healthyGIS

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GIS for Health and Human Services

In This Issue

GIS Application for Early Detection Tracks Hospital-Reported Symptoms

Online, Interactive Maps Keep Community Informed

Health services groups in Ontario, Canada, are working with geographic information system (GIS) consultants to make real-time emergency room information available online as a way to inform community health providers, community members, and stakeholders. The application, based on ESRI's ArcGIS Server technology, generates summary maps of real-time respiratory and gastrointestinal data reported in hospital emergency rooms. Online access to these maps gives community stakeholders an at-a-glance picture of where to expect spikes in these illnesses.

"The key element of this project is enhanced communication and collaboration between the acute care sector, public health, and the community at large to protect the public and prevent illness," says Dr. Kieran Michael Moore, project director at Queen's University Public Health Informatics (QPHI). The maps serve to inform decisions made by public health workers as well as family physicians, community care access centers, long-term care facilities, school and child care center administrators, and the general public. Institutions and schools can better understand and plan for absenteeism, and visitors to the site can also find related disease prevention and treatment information.

ESRI business partner Infonaut Inc. and the Sault Ste. Marie Innovation Centre developed the application in collaboration with Kingston, Frontenac, Lennox and Addington (KFL&A) Public Health; QPHI; and ESRI Canada Limited. GeoConnections, a Canadian government program that promotes geospatial initiatives, awarded sponsorship to develop the application.

"It's a great way to disseminate data," says Infonaut chief operating officer Matt McPherson. "You can see where a disease is active by a partial postal code [first three digits]. You can identify neighborhoods, towns, and municipalities and zoom in to identify different features of the community—schools, hospitals, day care, universities—in relation to reported hospital activity."

The KFL&A area is a public health region that covers some

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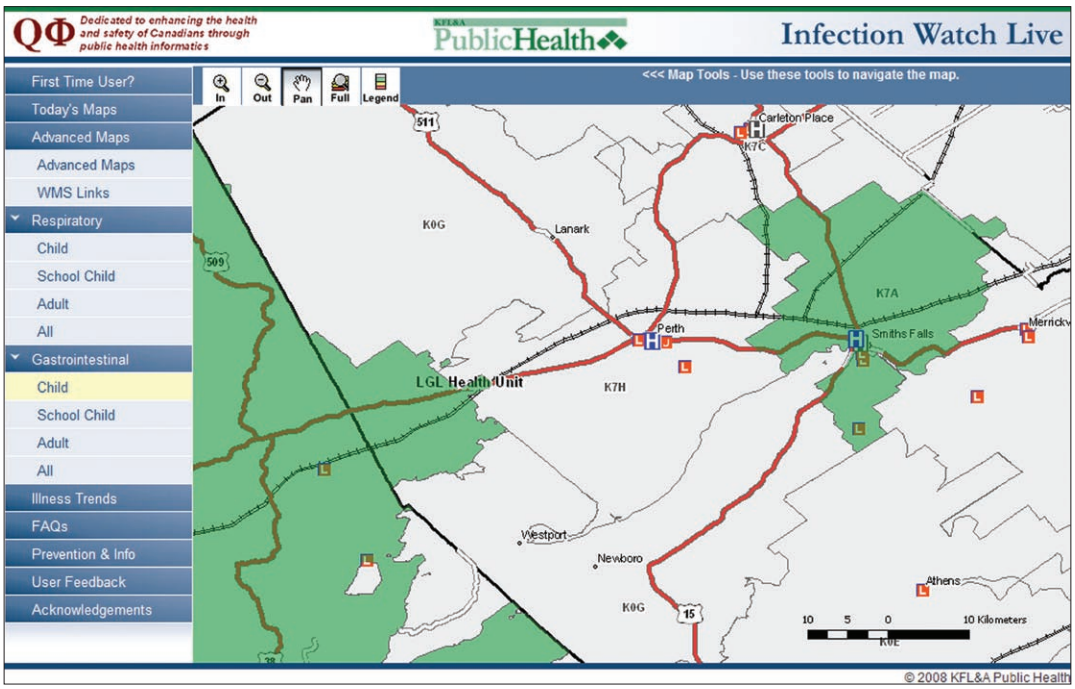


A new Web application, Infection Watch Live, uses geography to inform an Ontario, Canada, community with current data on respiratory and gastrointestinal illnesses reported from nine area hospitals.

Health Data Standards Chair Sees Spatial Data as Essential Contributor to Understanding Global Health Issues

W. Edward Hammond, Ph.D., chair of Health Level Seven

The following are excerpts from an interview with W. Edward Hammond, Ph.D., chair of Health Level Seven (HL7) and professor emeritus at Duke University Medical Center. The interview took place during the 2008 ESRI Health GIS Conference held in Washington, D.C., September 28–October 1, 2008.

Dr. Hammond, what is HL7, and why is it important?

Health Level Seven is a standards development organization. It is now about 22 years old, and it came into being to exchange data for hospital information systems for things such as admission and discharge processes, ordering and reporting laboratory data, materials management, medications, and other service-oriented things. Over the years, it has expanded into the ambulatory care arena and clinical documents, decision support algorithms, and modules for the electronic health record.

Standards enable data aggregation, which is mandatory for realizing the benefits of using electronics and information management in health care. HL7 provides an environment that brings together many different people to broadly address this issue.

The people who volunteer to participate in HL7 do so because their companies, on the vendor side or the health care provider side, need standards to accomplish their goals, whether they are selling an IT system or delivering health care. HL7 is an open environment that permits the development of those standards, carefully orchestrated to avoid dominant bias from any one group.

