healthyGIS

GIS for Health and Human Services
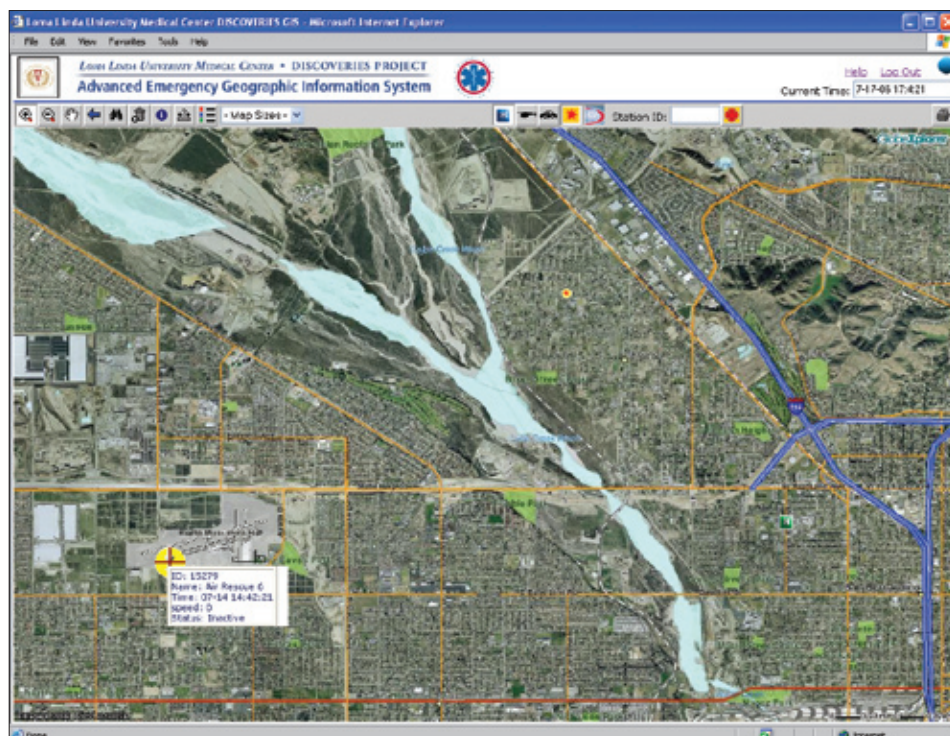
In This Issue

Loma Linda University Medical Center Activates Advanced Emergency Geographic Information System

The Center for Prehospital Care, Education, and Research at Loma Linda University Medical Center (LLUMC) is using a new state-of-the-art Web-based system that shares real-time information relevant to emergency medical service (EMS) calls. The Advanced Emergency Geographic Information System (AEGIS) monitors and maps the location and status of emergency resources, such as hospitals, air ambulances, and rescue helicopters, and is used when fielding calls.

ESRI developed AEGIS for LLUMC. The San Bernardino County Communications Center will also use it. Medical center officials expect that other agencies and area fire departments will eventually follow suit. "We want to be a community resource," said Dr. Jeff Grange, the medical center's EMS director, who conceived the idea for the system that he believes to be the first of its kind.

The AEGIS server receives continuous data feeds and photos that show, in close to real time, where air ambulances have been dispatched and which freeways are congested, for example. At the medical center, a Mobile Intensive Care Nurse working on a computer will be able to see that information displayed on a digital map on a 40-inch LCD monitor. The map's layers also include roads, schools, and malls.

By glancing at the screen or clicking a button marked with symbols, such as an H for a hospital or a helicopter icon for an air ambulance, the nurse will receive an instant snapshot of which hospital emergency rooms in San Bernardino and Riverside counties can accept more ambulances. A green H symbol on the map indicates that people can be transported there, while a yellow H means the emergency room is busy and a request is being made to divert ambulances to other hospitals. Clicking a helicopter button on the toolbar will show where air ambulances are located. A helicopter rotor twirls if the air ambulance is in flight. This information is provided by the Los Angeles-based Rapid Emergency Digital Data Information Network (ReddiNet).

The screen can also display traffic congestion and accidents on the freeways using reports or camera feeds provided by the California Highway Patrol and the California Department of Transportation. The touch of a button reveals a snapshot of traffic with a time lag of only two minutes.

