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ESRI India

ArcIndia News

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Mr Jack Dangermond

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From the President's Desk

Dear Friends,

In yet another endeavour of bringing a closer dialogue on GIS in the country, we are getting ready for the ESRI India User Conference to be held during April 21-22, 2010. Indian GIS users will have the opportunity to interact with experts from ESRI, TMM, ITT and many others and, of course, Jack Dangermond.

We enter 2010 and see a lot of opportunity and expectation for the GIS community – large projects getting implemented and an expectation that GIS technology would embed itself as an important element of governance and development. In India, the thrust for development is getting intensified and government has initiated many a programmes – hope is that the GDP will touch double digits. Many agencies are finishing their 4th Q results and the year and early indications are that this year has seen growth with a solid fortification and founding for 2010-11. In my own assessment too, GIS activities has seen growth with many a GIS-centric solutions being taken up. The thrust for APDRP continues as states start the full-scale implementation, new concepts of projects in NRLMP are getting initiated, Urban Property assessment is taking a big thrust, GIS for e-governance is important, UID may link GIS etc. The 2011 National Census Operation has also kicked-off and GIS plays a major element of the national Census. The UID project is getting on track with pilot operations and here too GIS has a major role to play. These are all good developments for GIS in the country and I am sure that many a good solutions will get positioned by the active involvement of government, private and other interested groups.

ESRI, as I have been mentioning earlier too, is all set to bring ArcGIS 10 - it will extend the reach of GIS to everyone beyond the GIS community. ArcGIS 10 is most suited for Cloud services - creating a social network of different communities of GIS users globally. ArcGIS 10 is also much simpler to use and provides new access through smart hand-held devices and smart-phones so that GIS users can publish their information for use by virtually systems. ArcGIS 10 will be easier to use and integrates new visibility tools, much faster display technology, 3D capabilities, and temporal capabilities. Quantum jump in capability, performance, knowledge sharing and establishing enterprise systems.

The recently concluded Map India, 2010 also saw major accolades for ESRI – mainly as Best GIS Software Company and Best Exhibitor Booth. The ESRI booth in Map India booth saw a large level of foot-falls and most participants passed by and got themselves a sight of the solutions that will be the GIS Future. Our Chairman, Mr RS Pawar, outlined his vision of a common-man's GIS and what GIS could mean to him as a common citizen – we plan to take and build this on (www.esriindia.com).

I had the opportunity to meet Jack Dangermond recently in Redlands and spend considerable time discussing about Indian GIS and also the future of GIS technology. To me the time I spent was quite enthralling and exciting. In this issue, we also bring Jack's interview – which I feel is a great "primer on modern GIS and its future". Jack's exposition of his vision for GIS must be a read for one and all. I am also happy that Jack will be there at the ESRI India UC and will provide the ESRI vision for GIS technology and applications. He will also be meeting many top personalities, senior officials and many user agencies. He would also interact with all of you and it will be a good opportunity for a high-level of networking – we believe this is important for ESRI community. Joining Jack will be ENVI and Arc FM experts – combinedly providing the best suite of spatial products for major initiatives in India to all of you.

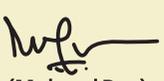
In this issue we introduce the concept of Geo Design – which is basically Jack's theme for the future of GIS. Geo Design is a more recent concept emerging from GIS technology but is more an applied concept – where spatial analysis founds the principle of "designing each citizen's life, every society, all communities, each of our nations and the Earth as a whole" – basically enabling a better environment and life-style around us. I believe that, in future, everything humans do will revolve around geographical concepts and every information would get "geo-tagged" and amenable to geographical processing. Thus, massive efforts would happen to create this System of GIS and societies will deal with massive levels of sketches, drawings, images, maps, geo-tagged data, virtualisation – both in 2-d and 3-d (even (-)3-d below the surface of Earth). Citizens will make many of their day-to-day decisions on geographical concepts; planners will depend upon GIS data to design and plan development; nations will progress ahead for which GIS will be most essential and the Earth's sustenance levels will get defined on in-depth geographical modelling and visualisation. Thus, GIS will have considerable impact on the economies of local, regional, and national governments by creating greater efficiency, more communication, and better decision making.

Life will revolve a lot around GIS technology and geographical concepts.