HL7 has 32 affiliates beyond the United States, and they have become very influential on the kinds of standards that we are developing. When it finally comes down to it, a diabetes patient in Germany exhibits the same symptoms as a patient in the United States. So there's a lot in common, and it makes sense to try to do this in a global environment.

Who are the vendors?

Vendors are the people that write software programs and sell the systems—hospital information systems, computer or data entry systems, e-prescribing, EHR [electronic health record] systems, and things of that nature. Other vendors deal with knowledge, which increases the number of stakeholders interested in the kinds of standards that we are building. It includes the payer industry, quality assurance industry, regulators, and managers.

Currently, what are the greatest challenges to creating a health record standard?

There are a number of challenges, one of which is that everybody would prefer having the standard that they want rather than compromise. I think that is the first barrier to overcome. I have often said that nobody enjoys working with standards; we only do it in self-defense. I think everybody that participates in the process of making a standard has a proprietary interest, and it is this conflict of interest that ultimately results in the compromises that produce a standard.

Currently, there are multiple standards that do the same thing. It is confusing and expensive. The course of action that has been taken thus far is to design systems that convert or map from one standard to the other, so a vendor has to be an expert in multiple standards. If you think about it, a loaf of bread has a certain size because it fits in standardized toasters. This concept enables us to build things with different components that all fit together.

Where does GIS fit into this?

GIS is a very important standard. Increasingly, the geographic coordinates where events take place are very important in understanding events. During the incident in which spinach in California was contaminated with E. coli, for example, identifying the geographic location of the victims and tracing that very quickly to the sites that were selling the damaged product was very important. With SARS [severe acute respiratory syndrome] and other types of epidemics, it is extremely important to know disease distribution and spread and track that geographically.

Beyond that, as we begin to get effective public health databases and understand the occurrence of disease, the prevalence of disease, and the response to treatment as part of a geographic parameter, we are able to better understand the environmental conditions that may impact the disease.

So, location is an essential component and should be part of every person's electronic health record.

Are your colleagues accepting GIS?

I think, to be honest with you, most of my colleagues are not thinking in terms of GIS. But events like Hurricane Katrina, for example, made it clear that the ideal electronic health record system would have identified the location of all the people who had a disease that required special care so you could optimize being able to go in and move those people out of harm's way—people on respirators or dialysis, for example.

So I think over the next few years, you will see a number of people beginning to track with GIS-type standards. Researchers in the area of biosurveillance and health surveillance are including geographic parameters.

How do you promote electronic health records?

One of the key things we can accomplish as a result of this is patient safety. An Institute of Medicine report says that the health care system unnecessarily kills about 100,000 people a year because of missing patient data such as drugs that should not be taken together. Other benefits include reducing health care costs, test redundancy, and patient dissatisfaction as a re-

sult of having to repeat the same health history to every health care provider. The first step in beginning to solve some of these problems is to be able to aggregate data across points of care. Unique personal identifiers would have a significant impact on reducing medical errors and increasing patient safety and quality of care.

Is there some other direction we need to go in?

Let me share with you my vision. I think that health care would become infinitely better if we could get the huge community of stakeholders together to go to a common language standard; a clinical term, for example, "unstable angina," would immediately have the same meaning wherever you were in the world. Collected data would then be usable for evidence-based medicine, education, quality control, and performance studies. I think the technology exists to do this.

I am trying to get the attention of enough people by saying, "Let's work together and solve these problems, because the rewards are much, much greater for each of us if we can do this in a collaborative way." That's why I am glad to be at this [Health GIS Conference] meeting.

It sounds like trying to achieve world peace, but in the data standards arena.

We jokingly talk about solving world peace and world hunger first, and then we might finally solve data standards internationally.

For more information on Health Level Seven, visit www.HL7.org. For specific questions, write Dr. W. Edward Hammond at hammo001@mc.duke.edu.

From My View . . .

By Bill Davenhall
Global Manager
Health and Human Services
ESRI

Exceptional Challenges, Exceptional Outcomes

Exceptional outcomes are rare in any human activity, perhaps save for the birth of a healthy child, the result of a process that has many inputs and many "best practices" that lead to an exceptional result—a baby!

Embracing the inputs and processes that can lead to exceptional outcomes is not always easy. It requires adoption of new practices that we may not fully understand or have experience with applying in daily practice. Sometimes we receive neither formal training nor management encouragement in their use.

We humans rarely perform exceptional things when we are not encouraged to engage in best practices or don't understand which results we want to achieve. So, it's not surprising that many organizational uses of technology, including GIS, fail to fully utilize a technology's inherent capabilities or deliver on its promise to achieve exceptional outcomes.

The challenge for most of us is to better understand the power of a technology's tools while at the same time improving understanding of the problems and challenges that engage us.

Best practices are defined as such because they usually produce an exceptional result. In adopting a best practice, we discover the key to arriving at exceptional outcomes.

Two important conditions are required to make the organizational commitment to achieve an exceptional outcome: management encouragement and provision of the proper tools. Best practices can only produce exceptional outcomes when the methods and procedures of the best practice are actually put to use.

Health and human services organizations around the world are faced with "supersized" challenges. Therefore, accelerating the adoption of a best practice such as GIS seems a big step in the right direction toward delivering exceptional outcomes, day after day.

As always, I invite your second opinion.