"Those features and others on the AEGIS will help emergency personnel, whether they're at a hospital or in a communications center, route

This AEGIS system displays a helicopter's last reported location, identification number, date, time, and air speed (lower left); a hospital location and diversion status, marked by an H and colored green for "open" (lower right); and the site of a vehicle accident that might cause delays for an ambulance (top center).

Pennsylvania Public Health Groups Increase Preparedness with GIS Training

By Lyndsay Mandel, East Stroudsburg University, Pennsylvania

In 2006, more than 50 Pennsylvania public health professionals attended geographic information system (GIS) training workshops designed to increase response preparedness for disasters that may affect public health. The purpose of the workshops was to help reach Centers for Disease Control and Prevention preparedness goals and provide a well-trained public health workforce that can both participate in relevant tabletop exercises and drills as well as deploy effectively during an emergency response. Attendees included staff members from state health bureaus for the cities of Allentown and Bethlehem and from the Northeastern District of the Pennsylvania Department of Health.

Participants gave positive feedback after the training. One workshop attendee said, "These learning sessions were extremely beneficial and applicable to our work, helped us realize the importance of GIS software in relation to our job duties, and made us think of the various ways we can utilize this exceptional program."

Dr. Shixiong Hu, a professor at East Stroudsburg University in the Geography Department, led the workshops. The first part introduced GIS technology with a lecture. The second part presented hands-on labs using ArcGIS 9.1 software. In part one, Hu introduced the basics of GIS and potential GIS applications in public health problems, especially the response to large-scale emergency events such as bioterrorist attacks, accidents, and natural disasters. The hands-on labs taught participants to use sample datasets to create maps of children who received flu shots in a sample county and, secondly, to conduct sample statistical applications in controlling mosquito-related epidemics. Each attendee received a free copy of the training material and the ESRI Press book, *GIS for Health Organizations.*

The workshops are part of the Northeast Lehigh Valley Project, a bioterrorism preparedness project led by Dr. Alberto Cardelle, the assistant to the Provost at East Stroudsburg University. The project is sponsored by the Pennsylvania Department of Health, Office of Public Health Preparedness.

For more information on the training, contact Dr. Shixiong Hu at shu@po-box.esu.edu.

User Group News

UC Health Luncheon Provides Forum for Discussing Advances in Health GIS

ESRI business partners Scientific Technologies Corporation (STC) and GeoAge sponsored the well-attended Health and Human Service User Group (HUG) luncheon during the 2006 ESRI International User Conference (UC) held last August in San Diego, California.

STC's Mike Garcia discussed his company's health-related GIS solutions, which range from immunization registry and disease surveillance to case management and contact tracing. Jeff Arnold of GeoAge reviewed his company's new application, Field Adapted Survey Toolkit, which provides tools for quickly organizing and carrying out rapid needs assessments. He also spoke about a medical supplies inventory tracking and distribution application recently developed for the Nebraska Department of Health and Human Services. (See the article regarding Nebraska in the Fall 2006 *HealthyGIS* newsletter.)

Kristen Kurland, coauthor with Wilpen Gorr of the new book *GIS Tutorial for Health,* explained that the book's step-by-step tutorials are written specifically for laboratory instruction but also serve as a guide for individuals interested in using GIS in the health and human services fields.

A new Illinois user group has formed, according to Kevin Gibbs, Chicago Department of Public Health, and Amy Herman-Roloff, an independent consultant, who both organized the Northern Illinois Public Health Consortium. The consortium was established to bring health officials interested in GIS and GIS managers together to share data and information on best practices and training.

Edward Carubis, ESRI Professional Services, reviewed examples of GIS health applications including the Federal Emergency Management Agency's HAZUS-MH earthquake, hurricane, and flood model and the Centers for Disease Control and Prevention's FluAid 2.0 application for responding to a pandemic influenza outbreak.

Calling the meeting to a close, Bill Davenhall, global manager, ESRI Health and Human Services, reminded the group that they are pioneers in the field of GIS and health and human services. He renewed his offer to help promote user successes as well as provide a discussion forum for difficulties encountered along the way.

For information on the 2007 UC HUG luncheon, see page 6 or visit www.esri.com/uc.

Health and Human Services Attendees Comment on the 2006 ESRI International User Conference

Question: What interests you at the ESRI International User Conference?