Exciting times for all of us in the GIS profession. I was telling Jack recently – "Jack, this is the most exciting time to be in GIS field – we visualised all these applications many years back but the tools and the concepts are now becoming a reality. How I wish we had these-days GIS tools in those early days of 1980s/1990s or how I wish I can get back to my rookie-days and get to use these high-performance and high-capability GIS tools to "design" and make things happen with a difference".

Of course, ESRI India will steer all this excitement of GIS in the country and drive many of these activities to a large extent to reality – we work for GIS, GIS is in our hearts and GIS is our passion. We firmly believe that the coming days herald many exciting opportunities, new projects, larger user-base and larger success for GIS in the country.

We will work together with all of you to bring value of the GIS proposition – through the technology of ArcGIS, through the solutions of ESRI partners, through the government agencies in their forward-looking programmes, through the System Integrators to position right-GIS, through our expert personnel, through our networking opportunities and many steps that we take to make GIS successful in the country. We will continue to make good for all your GIS projects, all the GIS projects that can be positioned in the country's development and truly bring to fore an ethos of a true system of a National GIS.



(Mukund Rao)
President & COO

Awards & Accolades @ Map India 2009-2010

- GIS Software Company of the Year 2009 – 2010 – ESRI
- Geospatial Personality of the Year 2009 - 2010 - Dr. Mukund Rao
- Best Exhibitor Award – ESRI India

The awardees were judged by the delegates participating in the conference. Forms were distributed to all the conference delegates asking them to select their preferred company/ personality in various categories. The poll results were assimilated on the second day of the conference and the results announced at the Valedictory Session of the conference.

ESRI India enters into a Strategic Partnership with ITT

NIIT GIS Ltd has entered into a strategic relationship with ITT Visual Information Solutions (ITT VIS) of Boulder, Colorado, a subsidiary of ITT Corporation, the developers of ENVI image processing and analysis software. As part of this partnership, NIIT GIS Ltd. will become the exclusive distributors of the ENVI suite of image processing software products for India, Nepal, Bhutan and Sri Lanka Sri Lanka beginning January 1, 2010. This suite of ITT VIS products includes ENVI, ENVI EX and IDL products.

This distributor arrangement was recently formalized between NIIT GIS Ltd. and ITT VIS at New Delhi, and a smooth transition process from the former ITT distributor, Sierra Atlantic, to NIIT GIS Ltd. was also initiated. NIIT GIS Ltd. and Sierra Atlanta will work to smoothly transition any existing user requirements, support, etc. in the coming months.

Quality @ ESRI India:

In our pursuit of excellence, ESRI India has developed a quality management system in line with ISO 9001:2000 standards and implemented it at the technical support, trainings, application development, data development, manufacturing, HR services and infrastructure service. The quality system has been upgraded to ISO 9001:2008 in March 2010.

Some of the key features that ISO 9001:2008 encompass are

- a set of procedures that cover all key processes in the business;
- monitoring processes to ensure they are effective;
- keeping adequate records;
- checking output for defects, with appropriate and corrective action where necessary;
- regularly reviewing individual processes and the quality system itself for effectiveness; and
- facilitating continual improvement

Speaking on the occasion Rajesh Mathur, Vice Chairman, ESRI India said " This reinforces our commitment towards creating value for our customers through our products and services. We assure this through our quality systems that we have built into our organization. "


BUREAU VERITAS
Certification

Certification

ESRI India

NIIT GIS Ltd.

ISO 9001:2008

13 February 2012

R. K. SHARMA
Director

ESRI India expands its management team:

To accelerate its growing business, ESRI India has expanded its senior management team at Head Office. Rajesh Raina has joined recently as Vice President – Domestic Sales. Rakesh has a degree in B.E. (Mechanical) from REC, Srinagar (in 1988-89). Rakesh brings in tremendous sales experience – he has >21 years professional experience and has gained considerable expertise in handling assignments in Profit Centre Management, Sales & Marketing, Business Development. He joins us from HCL Infosystems where, as Associate Vice President (Sales), he was business head for E Governance practice and has led a team for building government business. He is adept at Relationship management – which he has gained through his more than 2 decade of experience of working with HCL, TELCO and other companies.