Regards,

Bill

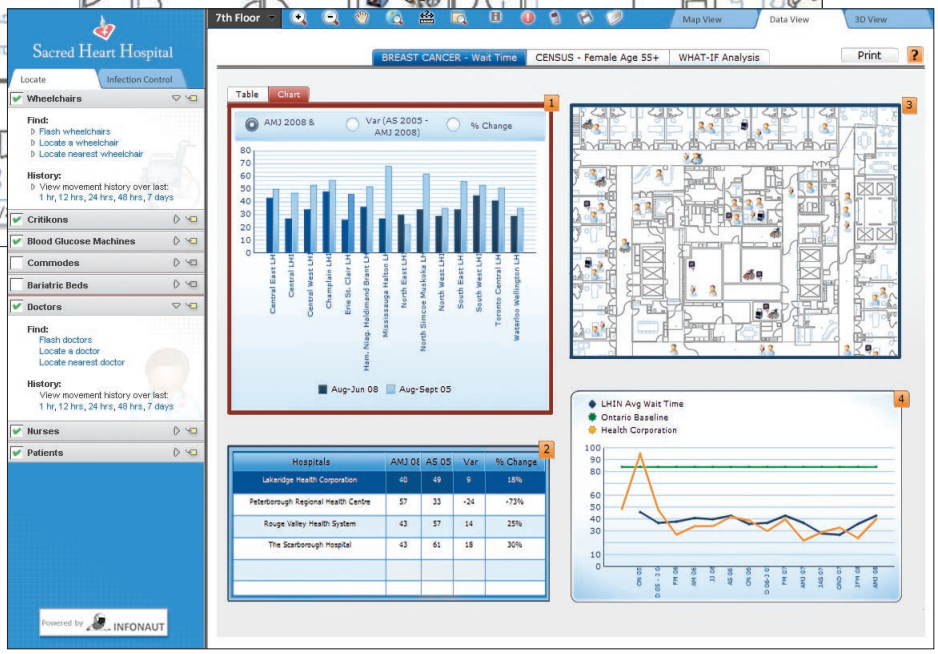
Spatial Analysis Supports Successful Infection Control Policies for Ontario Hospital

Understanding and control of patient secondary infections are high on any hospital administrator's list of priorities. Low secondary infection rates contribute to a hospital's good standing in the community, protect patients from undue suffering or even death, and reduce the costs associated with patient infection and recovery. In Canada, the Sault Ste. Marie Innovation Centre (SSMIC) and ESRI business partner Infonaut Inc. are collaborating on the use of GIS technology to understand how patient and equipment movement influences the spread of secondary infections.

Their solution helps administrators and infection control professionals make better decisions about policies for the containment and immediate outbreak management response to secondary infections. Results have already been used to influence policies that resulted in reduced infection rates. Currently, an innovative tracking program to collect precise data is being tested to further improve the commercial solution and provide real-time information for decision making.

"Algoma Public Health found great value in the ability of GIS mapping of patient transfers within the hospital environment and the reflec-

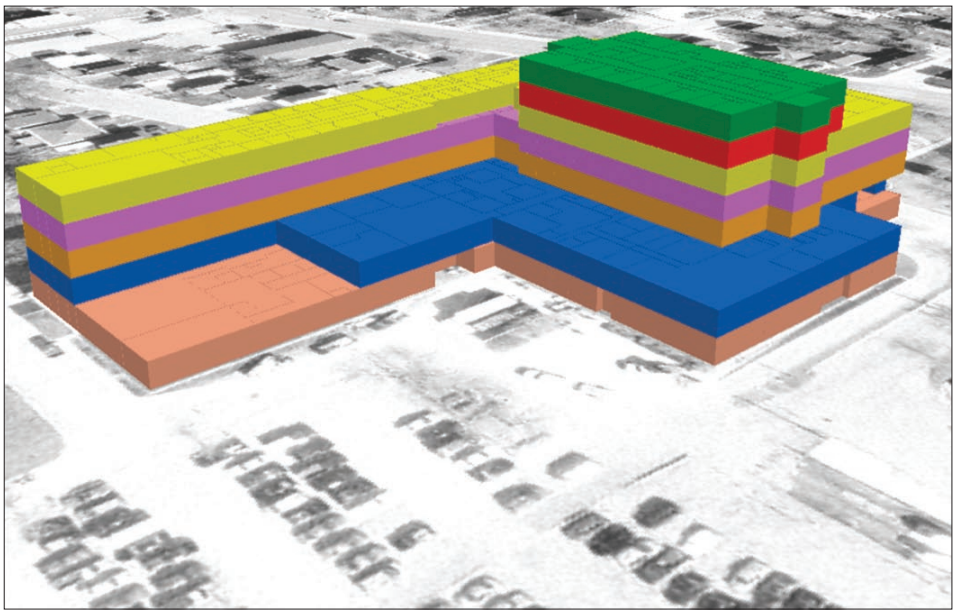
The infection control application presents a detailed layout of hospital floors and allows visualization of patient, staff, and equipment movement by time periods ranging from the last hour to the past week.



Charts comparing past and present performance can be constructed such as this one that compares wait time in 14 breast cancer centers for the same time period in 2005 and 2008.

tion of such movements in a spatial and time-linked analysis, which yielded valuable interpretations of the transmission of communicable disease in a closed system," says Jonathon Bouma, director of infection control, Algoma Public Health (APH), the region's local health unit.