"I take the opportunity to learn about new features and buy new books,"

said Jerry Curtis, contractor to the Centers for Disease Control and Prevention.

"From my experience here, I believe we will be factoring GIS into our thinking as we develop our new IT strategic plans,"

said John Damare, CIO for Veterinary Services, U.S. Department of Agriculture Animal and Plant Health Inspection Service.

"Not only is it a great place to seek out new business opportunities, but it is also a great place to network,"

said Kirk Mills, operations manager of First Watch.

. . . and the classic, *"I'm an intern, and I am looking for a job,"* by Anonymous.

From My View . . .

By Ann Bossard
Hospitals and Health Systems Specialist
Health and Human Services
ESRI

Ensuring Usability with Locational Accuracy

Last year, I began a journey that has taken me down an extraordinary road. I became a member of the Health Information Technology Standards Panel (HITSP) Biosurveillance Technical Committee. It almost requires an advanced degree to understand the ties and links between the American Health Information Community (AHIC) and HITSP as well as the purpose and goals of each group.

In September 2005, Health and Human Services (HHS) Secretary Michael Levitt created AHIC with the goal to make health records digital and interoperable and ensure protection of privacy and security of those records. Out of AHIC came HITSP and from there ensued the Biosurveillance (BS-TC), Electronic Health Record (EHR-TC), and Consumer Empowerment (CE-TC) technical committees. This alphabet soup of groups is the result of President Bush's call to create an electronic health record for most Americans within 10 years.

The first BS-TC task was to create a use case for transmitting laboratory results to public health officials. Then we worked on health information technology standards required for the use case. By August 2006, more than 10,000 volunteer hours were contributed to the project during monthly meetings and weekly conference calls, and the work continued with harmonization of the standards and interoperability specifications.

My goal as part of this whirlpool of activity was twofold. I wanted to make sure that, in the midst of a large representation from commercial health care IT organizations, the voice of the public health sector was heard. In representing ESRI at these meetings, I wanted to ensure that the importance of maintaining an accurate address was conveyed to the group. When standards and minimum data elements are finally defined, it is very important that location precision does not get "watered down" to a generalized location such as a ZIP Code.

Some committee members were not aware of the importance of locational accuracy to the electronic health record. I explained that a good address record means that a geographic pattern of chief complaints—such as fever, cough, sore throat, and muscle aches—might be quickly identified and recognized as an influenza outbreak. In addition, a doctor can render better care knowing the environmental geography of a patient's address. Does the patient live near a freeway? What is the air quality of the community? Did the patient grow up near a waste disposal site? Also, to conduct a patient follow-up, the nurse must be able to find the patient's house for a home visit. And for hospital business, the bill arrives at the right place the first time to avoid delayed reimbursement.

Once an address is captured accurately in the hospital information system, its potential value to the hospital and community is great. The goal is to validate the address at the point of entry into the system to ensure spatial accuracy from that point forward.

My challenge to each of you is to keep this concept of the value of locational accuracy in your "back pocket" and share it when the opportunity arises. Someday down the road when we all have electronic health records with locational accuracy included, you just might be the beneficiary.

As a teacher of mine used to say at the end of his classroom lecture, "Questions, comments, or observations?"

Best regards,

Ann

Loma Linda University Medical Center
Activates Advanced Emergency Geographic Information System

patients faster and to a hospital that specializes in the care they need," Grange said.

Referring to the computerized map, Grange commented, "This will give them the big picture. It gets the right information to the right people so they can make the right decisions."

"In the past, emergency vehicles have occasionally run into traffic jams," said Grange, who also is an attending physician for the medical center's Department of Emergency Medicine. "By consulting the freeway camera feeds and traffic incident reports on the computerized map, emergency personnel can plan alternate routes to the hospital."

Grange believes the technology can save lives by shaving minutes off transportation time and getting patients who need cardiac care or treatment for burns to a hospital with that specialty.

