs.

The application also has powerful routing capabilities so that Web site visitors can choose the service providers they want to visit and plan travel routes to them. They can search the database for services using different search methods including county, township, ZIP Code, neighborhood, and distance from a specific address. Results are listed by address and displayed on an interactive map that allows users to select specific search results, zoom in or out, and pan in any direction. The routing function allows users to plan trips with multiple stops and provides driving directions. Users are also able to include bus, subway, and train routes on their maps to assist those who rely on public transit.



Delaware Valley Association for the Education of Young Children and United Way representatives inaugurate CONNECT211.org (and a new look for the original CONNECT Services Web page), now sponsored by DVAEYC, UWSEPA, and the Free Library of Philadelphia. From left are Shelton Mercer, president, Mercer Advisory Group; Sharon Easterling, executive director, DVAEYC; and David Fair, vice president for community impact, UWSEPA.

The screenshot shows the CONNECT SERVICES website interface. At the top, there are navigation links: "about", "contact us", "map library", and "resources". Below these are four colored buttons: "Health" (orange), "Family" (green), "Education & Employment Services" (blue), and "Food & Shelter" (red). The main content area features a map of Philadelphia with a blue routing path. To the right of the map is a vertical zoom control with a "+" and "-" sign, a "print" button, and a small inset map of Pennsylvania. Below the map is a "Stops:" list with a search icon and a list of service locations: Alliance for Progress Charter School, Archdiocese of Philadelphia @ Our Mother of Sorrows, MT. ZION UNITED METHODIST CHURCH, Dunbar, Youth Opportunity Center @ North Central Ex, and Bright Hope Baptist Church. There is an "Update Route Map" button. Below the map is a search form with "Add Address" and "Address or Intersection:" fields, and dropdown menus for "City:" (Philadelphia), "State:" (PA), and "Zip:". At the bottom, there is a detailed list of driving directions for a route starting from the Alliance for Progress Charter School.

Depart Alliance for Progress Charter School
Go West on Cecil B Moore Ave (W Columbia Ave) toward N 19th St
Drive 1.2 miles ~ 3 minutes
Turn left on US 13 (N 33rd St)
Drive 0.5 miles ~ < 1 minute
Turn right at W Girard Ave to stay on US 13 (W Girard Ave)
Drive 0.3 miles ~ < 1 minute
Go on US 30 (Lincoln Hwy)
Drive 1.2 miles ~ 2 minutes
Make sharp left on Lancaster Ave
Drive < 0.1 miles ~ < 1 minute
Turn right on N 48th St
Drive 0.1 miles ~ < 1 minute
Arrive at Archdiocese of Philadelphia @ Our Mother of Sorrows Elementary
Depart Archdiocese of Philadelphia @ Our Mother of Sorrows Elementary
Go back North on N 48th St
Drive 0.1 miles ~ < 1 minute
Take ramp and go East on US 30 (W Girard Ave)
Drive 1 mile ~ 2 minutes
Go on W Girard Ave
Drive 1.1 miles ~ 2 minutes
Bear right on W College Ave
Drive < 0.1 miles ~ < 1 minute
Continue on Poplar St
Drive < 0.1 miles ~ < 1 minute
Continue on S College Ave

The CONNECT211 routing capability lets Web site visitors search for health, family, employment, and other social services resources; map them; and get driving directions to each location.

CONNECT211 is largely funded by the Pennsylvania Department of Public Welfare (PA DPW) and hosted by University of Pennsylvania's Cartographic Modeling Lab (<http://cml.upenn.edu>). DVAEYC and United Way are working in a long-term partnership that will provide sustainability and opportunities for CONNECT211. DVAEYC and United Way Southeast Philadelphia are working with PA DPW, the City of Philadelphia, and other key agencies in the area to expand and deepen the dataset. The long-term goal is for CONNECT211 to become a central data repository for health and human services information, with a wider pool of data and more details

about human services programs. This partnership will also help build CONNECT211 into an even more robust application and position it as the Web portal of choice for area residents to locate services for themselves and their families via the Internet.

For more information, visit CONNECT211 at [www.connect211.org](http://www.connect211.org) or [www.connectservices.org](http://www.connectservices.org), or contact Shelton Mercer, project director, at [connect@dvaeyc.org](mailto:connect@dvaeyc.org), or Megan Heckert, Avencia Inc. ([mheckert@avencia.com](mailto:mheckert@avencia.com)).

## ESRI Health GIS Conference Examines Shaping Global Health with GIS

Health and human services professionals will meet at the 2008 ESRI Health GIS Conference, September 28–October 1, 2008, in Washington, D.C., at the Renaissance Washington DC Hotel.