In Fall 2006, in a single example of a global phenomenon, the Sault Area Hospital (SAH) in the city of Sault Ste. Marie, Ontario, Canada, had a serious outbreak of patient secondary infections caused by the bacterium *C. difficile*. APH asked for help in applying a spatial analysis of the problem from the Community Geomatics Centre (CGC), a local group that specializes in GIS solutions. CGC is part of SSMIC, a nonprofit organization that promotes economic activity in the community. The regional health unit had successfully worked with CGC before to apply GIS to health-related problems and turned to them again.



GIS technology makes it possible to build a 3D map of a hospital (represented by this exterior view of an Ontario, Canada, hospital) that contains detailed interior architectural features for each individual floor and permits tracking of patient, staff, and equipment movement over space and time.

"So many people are involved in hospitals, and they work in shifts around the clock, so it is hard to see the big picture because of this complexity," says Paul Beach, CGC manager, about the challenge. He explains, "I have seen hospital staff try to manage infection control using whiteboards to draw isolation plans, but it is just too complex visually. GIS gives you a view to help overcome that complexity and help make the right decisions."

Working with hospital and health unit personnel, SSMIC technicians built an application for analyzing six months of historical information collected during a previous outbreak. SAH infection control practitioners collected data related to the *C. difficile* outbreak including data related to patient movement. APH inspectors then proceeded to input the SAH data, as well as the date of infection onset, hospital assets, and room and bed numbers, using SSMIC's electronic data collection form. To ensure patient privacy, unique codes were assigned to individual patients before inputting the data so that each could be uniquely identified but were not personally identifiable. SSMIC then imported the data and a data relationship structure into ESRI ArcGIS software to conduct spatial analysis.

Orthophotography (digital aerial photography in which distortions due to camera tilt and topography have been removed) and blueprints of both SAH's General and Plummer hospital sites were used to map the real-world coordinates of all rooms using ArcGIS. Other work graphically depicted the General site and a portion of the Plummer site in three dimensions. The spatially captured data was queried and analyzed to provide additional information for examining factors that contribute to the spread of disease. SSMIC took further steps to graphically depict patient flow over space and time to ensure capture of historical patient movement throughout the hospital.

Application development was accomplished using ESRI's ArcGIS Engine and Microsoft .NET Framework. The application runs on ArcGIS Desktop and uses ESRI's ArcGIS Spatial Analyst and 3D Analyst extensions to analyze spatial relationships.

For example, explains Beach, the application can run an analysis to identify whether "hot rooms" of contamination exist, whether patient movement within the hospital is a factor, and if and when patients with active *C. difficile* associated disease (CDAD) have been admitted or released. The health unit took these results and made recommendations to the hospital, which, combined with other internal hospital policy changes, resulted in a number of positive changes.

Based on the successful outcomes, the group received additional funding from the Ontario provincial government's Northern Ontario Heritage Fund Corporation (NOHFC) to add real-time tracking data to the GIS layers and further develop the solution as a Web-based application. CGC partnered with Infonaut, which specializes in location-based business intelligence for the health industry, to complete the project.

The next stage of development involves the incorporation of infection control best practices with GIS, real-time data tracking systems, and risk exposure metrics and alerts to create a final Intelligent Infection Control (IIC) application. This application will be used as a tool to calculate a hospital's unique risk exposure;

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ESRI on the Road

Public Health Preparedness Summit
February 18–20, San Diego, CA, USA
www.phprep.org/

ESRI Federal User Conference
February 18–20, Washington, D.C., USA
www.esri.com/feduc

HIMSS AsiaPac09
Health Information Management Systems Society
February 24–27, Kuala Lumpur, Malaysia
www.himssasiapac.org/

ESRI Worldwide Business Partner Conference
March 22–24, Palm Springs, CA, USA
www.esri.com/bpc

ESRI Developer Summit
March 23–26, Palm Springs, CA, USA
www.esri.com/devsummit

HIMSS09
Health Information Management Systems Society
April 4–8, Chicago, IL, USA
www.himssconference.org

Netsmart CONNECTIONS2009
May 18–21, Nashville, TN, USA
www.netsmartconnections.com/

2009 ESRI International User Conference
July 13–17, San Diego, CA, USA
www.esri.com/uc

2009 ESRI Health GIS Conference
September 21–23, Nashville, TN, USA
www.esri.com/healthgis

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Spatial Analysis Supports Successful Infection Control Policies for Ontario Hospital

test, monitor, and refine infection control policy; and improve operational and outbreak response. It is a dynamic drill-down hospital risk profile assessment and operational management application.

The IIC application identifies physical variables that directly impact the likelihood of CDAD. Tracking may be conducted on patients, objects, and discrete locations within the hospital. Risk factors for each category are weighted and used to create an overall risk profile for every tracked object within the hospital. The application then applies GIS technology to determine the spatial relationships and contacts between the risk-profiled people, places, and things. The risk profile is dynamically generated: as people and assets interact with each other, associated risks change to reflect new inputs.

The IIC tracking system uses Real-Time Location System (RTLS) tag technology. Existing hospital systems provide baseline patient and asset data, which is linked to the RTLS tags. The tags broadcast to local receivers that, in turn, transmit the tag's unique identifier, time, and specific location to the GIS for calculating movement and spatial intersections. By layering risk attributes on top of object tracking, the IIC system is capable of continual improvement as understanding of CDAD control grows.

For more information, contact Hugh Williams at hwilliams@infonaut.ca or Paul Beach at pbeach@ssmic.com. You can also learn more about Infonaut at www.infonaut.ca and SSMIC at www.ssmic.com.