"The patient gets to the right place at the right time the first time," he said.
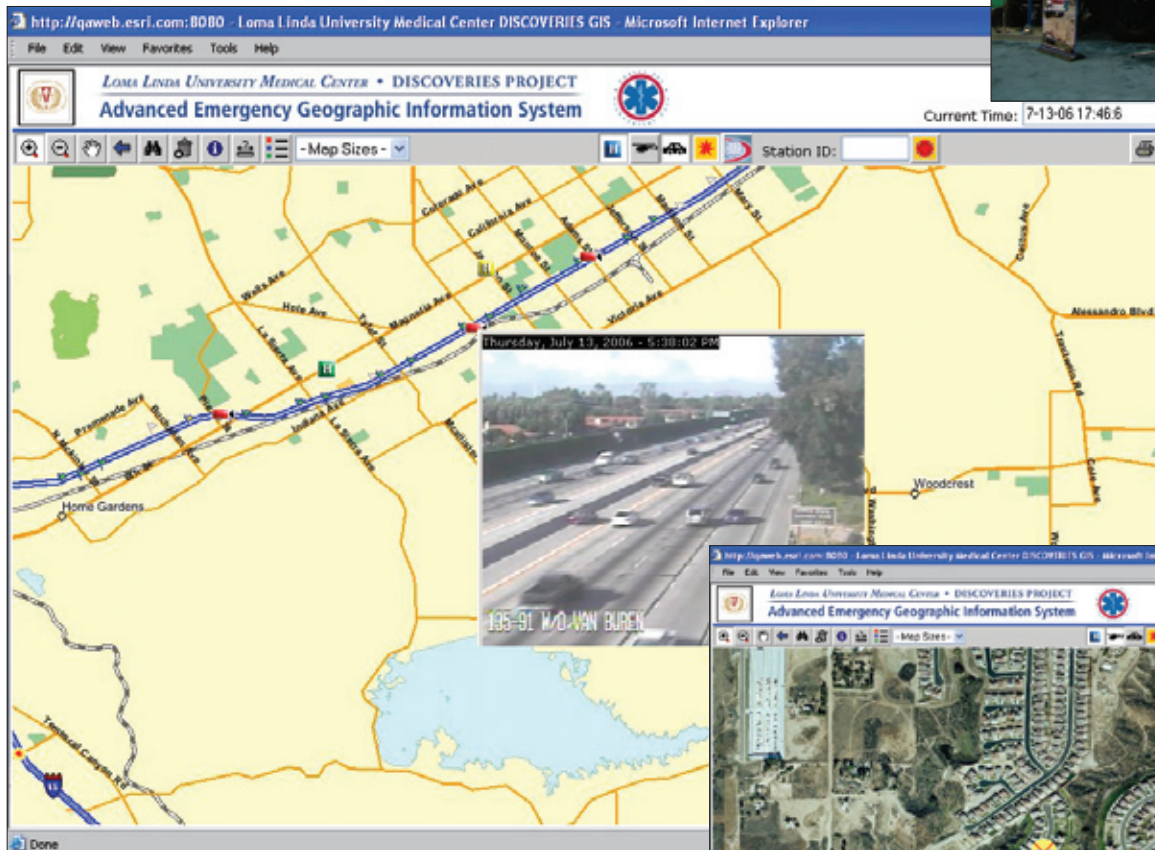
The ESRI application, a customization of ArcExplorer Web software, can be replicated elsewhere, according to Bill Davenhall, Health and Human Services Solutions manager for ESRI. "This unique system has been developed for LLUMC, but the solution could be implemented for any hospital or emergency medical service organization in the world," he said. "It is a dual-purpose solution in that it enhances the day-to-day decision making of the nurses and physicians working in the emergency department. And in case of a major emergency, it provides a single view for emergency personnel in the region. This is the first time that a hospital emergency department has had the tools to achieve situational awareness from multiple sources in one view."

The Center for Prehospital Care also uses the AEGIS system in its new 30-foot-long mobile telemedicine vehicle, a high-tech disaster response vehicle that contains everything from an X-ray machine to a satellite television that links to the medical center.

For more information about the AEGIS program, contact Ann Bossard, ESRI hospital specialist in the health and human services industry, at abossard@esri.com.

The LLUMC Center for Prehospital Care's new 30-foot-long mobile telemedicine vehicle, seen here on display during the 2006 ESRI International User Conference, is a high-tech disaster response vehicle that contains an X-ray machine, computers running the Advanced Emergency GIS system, a satellite television that provides a video link to the medical center, and more.

