



GIS Solutions for Urban and Regional Planning

Designing and Mapping the Future of Your Community With GIS



ESRI Solutions

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©2003 EDAW—Balboa Park Multi-Modal Transit Station



©2003 EDAW—St. Louis Downtown Core & Riverfront District Master Plan

"No matter how large or small your community, as a planner you deal with spatial information such as parcels, zoning, land use, addresses, transportation networks, and housing stock. You also monitor multiple urban and regional indicators, forecast future community needs, and plan accordingly to help improve the quality of life in your community."

*Milton Ospina, ESRI
Urban and Regional Planning and Economic
Development Solutions Manager*

Every day, planners use geographic information system (GIS) technology to research, develop, implement, and monitor the progress of their plans. GIS provides planners, surveyors, and engineers with the tools they need to design and map their neighborhoods and cities. Planners have the technical expertise, political savvy, and fiscal understanding to transform a vision of tomorrow into a strategic action plan for today, and they use GIS to facilitate the decision making process.

Planners have always been involved in developing communities everyone would want to call home.

Originally, this meant designing and maintaining cities and counties through land use regulation and infrastructure support. Agencies have had to balance the needs of residential neighborhoods, agricultural areas, and business concerns. Now, in addition to that complex challenge, local governments must factor into these decisions the requirements of a growing list of regional, state, and federal agencies as well as special interest groups.

Rapidly changing economic conditions have further complicated the process by threatening the funding needed to carry out these functions. To date, local governments have been rightsized and downsized and have had budgets drastically cut while trying to maintain service levels. Information technology, especially geographic information systems, has proven crucial in helping local governments cope in this environment.

ESRI® software solutions help planning, building and safety, public works, and engineering professionals meet or exceed these demands. ESRI software is the number one choice of local governments for mapping and analysis. Using GIS software from ESRI, planning agencies have discovered how traditional tasks can be performed more efficiently and tasks—previously impractical or impossible—can be easily accomplished.

Benefits of using GIS in local government include the following:

- Increase efficiency.
- Generate revenue.
- Improve accuracy.
- Automate tasks.
- Increase access to government.
- Promote greater collaboration among public agencies.
- Save time.
- Provide decision support.
- Manage resources.
- Save money.
- Enhance public participation.

"Urban and regional planning underlies the very fabric of society as we know it today. Without planning and foresight, our cities, towns, rural areas, and residential communities will not run efficiently. While communities today face many challenges, some of them, such as pollution and traffic, can be addressed by careful and creative planning. It is the planner's job to address such problems and provide viable solutions for today and the future."

*Dr. Christopher Pettit
Postdoctoral Research Fellow, RMIT University, Melbourne*

Urban and Regional Planning

Helping Design Tomorrow's Cities Today

Planning seems simple enough: Design the ideal community, and ensure regulations support design goals. Reality is far more complex. Today, city, community, and regional planning means dealing with constant change. Planning professionals have the technical expertise, political savvy, and fiscal understanding to translate a vision of tomorrow into a strategic action plan for today. Requirements handed down from federal and state regulatory agencies, regional boards, and an increasingly active public have made this job even more challenging.

Literally thousands of local government organizations, and planning agencies in particular, have embraced GIS tools from ESRI as a means of meeting these demands while dealing with limited funding and staffing.

Front Counter Service and Current Planning

GIS promotes a good public image of a planning department. Equipped with GIS tools from ESRI, staff members can quickly access information on parcel maps, such as environmentally sensitive areas, and all matters concerning the implementation of zoning, permit status, and other planning information.

Comprehensive Planning

Planners use GIS to prepare plans, which set the standard for policy decisions regarding long-range changes to a community's physical environment. Planners make use of GIS to smooth the progress of citizen participation and community input as they develop a vision for the community that enhances the quality of life for all citizens. ESRI GIS tools help planners analyze problems more quickly and thoroughly, formulate solutions, and monitor progress toward long-term goals for the community.

Planning Agencies

GIS is also used at planning agencies to conduct environmental review of projects; development review, analysis, and compliance; historic preservation; and redevelopment, as well as regional planning, as more planning agencies seek to coordinate planning efforts to minimize negative impacts on neighboring communities. In many cases, planning agencies are also using GIS Web services to coordinate planning and economic development initiatives.

It is no wonder that ESRI's software solutions have been adopted by more planning agencies than any other GIS software. By integrating and organizing information spatially, planners can get a broad view of the current situation and more accurately assess the future. GIS software can analyze more scenarios more quickly, giving decision makers more choices.



GIS planning solutions can be used for

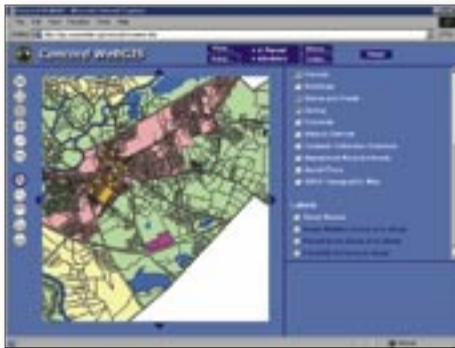
- Community-based design and planning
- Economic development
- Smart growth
- Improving the quality of life
- Creating better communities for future generations
- Creating livable communities
- Planning services
- Urban and regional planning
- Brownfields redevelopment

World Town Planning Day

While you are celebrating GIS Day™ this November, why not celebrate World Town Planning Day, too? Sponsored in the United States by the American Planning Association (APA) and its professional institute, the American Institute of Certified Planners (AICP), World Town Planning Day is celebrated in 30 countries on four continents each November. It is a special day to recognize and promote the role of planning in creating

livable communities. This November, plan a joint GIS Day/World Town Planning Day event within your organization, school, or community! GIS technology combined with responsible planning can help you as a citizen contribute to a sustainable strategy for the future of your community. For more details, visit www.planning.org/worldtown/.