GIS technology is shaping health in communities worldwide, from investigating what makes us sick to evaluating how interventions can improve our lives. Join more than 400 of your colleagues in health and human services at the 2008 ESRI Health GIS Conference to explore how GIS shapes health on a global scale by examining the intricate relationships between humans and our environment.

Just as GIS connects geography with understanding global health—from the smallest villages to the largest metropolises—you are invited to connect with others in the health and human services community. Discuss best practices, collaborative projects, and the future of geographic intelligence.

### Who Should Attend?

This year's conference will focus on sharing GIS best practices across health disciplines including public health, hospitals and health systems, social services, academic and research health interests, and commercial health and managed care organizations. Learn how to better serve your community with GIS, whether you are an experienced GIS user or looking for ideas to implement GIS within your health organization.

### Preconference Workshops

- ModelBuilder for Workflow Automation and Spatial Analysis, presented by Katie Clift, technical analyst, ESRI
- Spatial Statistics for ArcGIS, presented by Lauren M. Scott, Ph.D., geoprocessing spatial statistics product engineer, ESRI
- GIS for All Health Organizations: An Executive Overview, presented by Kristen Kurland, teaching professor, H. John Heinz III School of Public Policy and Management and School of Architecture

**New in 2008: Moderated Exchange Sessions**—Participate in discussions about specific GIS and health-related topics. A moderator will guide the discussion as you actively exchange ideas and learn from your colleagues. Session topics will include

- GIS for Local Public Health Departments
- Situational Awareness for Hospitals
- Best Practices for GIS Grants
- ArcGIS Family of Products Q&A

**Breakout Sessions**—The conference cornerstone is sharing technical approaches and best practices for using GIS within health and human services. Attend sessions to learn how others in public health organizations, hospitals and health systems, social services organizations, research and academic programs, and managed care organizations are using GIS.

### Special Sessions

- Taking Hospital Situational Awareness to the Next Level, presented by Stephen W. Corbett, M.D., Ph.D., chief medical informatics officer, Loma Linda University Adventist Health Sciences Center, Loma Linda, California
- Modeling Health Scenarios in a GIS Environment, presented by Yasushi Ohkusa, Ph.D., chief researcher, and Tamie Sugawara, Ph.D., researcher, Infectious Disease Surveillance Center (IDSC), National Institute of Infectious Diseases (NIID), Tokyo, Japan
- GIS and Public Health in the Americas, presented by Carlos Castillo Salgado, M.D., J.D., M.P.H., Dr.P.H., senior advisor, Forum for Public Health in the Americas, Pan American Health Organization, Washington, D.C.

Find out more about the conference and presenters at [www.esri.com/healthgis](http://www.esri.com/healthgis).



### 2008 ESRI Health GIS Conference Registration Deadlines

<b>Standard</b>	September 26, 2008	\$399
<b>On Site</b>	September 28, 2008	\$449

Register online at [www.esri.com/healthgis](http://www.esri.com/healthgis).

**Note:** The deadline for special group-rate hotel room reservations is September 5, 2008.

## ESRI on the Road

### 2008 ESRI International User Conference

August 4–8, 2008  
San Diego, California  
[www.esri.com/uc](http://www.esri.com/uc)

### Army Force Health Protection 11th Annual Force Health Protection Conference

August 9–15, 2008, Albuquerque, NM  
[chppm-www.apgea.army.mil/fhp](http://chppm-www.apgea.army.mil/fhp)

### Public Health Information Network (PHIN) 2008 PHIN Conference

August 24–28, 2008, Atlanta, GA  
[www.cdc.gov/phn](http://www.cdc.gov/phn)

### The Association of State & Territorial Healthcare Officials (ASTHO)/National Association of County & City Health Officials (NACCHO)

**ASTHO-NACCHO 2008 Joint Conference**  
September 9–12, 2008, Sacramento, CA  
[www.naccho.org/conferences](http://www.naccho.org/conferences)

**2008 ESRI Health GIS Conference**  
September 28–October 1, 2008, Washington, D.C.  
[www.esri.com/healthgis](http://www.esri.com/healthgis)

**American Public Health Association 136th Annual Meeting and Expo**  
October 25–29, San Diego, CA  
[www.apha.org/meetings](http://www.apha.org/meetings)

## Celebrate 10 Years of GIS Day!

Celebrate the 10th anniversary of GIS Day on Wednesday, November 19, 2008.

GIS Day provides an international forum for users of GIS technology to demonstrate real-world applications that are making a difference in our society.

To find help planning and putting on an informative and successful GIS Day event, visit the resource and registration Web site at [www.gisday.com](http://www.gisday.com).





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**1-800-447-9778**

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or

909-793-2853, ext. 1-1235,  
outside the United States.

Visit the ESRI Web site at [www.esri.com](http://www.esri.com).

See *HealthyGIS* online at [www.esri.com/health](http://www.esri.com/health).

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