A near real-time traffic camera's view of a busy freeway is displayed on top of a street map marked with the locations of hospitals (indicated by an H), camera locations (red camera icons), and traffic speed and volume sensors (green flags). A user can hover the mouse over map features to display additional information such as traffic collision status.

The Loma Linda University Medical Center's AEGIS system displays a combined map and satellite image on a computer screen and indicates a helicopter's location, identification number, date and time, and air speed.

Medical Seminar in Sweden Advocates GIS, Collaboration, and Data Sharing in Fighting Infectious Diseases

Applications Combine GIS and Statistical Analyses to Support Global Pandemic Preparations

By Evy Peters, Editor in Chief, Aktuell Forskning och Miljö (Research and Environment Today)

A Karolinksa Institutet seminar emphasized the need for international cooperation in dealing with contagious diseases. The seminar, conducted in Sweden in June 2006, presented how geographic information system (GIS) technology and statistical analyses provide increased preparedness, better information, and more effective measures against the spread of infectious diseases such as bird influenza.

Through seminars and conferences, authorities worldwide are actively working together to limit the effects of bird influenza. Karolinska Institutet (KI), a medical university near Stockholm, Sweden, hosted a seminar in June 2006 to provide an opportunity for organizations concerned with infectious disease control issues to meet and exchange experiences and thoughts. At the same time, the seminar offered an opportunity to find out how GIS technology is used internationally to deal with global epidemics.

For example, ESRI and the SAS Institute collaborated to create a software solution in which geographic information is combined with the analytic functions of SAS tools. The table data in SAS can be linked with geographic data in ArcGIS to reveal how issues that are connected to spatial relationships can become part of the computerized analysis. With this combination, maps and interactive presentations can be created to visually reveal new relationships and solutions. GIS provides a system for concordance, communication, and cooperation in attaining shared understanding. Data can be linked to legislation.

Nearly all information can be associated to a geographic location. For example, the Swedish Board of Agriculture developed an application using GPS for recording where dead birds are found. The carcasses are subsequently sent to the National Veterinary Institute to determine whether they are infected by H5N1, the virulent flu virus. The locations of dead diseased birds are entered in a geographic database. Since the locations of Sweden's domesticated birds are already registered in the database, protective zones around dead bird incidences can be easily drawn, and owners of domesticated birds can be informed of measures that must be taken. (See map inset.)

"More and more authorities in the health sector are using GIS, which provides increasing numbers of people around the world with improved capabilities for cooperation," said Bill Davenhall, global manager, ESRI Health and Human Services. "We also see that cooperation between groups and countries has increased with the threat from bird influenza."

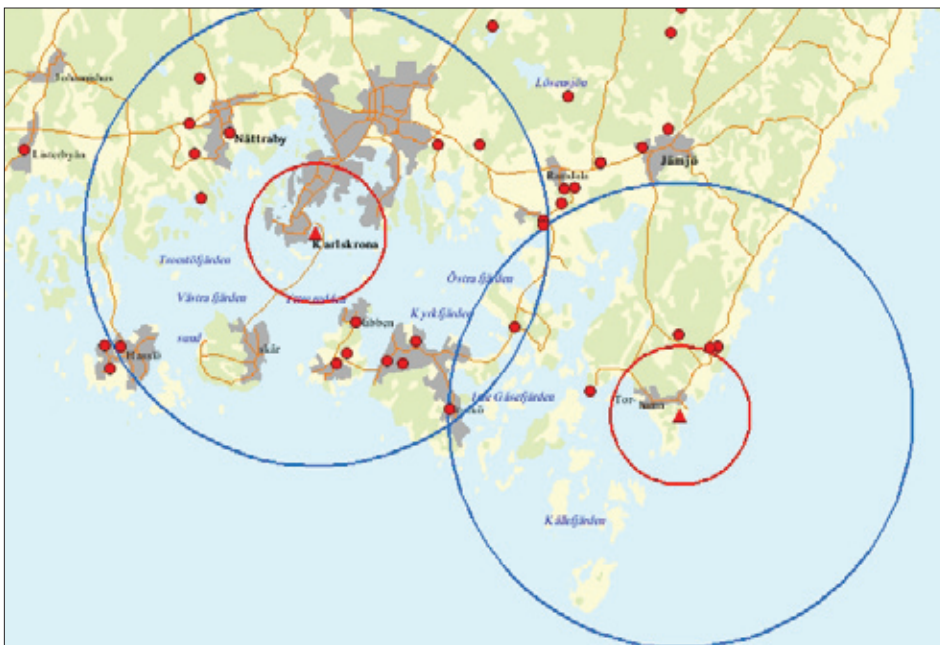Since animal infections have been known to mutate and spread to humans, the threat that bird influenza could develop into a pandemic (global epidemic) is real. Infections can spread quickly as humans use air travel to move around globally. Therefore, Davenhall maintained, national and global cooperation is important. A global, open database locating both people and animals is needed to prepare for future problems.