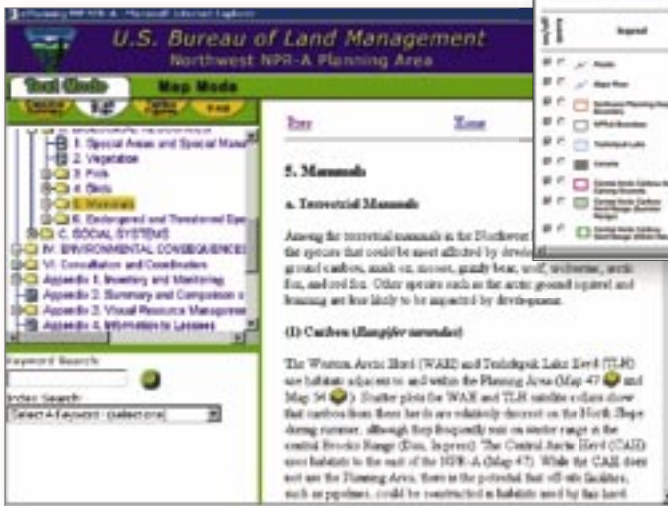
Integrated Web Services and GIS for E-Government



Concord's WebGIS Internet mapping solution allows users to search for any property in town by address, owner name, or parcel ID. Information, such as parcel size, zoning, owner name and address, and assessed value, is available.



Xplorer is designed as a simple but functional application that places special emphasis on the provision of public access to council and property information for the benefit of the citizens of Upper Hutt City, New Zealand.



E-government is using the Internet and GIS to create more effective government. The combination of readily available Internet access and maps lets governments provide a new level of service to both businesses and the public. It is making collaboration between government agencies possible in new and powerful ways. The strong data integration abilities of GIS let governments truly capitalize on data existing in legacy systems.

GIS-enabled Web sites can provide services, such as online mapping, fee payment, and application submission, that were not previously available. Three categories of e-government applications have developed: government to business, government to citizens, and government to government.

- Government-to-business applications typically relate to economic development, land development, licensing, or permitting.
- Government-to-citizen applications provide information on government service, such as trash pickup, or streamline the public's interaction with government agencies by allowing online payment of fees or providing feedback on land use plans to officials.
- Government-to-government applications improve the amount, quality, and speed of information exchange among various levels of government and/or agencies and departments within governments. Better communication helps governments use resources more wisely by avoiding duplication of effort and allows agencies to work together to tackle large-scale planning problems or respond to emergencies.



The U.S. Bureau of Land Management (BLM) uses ArcSDE and ArcIMS for management purposes and to facilitate public participation in the land use planning process. E-Gov for Planning and National Environmental Policy Act of 1969 (NEPA) project, or "ePlanning," is a project initiative that focuses on the delivery of planning information consisting of fully integrated text with intelligent and interactive maps and map layers. By doing so, BLM leverages information technology (IT), especially the application of the World Wide Web, to create more efficient business practices and encourage an open and collaborative process.

Using Imagery and GIS for Tracking Urban Growth Along South Carolina's Coast

The tri-county region of Charleston, South Carolina, composed of Berkeley, Charleston, and Dorchester counties, covers about 1.7 million acres (almost 10 percent of the state's land area). In the last 10 years, the region has experienced tremendous urban expansion, with 95 percent of the state's population growth resulting from increased coastal access via Interstate 95. With the emphasis on attracting more industry and business to boost the local economy and the state's expected population increase from 3.5 million to 4.5 million by 2010, local and regional planners were interested in balancing the environmental concerns of this fragile coastal region with economic needs.

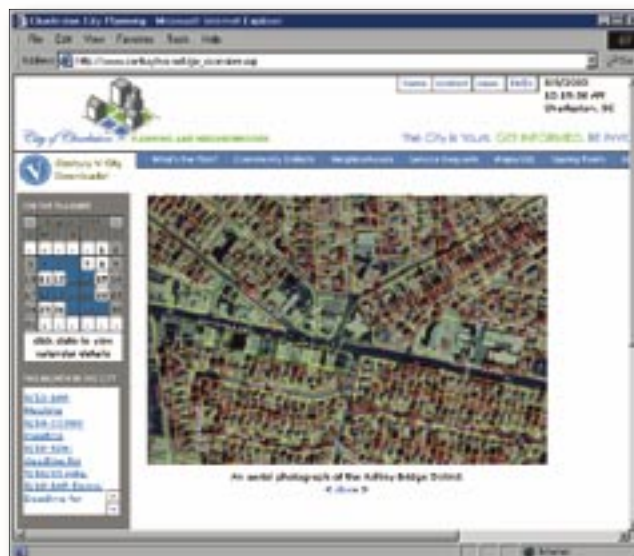
In 1994, the National Aeronautics and Space Administration (NASA) office of Mission to Planet Earth (MTPE), awarded a research grant (NAGW-4014) to the South Carolina Department of Natural Resources (SCDNR), the University of South Carolina, Georgia Tech Research Institute, and the Georgia Wildlife Federation (GWF) to use satellite imagery for studying the rate of development in the metropolitan Charleston area; South Carolina; and Savannah, Georgia. The goal of the study was to identify, document, and communicate the rate of urban change to support effective land planning decisions in the future.

After imagery was selected and compiled, three classes of land cover—water, nonurban, and urban—were identified and verified. In the final 12 classification maps, change detection was performed to identify urban growth in the coastal zone.

The change data confirmed that urban expansion in the region increased 255 percent over the two decades of the study (or 6.2 times faster than population growth, which occurred at 41 percent), increasing from 45,150 to 160,232 acres.

Primary growth occurred in residential neighborhoods, near major transportation corridors, and along the prominent river systems in close proximity to fragile estuarine marshes. The urban core of the Charleston peninsula saw densification of buildings, and the barrier islands expanded with developments such as resorts, golf courses, and beachfront homes.

Finally, the Berkeley, Charleston, and Dorchester Council of Governments (BCDCOG) is building on this project by developing a proposal funded under the Transportation and Community and System Preservation (TCSP) Program as part of the Transportation Equity Act for the 21st century (TEA-21) to link transportation and other infrastructure and land use planning.



The final report and image maps were made available to the public on a CD-ROM. The BCDCOG incorporated the imagery and change data into its ArcView database to assist local planners in identifying land use trends and developable land and to create more accurate basemaps. The project successfully produced the first multitemporal image database for use by local and regional planners in the area.

Benefits

- Assists planners in identifying land use trends and developable land areas
- Provides decision support
- Saves time
- Promotes enterprise or systemwide use of GIS data and technology
- Increases accuracy

Case Study—Madrid, Spain

Madrid Uses GIS to Meet Government Regulation.