About the Sault Ste. Marie Innovation Centre and Community Geomatics Centre

The Sault Ste. Marie Innovation Centre (SSMIC) is a nonprofit organization formed in 1999 to stimulate economic development in the Sault Ste. Marie community in Ontario, Canada. SSMIC's Community Geomatics Centre (CGC) promotes geospatial technologies and local partnerships to efficiently share GIS data and knowledge. CGC successfully built a community-wide GIS by first partnering with city and public utility companies, then expanding partnership to other local businesses and organizations. The community GIS includes utilities, wastewater, transportation, building, administrative, and land base datasets.

Mapped locations of electric utility underground transformer boxes helped Sault Ste. Marie public health teams respond quickly when disease-carrying mosquitoes were found in the boxes.

Benefits of the CGC business model include the elimination of duplicate efforts and the cumulative value of creating an integrated information system. From an initial investment of $1 million, SSMIC attracted $10 million in new revenues to the region through GIS projects.

The added value of information integration was evident when the local power company began a GIS project to review assets that might pose potential tripping hazards for pedestrians. It was discovered that one potential hazard, underground boxes that house power transformer equipment, also provided a perfect breeding environment for mosquitoes carrying West Nile virus. As a result, the public health department used the utility's GIS to quickly locate all existing boxes and send out mosquito eradication crews.

For more information, visit the SSMIC Web site at www.ssmic.com.

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GIS Application for Early Detection Tracks Hospital-Reported Symptoms

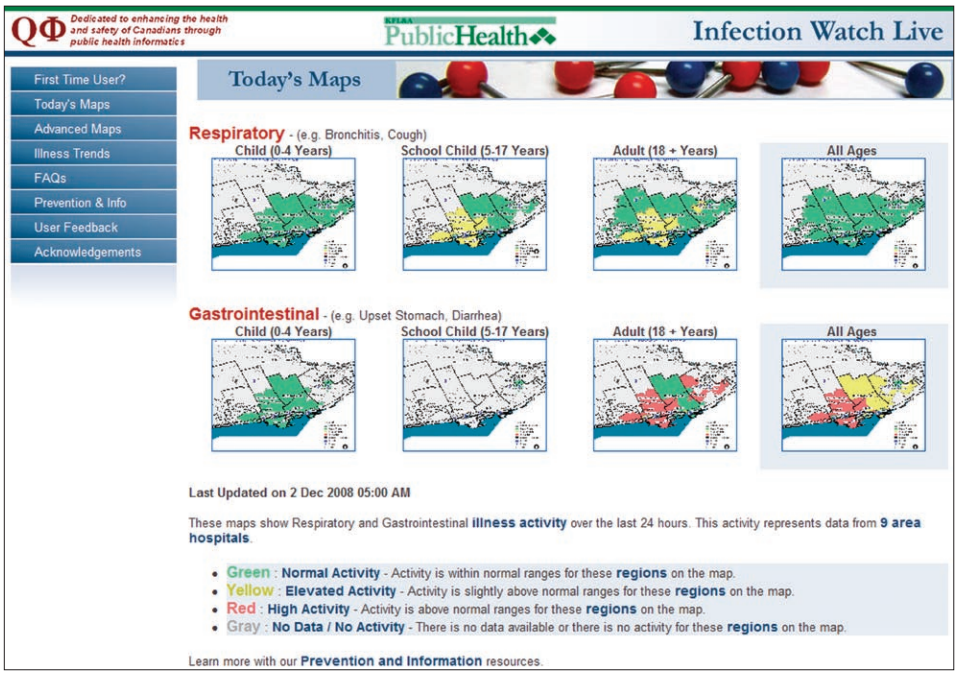
180,000 residents in the municipal and county areas surrounding the city of Kingston—where Lake Ontario meets the St. Lawrence River—north through Frontenac County and Lennox and Addington County including rural towns and villages such as Napanee, Cloyne, and Sharbot Lake. From the start, project objectives were to contribute to informing the community, understanding and limiting disease spread, reducing mortality and morbidity among at-risk populations, and reducing impacts on hospital emergency departments. Presentation of the most up-to-date information in an easy-to-use interface would provide an easily understood early detection resource to the community.

"The establishment of a surveillance system using data from hospital emergency departments has been an invaluable tool for public health to identify infectious disease risks early," says Dr. Ian Gemmill, medical officer of health for KFL&A Public Health. He explains, "The identification of salmonella in bean sprouts is an excellent example. Extension through the Infection Watch Live Web site to our partners in the community and to the public will provide our whole community with real-time communicable disease activity information, allowing better health decisions."