Annika Linde, a government epidemiologist at the Swedish Institute for Infectious Disease Control, explained during the seminar that the institute is dealing with bird influenza all the way down to the district level and that epidemics in Sweden are dealt with effectively. Travel behavior of Swedish households has been surveyed, but Linde would like to include other GIS data of interest, such as water supply and meteorological information, that can aid in tracing the spread of infections. According to Linde, more fundamental information is needed. With better handling of disease information, GIS can help identify and present how diseases are spread and thus have improved capabilities for stopping these diseases.

Marianne Elvander, a government zoologist working in epizootics at the National Veterinary Institute, pointed out that mapping the migration paths of wild animals all over the world would facilitate work in preventing the spread of diseases. Jan Danielsson, a veterinarian at the Swedish Board of Agriculture's unit for combating disease, suggested that a European portal giving access to an open and public database for all of Europe would be useful.

The KI seminar concluded with a panel discussion in which the participants agreed that a global discipline is necessary for handling the problem of bird influenza. In order to increase knowledge about the risks of infection for wild animals, information sharing is important and the technical capabilities exist. However, laws and directives concerning the spread of information must be respected even if, in certain respects, they hinder effective cooperative efforts to prevent disease spread.

Founded in 1810, KI is the largest single institution of higher education in medicine in the world. A committee of the institute appoints the laureates for the Nobel Prize in physiology or medicine. For more information on the institute, visit www.ki.se. For information on the seminar, contact Lars Skog, ESRI Sweden, at lars.skog@esri-sweden.com.

This map of a portion of Sweden indicates dead bird find incidences (red triangles), protective zones around the incidences (red and blue circles), and the preidentified locations of domesticated birds (red dots). GIS technology identifies which domesticated bird locations fall within the protective zone and extracts owner contact information for sending out mitigation instructions.

North Carolina Automates Statewide Hospital Emergency Department Surveillance System

Public Health Department and Hospitals Collaborate to Provide Timely Health Information

Hospital emergency rooms are often the first to record incidences of new health problem outbreaks, making hospital communication with public health systems essential for reporting and identifying the earliest warnings of nacent epidemics. North Carolina is the first state in the nation to have a fully automated statewide hospital emergency department surveillance system. In late 2005, state health director Dr. Leah Devlin unveiled the North Carolina Hospital Emergency Surveillance System (NCHESS), which provides real-time surveillance of hospital emergency department visits across North Carolina.

"Past experience has shown us that health problems often begin as a cluster of events that could be an early sign of a major epidemic or an act of bioterrorism that could go unnoticed until it became completely out of control," Devlin said. "NCHESS will allow us to catch problems while they are still small and take appropriate public health measures to ensure that they remain as small as possible."

With NCHESS, statewide hospital emergency department data is electronically submitted to the Division of Public Health. Public health experts are able to see quickly any unusual clinical information or trends that could point to a disease outbreak and take the appropriate response.

More than 100 hospitals across the state participate in the highly automated NCHESS. The program augments a manual, paper-driven system that can take weeks to analyze trends and investigate hospital records.

"Hospital emergency departments are always on the front line in efforts to protect patients," said William Pully, president of the North Carolina Hospital Association. "We are very proud to be working with the state in an effort that makes a tremendous stride forward in both public and patient safety. Our hospitals will benefit greatly from this effort. A positive working relationship between the state and hospitals has produced something unique and special for North Carolina citizens."