According to Spanish law, every city must have a General Urban Management Plan. Such a plan defines the rules for expanding a city and its infrastructure, for building real estate, and for protecting historical areas. After assessing its existing plan, the city of Madrid determined that in order to realistically meet this mandate, they needed an elaborate new plan.

The methodology of developing the new plan was much different than the development of the old one. This time, maps used for constructing the plan were to be spatially digitized and offered on CD-ROM as well as via the Internet.

The city also wanted to improve its customer response time. The old system, Public Services, which offered detailed city information, could provide consultation to only three people a day, creating a backlog in meeting conference demands.

The need to update the old plan was the impetus for administrators to consider how new technical information systems could help. The administrators decided to adopt a sophisticated GIS system that would not only serve the immediate need of plan development but also operate that plan in the next century.

Once the plan was submitted and approved, it had to be executed. To meet the legal framework of its scheme, the city needed a GIS that could update information daily and make it available to more than 20 district offices. A corporate database was created using ESRI's ArcSDE®. ArcInfo™ was selected to convert information contained in hundreds of computer-aided design (CAD) files, create topology, and verify the data's accuracy.

The database became a repository of vital information that was quickly adopted by more than 1,000 users.

While access to information is important in a GIS, it must also be functional in interacting with agencies. This goal was achieved by developing applications based on Visual Basic®, MapObjects®, ArcView®, and MapObjects Internet Map Server applications for viewing information managed by ArcSDE and Oracle®. The functionality offered to users included viewing and printing thematic maps, zooming in and out, measuring distances, making queries and selections, and exporting and importing data to different file formats.

All applications use a continuous map with transparent access to information contained in maps, tables, and raster files. The user can access the information by linking addresses, map sheets, or the name of a property such as a school or a particular zoning area.

The city of Madrid's plan successfully meets the criteria set by the General Urban Management Plan law. City officials work with geographic data quickly and easily. Spatial visualization of the city offers relevant data about the future. The system provides the tools to analyze geographic images such as aerial photographs, cartography, and detail studies. Tools also aid in control and inspection work.

The GIS has improved the lives of many of Madrid's citizenry. For example, the Public Service office reports that it has vastly improved its customer services. Access to geographic information takes only 10 minutes; thus, its time with clients has been dramatically reduced.



Land Use Model of Madrid

Benefits

- Streamlined business practice work flow
- Improved collaboration and communication across departments
- Increased decision support
- Increased efficiency
- Improved access to government
- Improved customer service

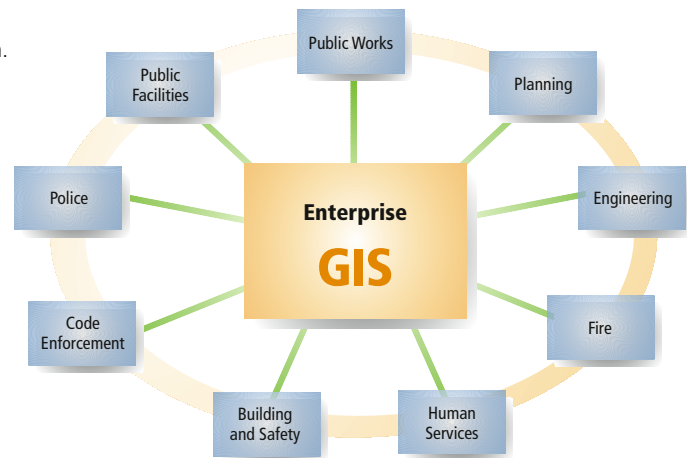
Using GIS to Enhance Business Work Flow Across the Enterprise

GIS has expanded from a niche technology used by specialists to an integrated information technology used throughout an organization. While the demand for staff who specialize in GIS persists, numerous planning and economic development, community development, and public works professionals are embracing GIS as a basic tool for conducting their daily business. ESRI supports both approaches with an array of tools for GIS professionals performing georeferenced tasks and those who use GIS in many disciplines to improve efficiency and productivity and centralize information.

Furthermore, many urban, community, and regional planning efforts are so complex that they involve federal, state, and local governments. In this case, GIS is used to facilitate this process across many agencies and departments and thus help prevent traditional problems of data redundancy and data currency.

GIS provides the framework for an integrated work flow across the enterprise for creating, enhancing, and updating the GIS databases that can be easily shared both within and between organizations. Although GIS applications have been used to manage individual planning projects for decades, the real benefits of GIS use can only be fully realized by applying GIS across the entire organization's business work flow.

The ESRI family of software works together to handle the entire work flow from data creation to information distribution in an environment that supports information technology standards and interoperability with existing systems. Enterprise GIS, with the geodatabase, data models, and an array of applications, is revolutionizing the planning process.



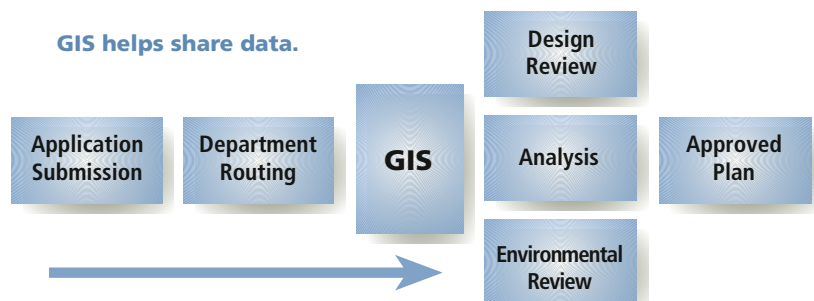
By integrating GIS with local government daily business processes, planning staff can

- Streamline processes.
- Track projects better.
- Create an information base.
- Perform joint project analysis.
- Share information resources.
- Reduce redundant data sets.
- Increase interdepartmental communication.
- Increase efficiency and productivity.

Managing the Development Review Process

The development review process ensures that plans for development adhere to federal, state, and regional requirements as well as protect citizens from environmental or public safety hazards and support progressive economic development. Planning agencies are integrating ESRI® software solutions as a central component in the development review process. The functionality of ESRI's GIS software streamlines design review activities such as mapping, site review, notification, analysis, and environmental review. GIS integrates and streamlines processes among different departments.

ESRI's GIS software, the next step in the evolution of information technology, streamlines the development review process by sharing data. Using a central information base eliminates problems caused by conflicting data.