ESRI India sets up a new facility at Parwanoo:

To augment the growing present and future needs of its national and international customers, ESRI India has added a second facility at Parwanoo. Located in the lush green low rolling Shivalik hills, this facility will cater to data conversion & software manufacturing requirements of the customers. A 35 seater infrastructure with latest state of art technology this facility will act as a centre of excellence for data development.

What's coming in ArcGIS 10

Overview

ArcGIS 10 is a major release that dramatically transforms how people use and apply GIS. Regardless of whether you are using ArcGIS in a desktop, mobile, or server environment, the new enhancements will:

- Make you more productive
- Provide you with faster performance
- Give you more powerful spatial analysis capabilities
- Help you leverage GIS everywhere via Web-extended desktops, Web-hosted applications, and cloud GIS

New Features

Perform your ArcGIS Desktop Work More Efficiently

- Faster, more responsive drawing performance including smooth, continuous panning of your data
- Easier access to most commonly used geoprocessing tools
- New Search window in ArcMap to let you quickly locate maps, data, and tools
- Catalog window built into ArcMap for quick data access
- Easier and faster ways to find and use symbols and tools
- Auto hide and dockable windows (e.g., table of contents) so your focus remains on the map
- Ability to execute geoprocessing in the background, allowing you to continue to interact with your map
- Automation of additional workflows with Python (maps and layers)
- Easy-to-use Web APIs and software developer kits (SDKs)
- Single-line simplified geocoding

Save Time on Map Creation and Production

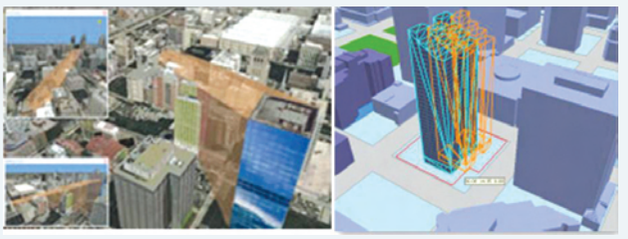
- New geoprocessing tools for multiscale map creation (reduce feature count, complexity, and conflicts)
- Support for layouts with multiple pages for producing map books, including PDFs
- Dynamic layout of text elements (title, date, page number, etc.)
- Map templates for high-quality map generation on the desktop and the Web
- Optimized map service (introduced in 9.3.1) supporting cartographic representations and Maplex labeling authored in ArcMap
- New compact cache format facilitating the creation and management of large map caches
- Enhanced integration of ArcGIS Server with ArcGIS Desktop for map production via geoprocessing services and Python

Manage and Create Data More Easily

- Open access to the geodatabase
- Integration of a new window in ArcMap to simplify project management and collaboration
- New Query layers that allow you to access all data (including spatial data) stored in relational databases via standard SQL

Access Improved 2D and 3D Editing and Design with Desktop, Mobile and Web Clients

- New sketch-based editing so you can choose from a customizable on-screen palette of features in desktop and Web clients
- Easier access to common editing tools in ArcMap, ArcScene, and ArcGlobe
- Ability to edit the geodatabase over the Web with the new Feature Editing Service
- New customizable ArcGIS Mobile application for mobile and Tablet PC devices



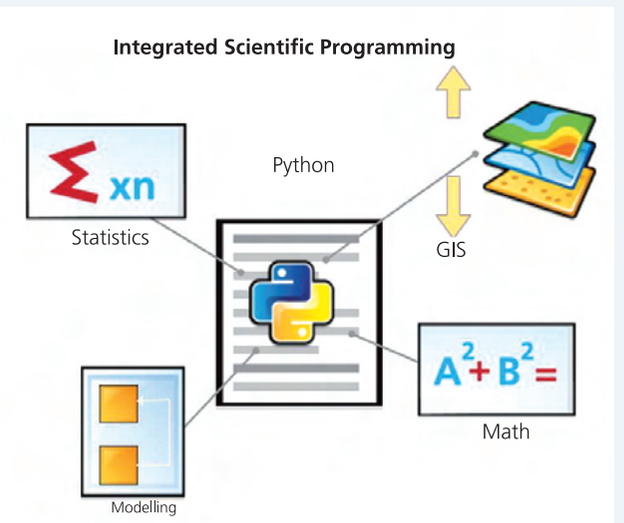
ArcGIS 10 provides a streamlined editing experience in both 2D and 3D. This example shows a shadow impact study using 3D analysis.