The system was developed in a partnership between the North Carolina Division of Public Health; North Carolina Hospital Association; the University of North Carolina School of Medicine, Department of Emergency Medicine; and all North Carolina hospitals with emergency departments. It was funded with a federal bioterrorism grant that became available after 9/11. It will detect incidents of bioterrorism like anthrax and will track other public health threats such as SARS or influenza. It will also be used in the wake of natural disasters like hurricanes to track health problems and ensure that they are addressed quickly.

For more information, contact Debbie Crane, director, North Carolina Public Affairs Office, 101 Blair Drive, Raleigh, North Carolina 27603 (tel.: 919-733-9190).

ESRI International User Conference Set for June 2007

The Twenty-seventh Annual ESRI International User Conference (UC) will take place June 18–22, 2007, at the San Diego Convention Center in San Diego, California. This gathering is for those who use ESRI's GIS solutions to manage and share geospatial data and analysis capabilities on the desktop, across the enterprise, in mobile devices, and through Web-based services. A comprehensive offering of sessions, workshops, and exhibits will help both experienced and novice users of GIS expand their knowledge and further their skills for deploying geospatial data and workflows at all levels of government, in business operations, and in society.

The Health and Human Services User Group (HUG) will hold its annual luncheon during the conference. Please be sure to attend to hear the latest updates on GIS health applications and meet other health and GIS professionals using ESRI technology for health-related applications.

The 2007 conference will feature a one-day Plenary Session covering highlights in development work by ArcGIS product teams. The conference week will include technical workshops and user presentation sessions. Workshops will cover ArcGIS software and extensions in detail, benefiting GIS users and development teams. User presentations, organized by topic and industry tracks, will enable users to discuss their applications and share lessons learned with others who share their goals and objectives for GIS.
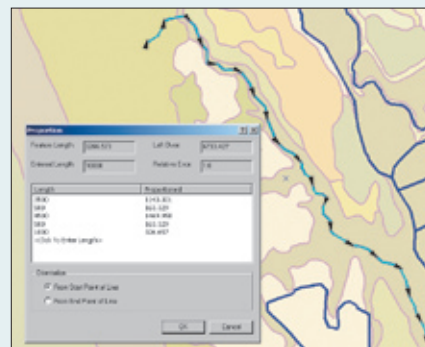
New for 2007 will be the Benefits of GIS track, designed for managers and senior executives to discuss the value and achievements of GIS technology within government and utilities as well as private sector organizations. The 2007 ESRI UC will feature a comprehensive exhibits area, offering direct access to hundreds of ESRI business partners and information on the products and services that are available to support GIS users.

All levels of GIS users will benefit from attending the 2007 ESRI International User Conference and concurrent events. Dates, deadlines, and other conference details are now available at www.esri.com/uc.

ESRI Best Practices Series: Case Studies from Your Industry

Free Booklets Showcase Users' GIS Stories

How are real users succeeding with GIS in your industry? To help you find out, ESRI has put together a no-cost, downloadable case study series relevant to your specific field. The GIS Best Practices booklets are discipline-driven collections of previously published ESRI articles that highlight the work of your peers, suggest solutions for your GIS challenges, and help you develop your business case. To date, ESRI has published more than a dozen GIS Best Practices booklets, in PDF format, on a variety of topics such as public works, law enforcement, and ArcMap editing tips and tricks. Stay tuned, because more than 20 additional titles will become available throughout 2007. For a complete list of the currently available GIS Best Practices booklets, visit www.esri.com/bestpractices.
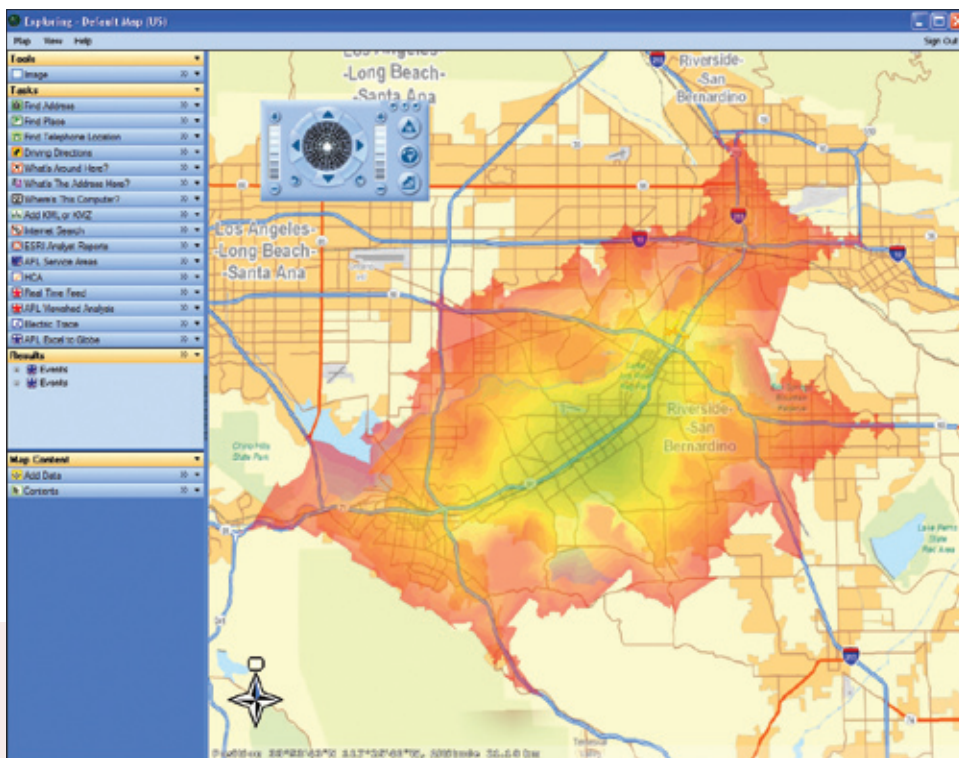