GIS Supports Planning and the Public Participation Process With Planning Support Systems

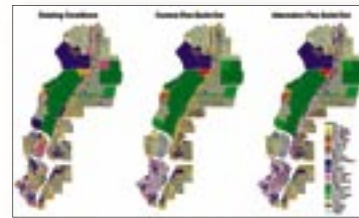
Advances in GIS and supporting technologies have led to the development of decision support systems that facilitate the community planning process. There are several planning support systems (PSS) available on the market today to ESRI users. PSS use indicators and alternative development scenarios to measure the attributes and performance of communities and their plans. Planning support systems are instrumental to successful community planning and public participation processes because they focus on the needs and the know-how of users as opposed to focusing on or requiring a high degree of GIS expertise.

Planning support systems can measure and compare performances of different planning scenarios according to planner- or citizen-defined indicators for land use, transportation, natural resources, and employment, to name a few. The ultimate goal is to bring together all potential players to work collaboratively on a common vision for their community.

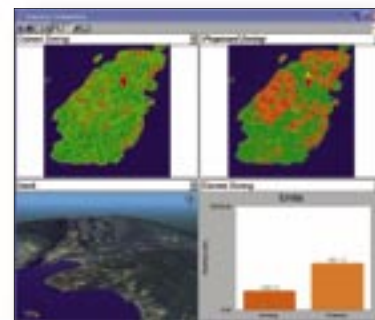
GIS-based planning support systems allow planners and citizens to quickly and efficiently create and test alternative development scenarios and determine their likely impacts on future land use patterns and associated population and employment trends, thus allowing public officials to make informed planning decisions.



The compare scenario functionality in *What if?*[™] enabled council planners from the shire (township) of Hervey Bay, Australia, to undertake visual comparative analysis of alternative urban growth scenarios generated for Hervey Bay 2021. The diagram above illustrates two resultant land use patterns based on different sets of user-specified input values. The No Land Use Controls scenario scatters residential development (shown in magenta) across the shire to areas outside the map window extent. The Land Use Control scenarios concentrate residential development within and around the city of Hervey Bay, filling in undeveloped land tracts (shown in yellow) and rural urban fringe areas (shown in green).



San Antonio's Broadway Corridor was modeled three ways in *Smart Growth INDEX*[®]: existing conditions, current build-out plan, and stakeholders' alternative build-out plan. The latter emphasizes mixed live/work/shop land uses. The final INDEX "report card" for the corridor revealed that the stakeholders' new proposed plan would create much better conditions than the current plan. In this way, the GIS tool gave participants rapid, critical feedback on the validity of their work to date and the promise of their future efforts. The catalyst for bringing these stakeholders together was an offer from the U.S. Environmental Protection Agency (EPA) to apply *Smart Growth INDEX*, a GIS-based planning support tool that EPA is distributing nationally to selected communities.



Like many other small rural communities across North America, Bowen Island in British Columbia, Canada, is feeling the pressures of urban growth, and it is actively exploring new smart growth strategies and integrated planning frameworks for navigating a path forward. A key element of this planning framework is the capacity to envision and assess viable pathways toward community sustainability. Bowen Island is using *CommunityViz*[™] to support this process of planning and "what if" analysis through a powerful suite of integrated GIS modeling and landscape visualization tools that provide both context and focus for community-based decision making.