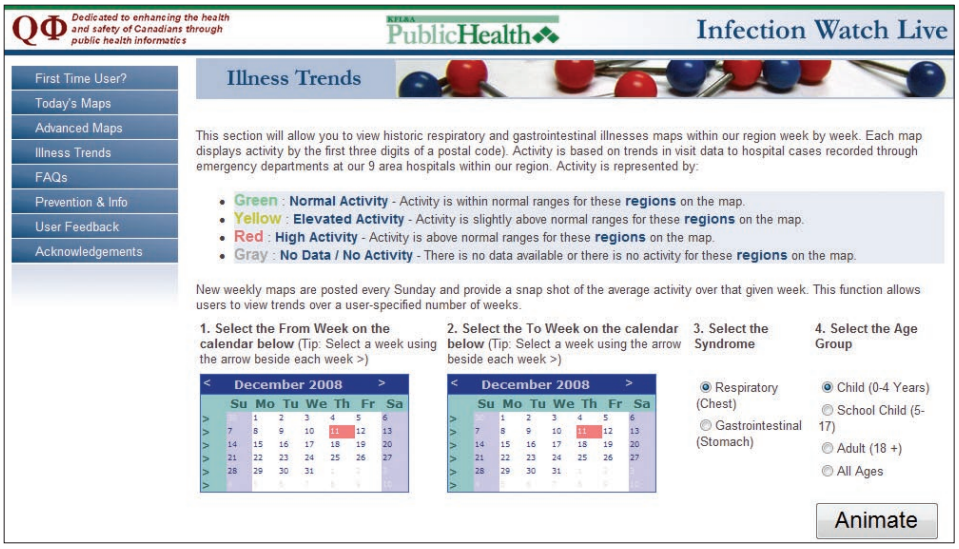
For application development, two variables, respiratory and gastrointestinal complaints, were chosen because of their rapid transmission rates and high burden on community health services. The data source is real-time data collected from nine area hospitals by an electronic system adapted from the University of Pittsburgh's Real-Time Outbreak and Disease Surveillance (RODS) system, in use since 2004. Map data was obtained from the Canadian Geospatial Data Infrastructure, which provides online resources for digital maps and satellite images. A public health epidemiologist working on the project created an algorithm that models the seasonal patterns of respiratory and gastrointestinal infections in the community.

Application maps present a generalized view of illness rates using three color zones—red, yellow, and green—to indicate high, elevated, and normal activity zones, respectively, in a display similar to at-a-glance air quality maps. This generalized view complies with health data privacy constraints by showing results for each syndrome by age groups (child, school child, and adult) and obscuring details about specific hospitals or patients. Results are displayed as a static snapshot of current activity or as interactive maps that group historical activity by syndrome and age group. The application can also make detailed data available to authorized health authorities, providers, and researchers through a secure Web mapping service.

For more information, visit www.kflapublichealth.ca/ or contact Hugh Williams at hwilliams@infonaut.ca.



Site visitors get an overall picture of illness activity in the last 24 hours and see at a glance affected age groups and neighborhoods. Health authorities can access more detailed information through a secure connection.



An easy-to-use interface to the Infection Watch Live Web page allows visitors to customize maps of historic data on reported respiratory and gastrointestinal illnesses by date and region.

ESRI Honors GIS Innovators in Health and Human Services

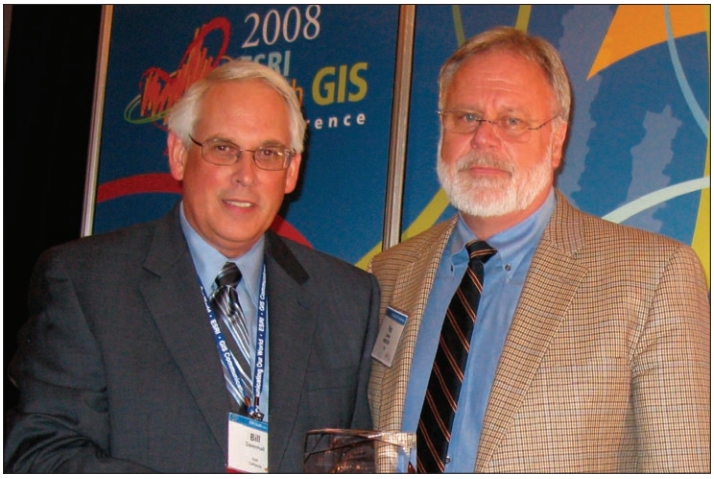
Several awards for contributions in applying GIS in health and human services were announced during the 2008 ESRI Health GIS Conference held in Washington, D.C., September 28–October 1. Bill Davenhall, global manager for health and human services, ESRI, explained the significance of the award winners' work, saying, "These exemplary people and organizations set the bar and inspire all of us to do better in our daily work."

Alabama Department of Children's Affairs (ADCA) received the Vision Award for demonstrating foresight in the implementation of GIS to enhance communication, collaboration, and data sharing through the development of its Alabama Resource Management System. The Web-based system uses GIS to integrate data from more than 20 health and human services agencies. As a result, it connects decision makers in agencies, programs, and communities with the information they need to evaluate community needs and plan and implement solutions that improve the lives of children in the state.

The Service Award recognized Pat Libbey, executive director of the National Association of County and City Health Officials (NACCHO), who, over the years, provided leadership for more than 3,000 local health departments across the United States. "To move a community like that forward takes strong and dedicated leadership," said Davenhall when he presented the award.

"In tracking, mapping, and identifying the social determinants of health, I think we all recognize that the practice of public health has as its core the spatial distribution of elements

Chris McInnish, center, deputy commissioner of the Alabama Department of Children's Affairs (ADCA), and Tammy Coates, right, executive assistant to the ADCA commissioner, receive the ESRI Vision Award from Jim Geringer, ESRI's director of public policy and former governor of Wyoming, during the 2008 ESRI Health GIS Conference.



Pat Libbey, right, executive director of the National Association of County and City Health Officials (NACCHO) accepts the ESRI Service Award from Bill Davenhall, ESRI global manager for health and human services, during the 2008 ESRI Health GIS Conference.

Duane Flemming, right, director, Veterans Health Administration (VHA), accepts the ESRI Making a Difference Award on behalf of Bruce Ripley from Thomas Gibbs, ESRI federal account manager, during the 2008 ESRI Health GIS Conference.