Experience New Ways to Share

- Tight integration with ArcGIS Online search and sharing application
- Easy to create and distribute projects that may include data, layers, maps, tools, scenes, globes, diagrams, and add-ins
- Easier to share and organize geographic data on the enterprise through the new Search service in ArcGIS Server

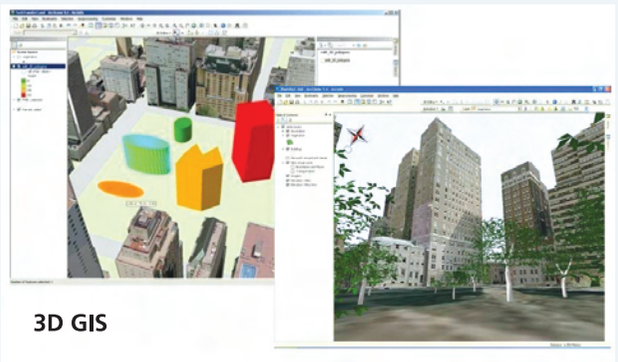
Perform Better Analysis and Modeling

- Improved geoprocessing framework
  - ModelBuilder now supporting undo/redo, iterators, and ToolTips
  - Improved map algebra with Python support
- New Fuzzy Overlay and Fuzzy Reclassify tools for better site selection and suitability modeling
- Location/Allocation modeling of network datasets
- New tools for image classification for easier collection and evaluation of training samples
- New ecological sampling design tools accommodating user-defined spatial criteria
- New types of graphs for visualizing analysis results



Technology Update

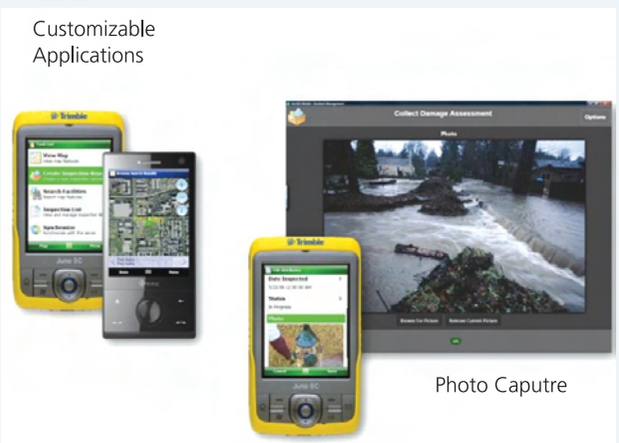
- New Unicode-aware geocoding engine supporting international languages and more flexible address entry and matching



3D GIS

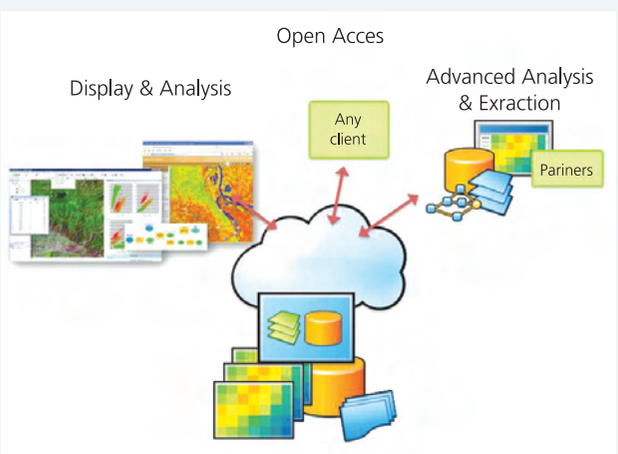
Access Improved 3D GIS Environment

- Improved 3D data management and creation
- New 3D editing tools in ArcScene and ArcGlobe
- Additional 3D analysis and visualization tools
- Included templates and best practices for creating virtual cities