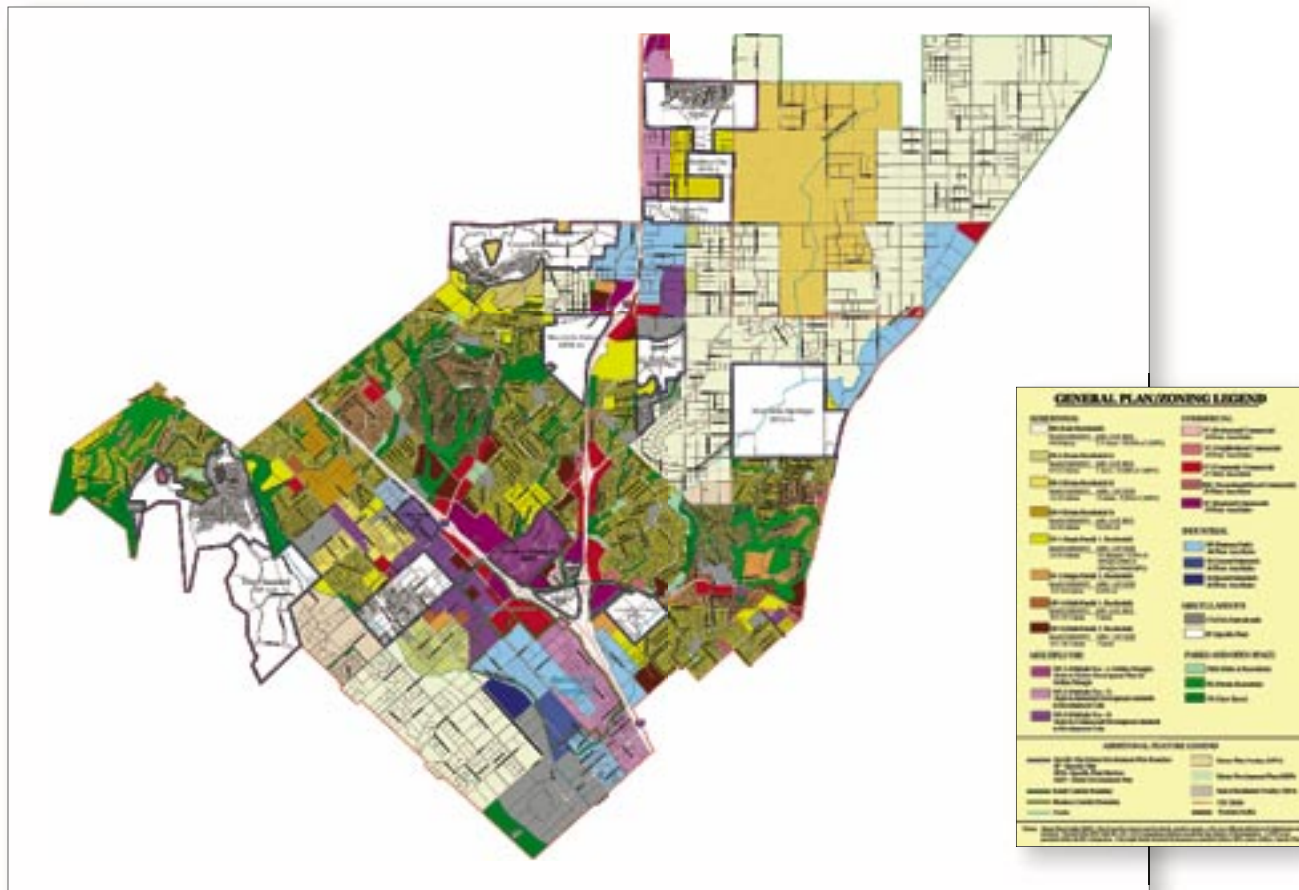
Three-Dimensional Visualization Tools

Community planners, architects, urban designers, and land use planners are increasingly using three-dimensional visualization tools to give citizens and public officials the ability to visualize the impact or probable result of urban design projects and proposed land use and zoning changes or envision the results of smart growth initiatives. Three-dimensional GIS tools facilitate public participation by communicating both complex and simple geographic and man-made phenomena. Three-dimensional visualization tools combined with planning support systems allow the public and decision makers to interactively change or simulate existing and proposed modeled environments or scenarios.



SiteBuilder 3D[™] is used to visualize the potential development of the Tacoma Dome area. *SiteBuilder 3D* is used to explore and model different height proposals for the mixed use development, and three-dimensional visuals have been created for specific proposed developments.

City of Murrieta General Plan/Zoning



The city of Murrieta, with a population estimated at 72,000, is located in southwestern Riverside County, California. The general plan/zoning map provides intricate zoning information to city planners, developers, and the public. The city has a rather unique general plan/zoning map that combines both land use and zoning designations to ensure that zoning and general plan internal consistencies comply with state law.

The map's legend is also unique in that it includes information about the zones, and the zoning color scheme closely adheres to that suggested by the American Planning Association.* ArcView and HP® plotters offer the necessary tools to develop this zoning map.

City of Murrieta Planning Division

Murrieta, California, USA

By Jay Seckman

Contact

Jay Seckman
jseckman@murrieta.org

Software

ArcView and Windows® 2000

Hardware

Dell Workstation

Printer

HP Designjet 5000

Data Source(s)

Riverside County

**For more information on the American Planning Association Land-Based Classification Standards (LBCS) and to download the LBCS ArcView legend to use in ArcView and ArcGIS, visit www.planning.org/lbcs/GIS/.*

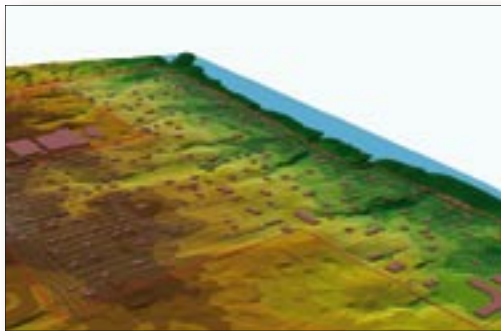
Map Gallery



City of Evanston GIS

The zoning map is available in several formats including 26" x 26" plots, 36" x 36" plots, and PDF downloads from the city's Web site. In addition, an ArcIMS® application provides an interactive map utilizing similar layers and symbology. The zoning map contains more than 12 geographic layers, including tax parcels, building footprints, wards, historic districts, and various annotation layers, completely maintained by the GIS Division and stored as ArcSDE feature classes. It represents a collaborative effort between the GIS Division and the Zoning Division. The Evanston GIS Division supports all other city departments with data, maps, Web applications, and geographic analysis.

Village Comprehensive Land Use Plan



3D Elevation Model



Aerial Photo



Shawnee Hills was platted in the 1920s as a resort fishing community on the O'Shaughnessy Reservoir. Lots were small, and utilities were not available. The village is ripe for rapid population growth with the recent provision of sanitary sewer.

The comprehensive land use plan Delaware County Regional Planning Commission (DCRPC) proposed includes a one-way street pattern with bikeways and walkways to calm traffic. The plan could enhance the safety of narrow streets while retaining their charm. A village square is proposed with a new village hall as its anchor. To improve active recreation, the acquisition of five to 10 acres in the northwest corner of the village for a village park is recommended. New commercial uses could be approved under the new Select Commercial District, which gives flexibility to the design plan. Access management controls are important to prevent congestion and enhance safety on the main street of the village.

The 2001 village comprehensive land use plan map shows the analysis process and the recommendations from the DCRPC.

Delaware County Regional Planning Commission, Ohio

Delaware, Ohio, USA

By Da-Wei Liou

Contact

Da-Wei Liou
dliou@co.delaware.oh.us

Software

ArcInfo, ArcView, and Windows NT®

Hardware

Dell Precision Workstation 340 Pentium 4

Printer

HP Designjet™ 755CM

Data Source(s)

DCRPC and Delaware County Auditor's Office

Massachusetts Geographic Information System

Build Out Analysis of All 351 Cities and Towns in the Commonwealth



Developable Lands and Partial Constraints



Absolute Development Constraints

Development Constraints—

Interstate 495 Region

Massachusetts Geographic Information System
(MassGIS) Commonwealth of Massachusetts

Boston, Massachusetts, USA

By Michael Trust

Contact

Michael Trust, michael.trust@state.ma.us

Software

ArcView and Windows NT

Printer

HP Designjet 2500CP

Data Source(s)

MassGIS and Massachusetts regional
planning agencies

As part of its Community Preservation Initiative, the state Executive Office of Environmental Affairs (EOEA) contracted with the 13 Massachusetts regional planning agencies (RPA) and consultants to provide a build out map and analysis of all 351 cities and towns in the commonwealth. A build out analysis is a series of GIS-based maps that illustrate a community's current zoning, the land available for development and how it is zoned, and maximum development possible in a particular community if every piece of developable land was developed based on existing local zoning. Accompanying the maps are projections of the numbers of residents, households, public school students, and water use at build out. The analysis is a planning tool that demonstrates development as it could occur if no changes are made to current zoning, and it helps to stimulate discussion as communities continue to grow. EOEA's watershed team leaders and RPA presented each city or town's build-out analysis to city councils and boards of selectmen in all 351 communities.