ESRI Communication Award recipients Chris Sambol, right, manager of health and human services, Sault Ste. Marie Innovation Centre, (SSMIC), and Angela Piaskoski, left, SSMIC GIS technician/analyst, pose with ESRI health and human services account executive Scott Christman during the 2008 ESRI Health GIS Conference.

that contribute to our health as well as take away from it," commented Libbey.

ESRI bestowed the Making a Difference Award posthumously on Bruce Ripley, who was a strong advocate of the use of GIS technology in the Veterans Health Administration (VHA) hospital system for more than 15 years. An early adopter of health GIS in the federal government, Ripley was willing to take an organizational risk to implement spatial analysis technology at VHA. Duane Flemming, VHA director, accepted the honor on Ripley's behalf.

The Sault Ste. Marie Innovation Centre, Canada, received the Communication Award for excellence in map presentation, visualization, and communication.

Conference Reminders

Save the Date

2009 ESRI International User Conference
July 13–17, San Diego, California
www.esri.com/uc

2009 ESRI Health GIS Conference
September 21–23, Nashville, Tennessee

Call for Papers

Submit your paper proposal for the 2009 ESRI Health GIS Conference at www.esri.com/healthgis.

For links to the 2008 ESRI Health GIS Conference proceedings and highlights, go to www.esri.com/healthgis.

ESRI Health Conference Explores How GIS Is Shaping Global Health

Attendees from more than 21 nations and 45 U.S. states gathered September 28–October 1, 2008, to discuss how they are using GIS in innovative ways, from spatial analysis used to measure health disparities to embedding GIS into organizational information technology.

Keynote speaker Christopher Murray, M.D., director, Institute for Health Metrics and Evaluation, reviewed how GIS contributes to improving health metrics and evaluation. "For each investment in health, we need to demonstrate that the money has been well spent. GIS plays a role in understanding spatial inequalities in health outcomes and coverage by providing spatial analysis tools for quantification, communication, and hypothesis generation."

Tom Vair, executive director, Sault Ste. Marie Innovation Centre (SSMIC), Ontario, Canada, related the center's successful use of data sharing through innovative GIS technology to stimulate economic development in the Sault Ste. Marie community. SSMIC attracted $10 million in new revenues to the region through GIS projects with an approximate $1 million investment.

Stephen Corbett, M.D., Ph.D., chief medical informatics officer, Loma Linda University Adventist Health Sciences Center, Loma Linda, California, described how the center's advanced emergency GIS (AEGIS) uses GIS to run a Web-based hospital emergency situational awareness system. "Users should be able to talk to each other through the map, in that they can edit the map, exchange text messages, identify the command structure, draw perimeters, and add cell phone photographs with the correct location information already built in," said Corbett.

Yasushi Ohkusa, Ph.D., chief researcher, Infectious Diseases Surveillance Center, National Institute of Infectious Diseases, Tokyo, Japan, described how the center is using GIS for spatial analysis and to model health scenarios in Japan such as tracking the geographic diffusion of virulent influenza through a crowded transportation system in Tokyo. Ohkusa added, "GIS allows visualization of very complex human interaction events and thus provides added understanding for policy makers and public health workers."

Carlos Castillo-Salgado, M.D., Ph.D., senior advisor for the Forum for Public Health in the Americas, Pan American Health Organization, said that the adoption of new knowledge is essential for success in improving human health. Castillo-Salgado also called for using GIS methods to quantify the results of health programs. "GIS can help do this by combining multiple data layers and providing spatial statistics tools that close the gap between what we know and what we do with that information," he stated.

W. Ed Hammond, Ph.D., chair, Health Level Seven (HL7), and professor emeritus, Duke University, stated, "The strength of health information systems depends on supportive data standards that enable the linking of information from different sources." Hammond also suggested that more collaborative participation between the HL7 and GIS communities is necessary to develop additional spatial data standards that have the capacity to inform the electronic patient record.

Other highlights of the conference included preconference seminars and workshops on spatial statistics (Lauren Scott, Ph.D., ESRI), using GIS in health organizations (Kristin Kurland, Ph.D., Carnegie Mellon University), and new GIS tools for health authorities (Alan Fremont, M.D., Ph.D., and Nicole Laurie, M.D., Ph.D., Rand Corporation); 80 professional scientific paper presentations; a hands-on GIS software learning center; a technical plenary that addressed ESRI software innovations; and the annual meeting of the ESRI Health and Human Services User Group.