Use the Proportion command to split a selected line feature into a number of segments based on distance values.

Source: *Be More Productive with ArcGIS: ArcMap*

Latest ArcGIS Software Release Makes It Easier to Author, Serve, and Use Geographic Knowledge

ESRI's ArcGIS 9.2 is a full release of ArcGIS Desktop (ArcInfo, ArcEditor, ArcView, and ArcReader), ArcGIS Engine, ArcGIS Server, and ArcIMS. ArcGIS 9.2 introduces a new way of sharing and accessing the rich geographic knowledge maintained in a traditional GIS to make users more productive.

"By including all of the ArcGIS technology in a server environment and providing a family of new, easy-to-deploy applications and clients (Web, desktop, and mobile), we anticipate major growth in GIS deployment and use," says Jack Dangermond, ESRI president. "Together, the desktop, server, and new thin client tools provide a complete system for authoring, serving, and using geographic knowledge by all types of users."

ArcGIS 9.2 lets you deliver GIS capabilities to large numbers of users over networks with server-based GIS.

Highlights of the ArcGIS 9.2 release include

- Usability and quality enhancements that include an entirely new help system featuring intelligent search and an improved tables experience in addition to new navigation tools and keyboard shortcuts designed to make you more efficient and productive in your GIS work.
- A new method for storing cartographic representations in the geodatabase and a suite of advanced drawing and symbolization tools to help you automate tasks and perform the complete cartographic production process within the GIS.
- Server-based GIS with ArcGIS Server, which allows you to serve models and applications authored with ArcGIS Desktop as GIS services that can be consumed by browser-based, desktop, and mobile clients. ArcGIS Server also comes with the new ArcGIS Explorer client, which supports a wide variety of 3D mapping services as well as geoprocessing services for spatial analysis.
- New visualization and analysis tools that allow you to create, play back, and export time-based animations and graphs of how processes evolve, thereby revealing patterns and trends that help you make better decisions.
- New tools and wizards that make it easy to set up and manage a geodatabase. ArcGIS 9.2 also includes high-precision coordinate storage and greater flexibility in distributing your enterprise GIS data. You can create and share complete or partial database replicates (copies), synchronize and reconcile edits and changes, and create archives of transaction histories, allowing for improved collaboration and data sharing between departments, organizations, and field staff.
- Support for a growing array of open data standards including Open Geospatial Consortium GML Simple Features data, the ISO 19139 metadata standard, and DXF and KML. In addition, there is enhanced support for reading, exporting, and working with CAD drawings from AutoCAD and MicroStation.

All ArcGIS 9.1 users who are current on their maintenance will automatically receive ArcGIS 9.2 at no additional cost. For more information about ArcGIS 9.2, visit www.esri.com/whatsnew.

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