Absolute Development Constraints—Interstate 495 Region is the first in a set of maps for a super summit held in May 2001 for 27 communities in the Interstate 495 beltway. It displays land already developed or absolutely constrained. Such constraints may vary from town to town due to zoning regulations but generally include steep slopes, wetlands, and floodplains. Current regionalized zoning codes, protected open space, and recent subdivisions are featured.

Developable Lands and Partial Constraints—Interstate 495 Region is the second in the set of super summit maps. It displays land potentially developable, symbolized by a regional zoning classification. Massachusetts Geographic Information System derived these regional zoning codes to assure a standard legend across a state in which the 351 communities' zoning codes vary greatly. For more information on the methodology used in the build out analyses, visit www.state.ma.us/mgis/buildout.htm.



Lighting



Open Space Register



Supply With General Goods



Transportation Development

The urban planning department of Rostock is using an urban information system to characterize its state of development and determine potential planning sites, wasteland, and problem sites.

The four maps are a part of a larger process involved in using a GIS to develop an urban quarter. They are used as layers to form larger main categories or data blocks including land use, open space, transportation, and social infrastructure.

The GIS-based analysis has played an essential role for the city in setting goals and developing strategic plans for a problematic urban corridor. In addition, the information can be continuously updated for further land use management policies.

Integrated Urban Development

Planungsbüro für Ingenieurbauwerke und Verkehrsanlagen GmbH (PLANIVER)

Neubrandenburg, Germany

By Thomas Weber and Stefan Höse

Contact

Thomas Weber, tweber@planiver.de

Software

ArcView, ArcPress™, Corel Draw, and Windows NT

Hardware

Pentium III

Printer

HP Designjet 1050

Data Source(s)

Land surveys, aerial photography, and city maps



Case Study

More Efficient Business Work Flow Results in Significant Savings.

The Sumter, South Carolina, City–County Planning Commission has found that implementing ESRI software has not only greatly enhanced their work flow process but also saved the public significant amounts of money.

One of the many responsibilities of the Planning Commission is to rule on rezoning petitions filed by the public. Previously, the Planning Commission would use a cumbersome filing system to monitor these cases. The GIS Department presented the planning director with a solution that included ArcView and ArcGIS Zoning Analyst. The plan was not only to make the business work flows more efficient, but also to provide the planning director with a spatial reference for each case. Recognizing that almost every planning-related

case is strongly influenced by its location, the planning director decided to implement the ArcView and Zoning Analyst GIS solution from ESRI business partner Geographic Information Services, Inc.— www.gis-services.com.

The benefits were quickly apparent. By implementing Zoning Analyst to track land use cases, create parcel buffers, and generate public notification letters, the Planning Commission has reduced its previous effort by 90 percent. The commission has saved two months of personnel time in a single year, and it provides a more efficient service to both internal users and the public.

In addition, the commission found new uses for GIS software including using it for an inspection by the National

Flood Insurance Program and to perform a joint land use study with neighboring Shaw Air Force Base. In the National Flood Insurance Program application, the GIS Department was able to identify and document 2,300 properties in the flood zone in under a day—a process that previously took six to eight weeks. This timely process is likely to upgrade the county's Community Rating System (CRS) by a level, which would save the public up to 4 percent on their flood insurance premiums.



Benefits

- Increased customer service efficiency
- Time saved
- Money saved
- Increased decision support
- Improved business work flow

Case Study

Land Use Mapping Efficiency Increased by 90 Percent.

The Division of Land Use Administration for the city of Richmond, Virginia, replaced a cumbersome manual process with automated GIS-based map production. Adopting GIS has not only made the process more efficient but also more accurate. As part of the Department of Community Development, the division is responsible for amending the zoning ordinance and supporting the Board of Zoning Appeals and the Planning Commission. Until recently, a drafting technician created zoning, land use, and Master Plan maps by accessing data kept in filing cabinets, outdated paper maps, and legacy mainframes.

Before GIS was implemented, property maps were compiled by an outside vendor and delivered in paper format. Property maps, copied from the Assessor's keycards, were made at different scales. Because each city block was recorded on a separate page, a drafting technician had to assemble, copy, and scale a number of pages to map an area.

The process for creating zoning maps was equally onerous. The zoning maps, printed on Mylar, had to be sent out for large size duplication on paper. These paper copies were hand colored to indicate zoning. If a property was located at or near the edge of a zoning sheet, additional sheets would have to be printed, scaled, and colored. The resulting sheets would be pieced together manually.

Before GIS was used, staff members researched land use coding values assigned by the Assessor's Office by locating properties on a paper map, checking property locations by referencing property descriptions stored on a mainframe, and then cross-referencing coded values with a more generalized scheme kept in a notebook. Finally, each property was hand colored according to existing land use.

The city's Master Plan maps were created using a graphics program so the technician had to photograph the pertinent Master Plan map to create slides for zoning board meeting presentations. Because Special Use Permits were not noted on zoning maps, this information had to be researched using the division's card catalog.

With GIS, the drafting technician can query for a specific address, zoom to a desired geographical extent, and quickly create a site, zoning, existing land use, or Master Plan land use map with a date and scale bar. Layers were developed for parcel, zoning, Master Plan land use, transportation, surface parking lots, and the existing land use.

The parcel layer is powerful because its features are directly linked to the Assessor's Office and Central Address databases. Address, ownership, property values, and land

use information can be accessed directly by clicking on a parcel without any time-consuming research!

The drafting technician can now query a complete, citywide representation of property boundaries. After labeling streets and properties, the drafting technician simply turns on the zoning, existing land use, or Master Plan land use layers and prints any of these maps. Before GIS, producing a series of site, zoning, existing land use, and Master Plan land use maps took between five and seven hours. With GIS, it now takes less than 30 minutes. GIS has reduced the time needed to complete mapping tasks by more than 90 percent, and the result is a better product.



GIS has reduced the time needed to complete mapping tasks by more than 90 percent, and the result is a better product.

Benefits

- Optimized work flow and streamlined business practices
- Increased decision support
- Saved time
- Improved access to government
- Increased accuracy

The ESRI Family of GIS Solutions

ESRI is the leading provider of GIS software to land records, assessment, and cadastral agencies worldwide. ArcGIS is the enterprise foundation for these agencies. It integrates mapping, surveying, registration, valuation, and public access. These solutions can be deployed on the desktop, on the Web, or across the enterprise. ESRI products work in an integrated and flexible manner. They provide just the right software for your needs today and can be scaled to meet future needs.