ArcGIS Server

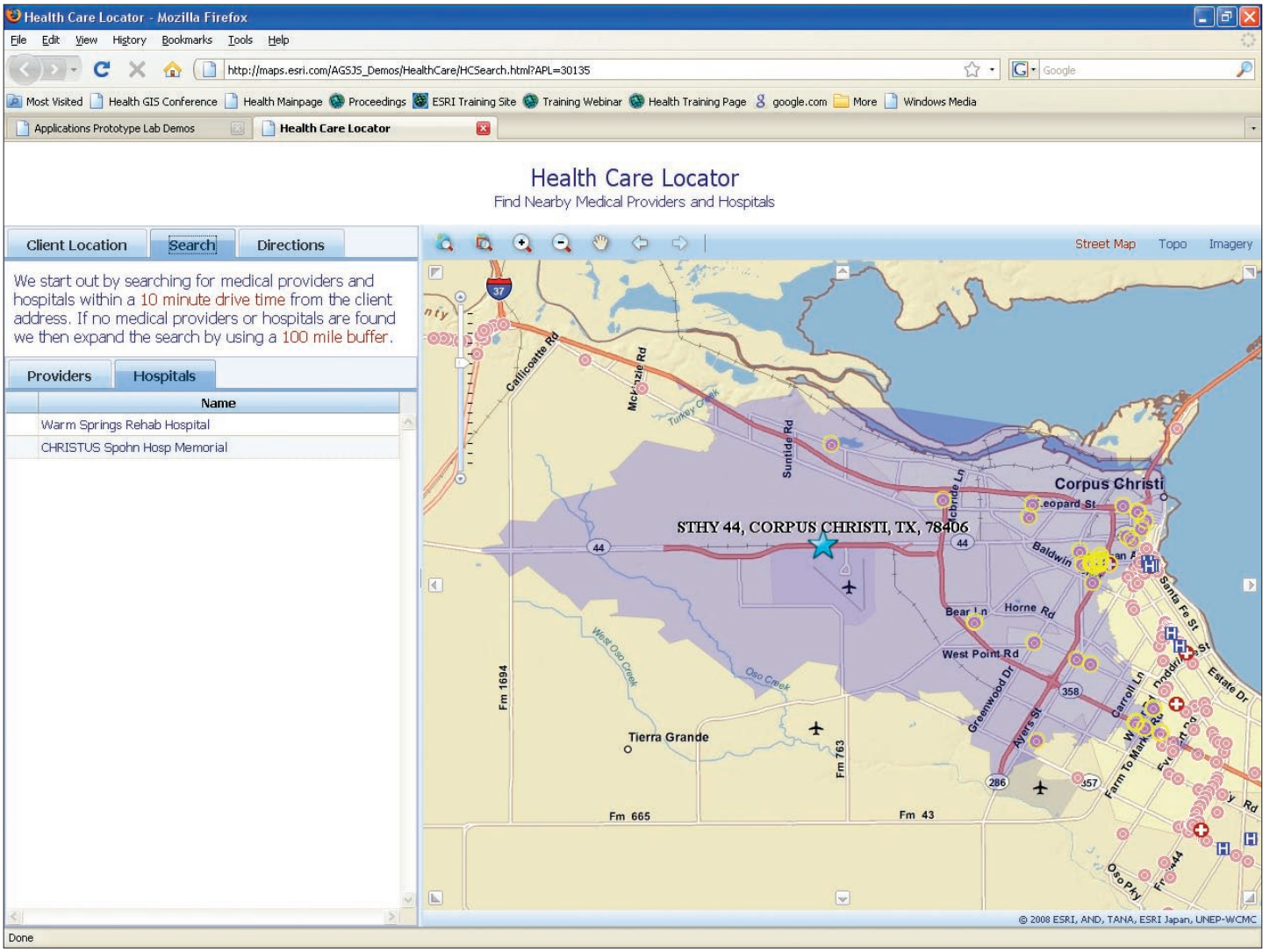
Connect Your World via Web Applications and Services

ESRI's ArcGIS Server gives organizations the ability to manage and distribute Web services for mapping, data management, and geospatial analytics. It enables centralized management of data and applications and provides fast access to large volumes of imagery and data.

Organizations use ArcGIS Server to leverage their internal GIS resources, as well as services hosted on other GIS servers, and deliver that information to a wider audience of decision makers, stakeholders, and community members. ArcGIS Server also allows organizations to create integrated applications that blend GIS resources with other IT enterprise systems. For example, data from a real-time tracking system could be blended with digital maps and imagery and delivered via a simple Web mapping application that allows users to visualize geographic patterns resulting from the data stream.

To take it one step further, the application could also include tools for performing spatial analytics and generating results in the form of a map, chart, or report. Since the tools employ models designed by the organization, site visitors simply interact with the map or make choices on a form to initiate the analysis; they don't need GIS expertise.

This means that organizations can disseminate geographic intelligence and GIS capabilities throughout the enterprise, creating an enhanced environment of communication and collaboration between departments, partner organizations, and the public. ArcGIS Server provides secure accessibility to GIS services and empowers users to solve real problems by incorporating the business knowledge and resource investments made by the organization. Centralized access puts all this in the hands of analysts who need intelligent information for making informed decisions.



ArcGIS Server makes maps and data available over the Web and provides analytics that visitors can use to customize and display information results.

B&G Sentinel™ GIS

Adulticide • Larvicide • Surveillance • Service Request

Map, Track, and ATTACK

Drop it. Dunk it. Use it. Your data survives.

Sentinel GIS with an Archer Field PC, Trimble GPS receiver and ArcPad software is the ideal system for mosquito control.

Sentinel GIS is your complete solution for recording and managing data critical to controlling mosquitoes. Everything you need is included and easy to use. Applications are based on industry standard ESRI software and fully customizable.

GET THEM BEFORE THEY GET YOU!

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William F. Davenhall, Manager
E-mail: bdavenhall@esri.com
Tel.: 909-793-2853, ext. 1-1714

Peggy Harper, Health Education Specialist
E-mail: pharper@esri.com
Tel.: 704-541-9810, ext. 8677

Ann Bossard, Hospital and Health Systems Specialist
E-mail: abossard@esri.com
Tel.: 909-793-2853, ext. 1-2328

Chris Kinabrew, Public Health Specialist
E-mail: ckinabrew@esri.com
Tel.: 909-793-2853, ext. 1-2382

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