ArcGIS

ArcGIS®, a family of software comprising a complete GIS, is built on industry standards. Out of the box, it provides rich functionality and the applications in ArcGIS—ArcView, ArcEditor™, ArcInfo—can be configured to match an organization's needs. Built out of modern object-based components, these software programs share the same core applications, user interface, and operating concepts. ArcGIS is used for the creation, management, integration, analysis, display, and dissemination of spatial data. Strong visualization, editing, and analysis, along with advanced data management, distinguish the ArcGIS software family as the leading GIS software.

ArcView

ArcView is designed with an easy-to-use, Windows-like user interface and includes Visual Basic for Applications (VBA) to allow for customization. ArcView consists of three desktop applications: ArcMap™, ArcCatalog™, and ArcToolbox™. Display, query, and analyze data in ArcMap. Manage, create, and organize geographic and tabular data using ArcCatalog. Use the tools and wizards in ArcToolbox to convert data to other formats.

ArcEditor

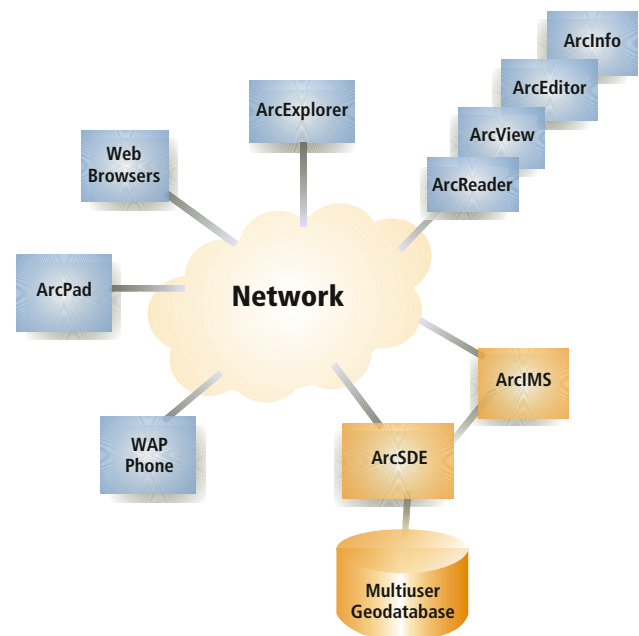
ArcEditor is a state-of-the-art GIS data visualization, query, and creation solution. Designed for the Windows desktop, ArcEditor can create and edit all ESRI-supported vector data formats including shapefiles, coverages, personal geodatabases, and multiuser geodatabases.

ArcInfo

ArcInfo is the complete GIS data creation, update, query, mapping, and analysis system. ArcInfo includes the most comprehensive collection of GIS tools available. As part of the ArcGIS software family, ArcInfo encompasses all the functionality of ArcView and ArcEditor and adds the advanced geoprocessing and data conversion capabilities that make it the de facto standard for GIS.

ArcSDE

ArcSDE is an application server that facilitates storing and managing spatial data (raster, vector, and survey) in a database management system (DBMS) and makes the data available to many kinds of applications. ArcSDE allows you to manage spatial data in one of four commercial databases (IBM® DB2, Informix, Microsoft SQL Server, and Oracle). ArcSDE serves data to the ArcGIS Desktop products (ArcView, ArcEditor, and ArcInfo) and through ArcIMS.



ESRI has solutions that can be deployed on the desktop, on the Web, or across the enterprise.

ArcGIS Extensions

ArcGIS extensions operate seamlessly with ArcGIS Desktop products to provide additional functionality on demand. The ability to incorporate task-specific data and analysis and display capabilities within a consistent interface significantly reduces training, operating, and acquisition costs. Of the many available, the extensions described here offer functionality that is especially useful for land records management.

ArcGIS Survey Analyst

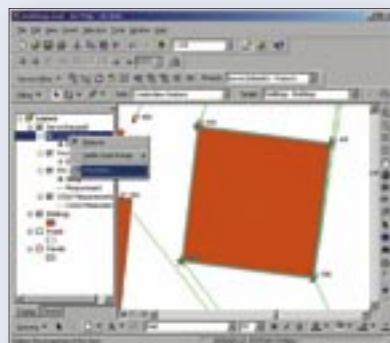
ArcGIS Survey Analyst brings survey-quality data into the GIS environment. Developed jointly by ESRI and Leica Geosystems, this new extension to ArcGIS allows surveyors and GIS technicians to work in a truly collaborative manner in a unified environment. Users can manage survey measurements in ArcCatalog as a survey data set.

With ArcGIS Survey Analyst, a new data type—survey data—allows surveyors and engineers to build a survey information system within ArcGIS. ArcGIS Survey Analyst uses industry-standard computations and adjustment procedures to resolve the locations of features. Computations resolve and adjust survey measurements into a completed survey with coordinates computed for the survey points. Any survey point that has a corresponding identifiable GIS feature in a GIS layer can be used to edit a GIS feature.

This improves spatial quality and also allows for heads-up digitizing by selecting survey points that define the location, size, and shape of new GIS features interactively from the screen.

In ArcGIS Survey Analyst, new surveys can be added and new computations performed on existing survey points. The coordinates of survey points can change as new data is added or new procedures and equipment are used to better define survey point locations. This data can come from multiple sources such as digital data files from survey collectors (e.g., Total Stations); notes and measurements contained in a survey field book; or measurements from map manuscripts, legal documents, and maps.

This provides opportunities to build multiuse survey data sets within the measurement database, adding value to the volumes of survey data collected, managed, and maintained by surveying and engineering firms. The bottom line—GIS technicians, practitioners, and managers have a tool for improving the quality of GIS data.



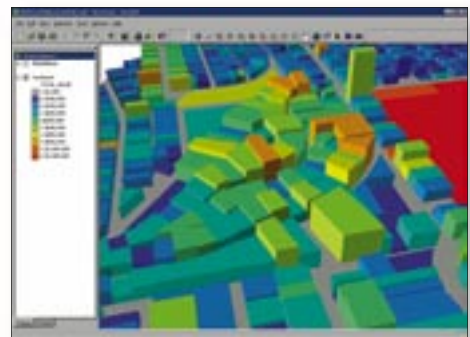
ArcGIS Survey Analyst



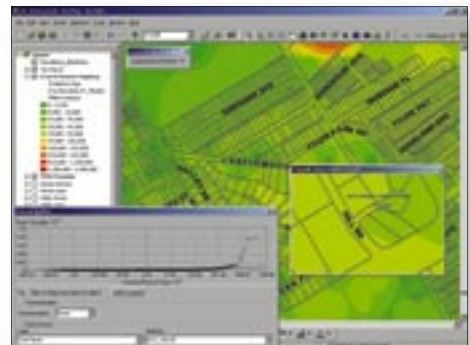
ArcScan™ for ArcGIS—Converts raster scans of parcel maps into vector-based geodatabase feature classes. ArcPress for ArcGIS helps produce high-quality maps quickly.



ArcGIS Spatial Analyst—Advanced spatial analysis using raster and vector data to model the influence of location-specific data on value



ArcGIS 3D Analyst™—Three-dimensional data visualization and topographic analysis



ArcGIS Geostatistical Analyst—Statistical tools for data exploration, modeling, and advanced surface creation

Internet and Mobile GIS



ArcIMS

ArcIMS is the foundation for distributing and disseminating GIS data on the Internet. ArcIMS enables a common foundation for the exchange and sharing of resources by providing a collaborative environment for land records agencies to share information. ArcIMS works with a variety of clients including ArcGIS Desktop products, ArcExplorer™, ArcPad®, and Web browsers. ArcIMS is being used by hundreds of land records agencies to provide public access to GIS data maintained by various land records departments. Ready access to this data by the public as well as intensive users of land record data, such as the real estate industry, has resulted in significant savings to public service departments.



ArcPad

ArcPad is a mobile GIS technology for field data collection and verification. ArcPad provides database access, mapping, GIS, and global positioning system (GPS) integration to users in the field via handheld and mobile devices. ArcPad allows you to take a portion of the land records geodatabase into the field and then verify, edit, or create data. The new version of the data can then be inserted back into the geodatabase and reconciled with other editing that may have occurred in the same area. This ability to disconnect from the geodatabase, edit data, then commit the data back into the geodatabase without additional conversion is measurably increasing the efficiency of field appraisers.

Cartography



Maplex

Traditionally, land records mapping required extensive, time-intensive labeling. Maplex, the fully automated name placement and cartographic design software for high-end mapmaking, improves the quality and speed of labeling. User-dictated rules specify how annotation is placed, ensuring that names on a map do not overlap and are clearly associated with the features they annotate. Quickly place several labels per second, saving valuable time and up to 40 percent in cartographic production costs. Maplex allows the user complete control over the specification of preferred text style and configuration for each class of named feature.



Bringing GIS to the World

ESRI has been the world leader in the GIS software industry for more than 30 years. As the leader in GIS technology, ESRI offers innovative solutions for the desktop, Internet, and field that will help you create, visualize, analyze, and present information more clearly so that you can make better decisions.

Working with location information, ESRI's GIS software and solutions give you the power to solve the problems you encounter every day. Organizations around the world, as well as local, state, and federal government agencies, are using ESRI GIS software to make smart and timely decisions. ESRI provides powerful GIS solutions to more than 300,000 clients in more than 220 countries. In fact, ESRI leads the industry in providing mapping technology that meets today's global needs.

ESRI has continued to make major investments in the development and implementation of open GIS standards and interoperability to meet the needs of users for a distributed, multipurpose GIS that works in the larger IT community. The goal is to create one infrastructure that works everywhere—across all platforms and technologies and on all types of devices. ESRI GIS solutions help unlock the spatial component of your data and allow you to see your organization's information from a new perspective.



The goal is to create one infrastructure that works everywhere—across all platforms and technologies and on all types of devices.





For more than 30 years ESRI has been helping people manage and analyze geographic information. ESRI offers a framework for implementing GIS technology in any organization with a seamless link from personal GIS on the desktop to enterprisewide GIS client/server and data management systems. ESRI GIS solutions are flexible and can be customized to meet the needs of our users. ESRI is a full-service GIS company, ready to help you begin, grow, and build success with GIS.

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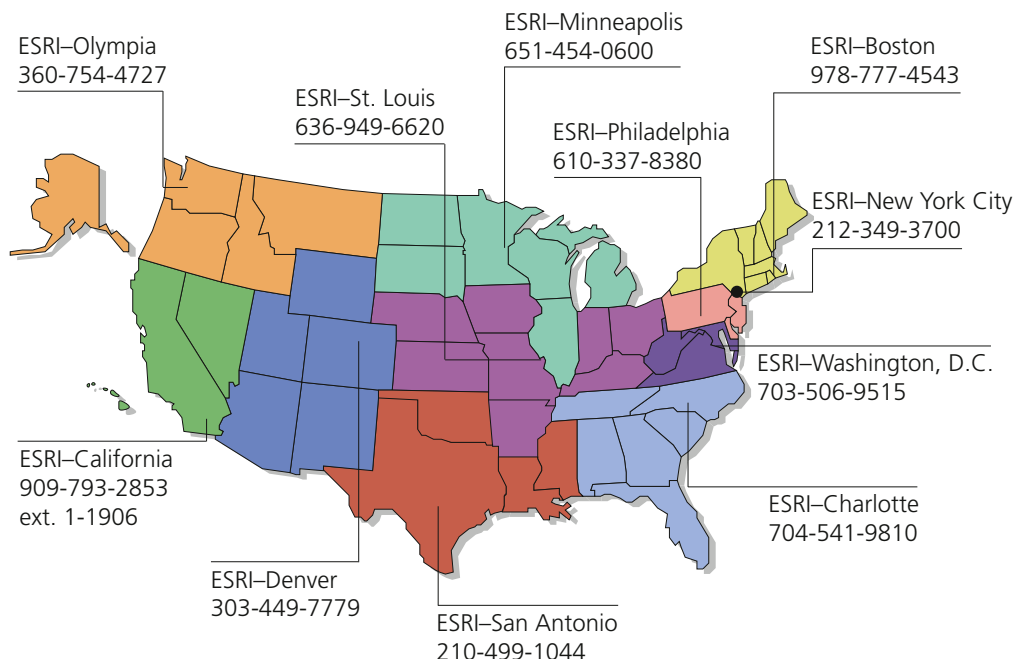
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