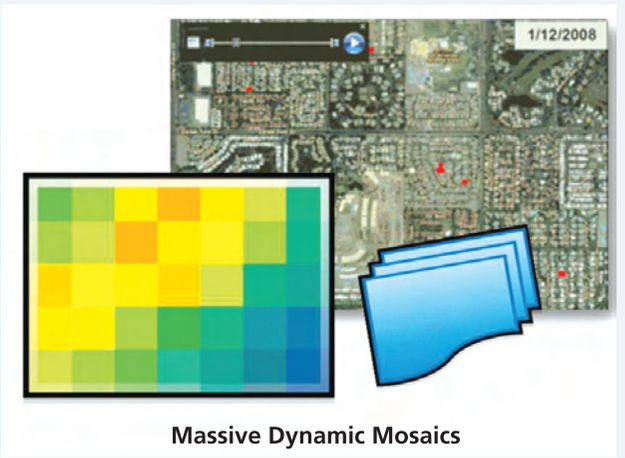
Create, Manage and Visualize Time-Aware Data

- Creation and management of time-based data
- Can display and animate temporal datasets
- Can publish and query temporal map services



Find Tighter Integration of Imagery with ArcGIS

- Fast, dynamic raster display
- Web API access to image services
- On-the-fly processing and mosaicking
- Focused Image Analysis Tools



Massive Dynamic Mosaics

Use Improved Map Services

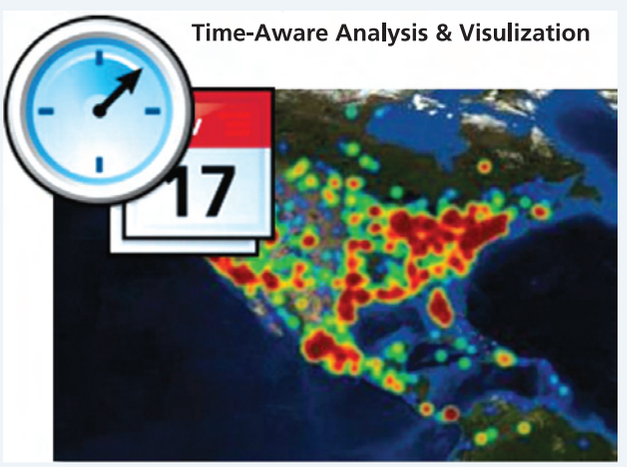
- New compact cache for easier management of large map caches
- Enhanced optimized map services support for advanced ArcGIS cartography

Access Enhanced Configurable Web Mapping Applications

- New, out-of-the-box configurable Web mapping application for ArcGIS Server

Perform Simplified Mobile Project Management

- New capability to deploy out-of-the-box ArcGIS Mobile projects to in-vehicle and tablet-based PCs
- Enhanced data collection experience with streaming GPS, photo attachments, and location tracking for ArcGIS Mobile applications
- Can quickly configure mobile projects using the new Mobile Project Center to simplify the deployment of projects
- Extended SDK enabling developers to create extensions to ESRI-provided out-of-the-box ArcGIS Mobile applications



Easily Install and Manage ArcGIS Desktop Licenses

- Ability to check out shared ArcGIS Desktop 10 licenses on a different computer (i.e., field units, home machine, or other machine) for temporary use in a controlled environment

Support for Cloud Computing

- ArcGIS 10 – the first GIS Product to leverages cloud computing architecture and offer additional products and services for direct use in the cloud.

For more details & demos, Please refer http://www.esri.com/software/arcgis/whats-new/index.html

ENVI EX: A high performance Image Analysis Solution for Geospatial Analysts and GIS professionals

ENVI EX, a new, high performance image processing and analysis software solution designed for image analysts and geographic information systems (GIS) professionals. Developed in response to the growing convergence of mapping and image analysis applications, ENVI EX combines powerful image analysis tools and seamless integration with ESRI®'s leading GIS platform, ArcGIS®, to streamline image analysis workflows and allow users to easily extract important information from imagery. ENVI EX also distills complex image analysis tasks into easy-to-use workflows, while maintaining the scientific accuracy the ENVI product line is known for, making image analysis faster and easier for analysts of all skill levels.

Seamless Integration with ArcGIS Delivers Improved Workflows

The seamless integration between ENVI EX and ArcGIS allows GIS users to easily exchange data and files from ArcGIS to ENVI EX with simple drag-and-drop methods that preserve the style, symbology, vectors, and layer information from one product to another. The displays of both products can be linked to allow the movement across the screen of one application to occur simultaneously in the other product. This integration allows users of both products to share data and files back and forth between the products to add imagery analysis results to the ArcGIS workflow and vector layers and information to image analysis in ENVI EX.

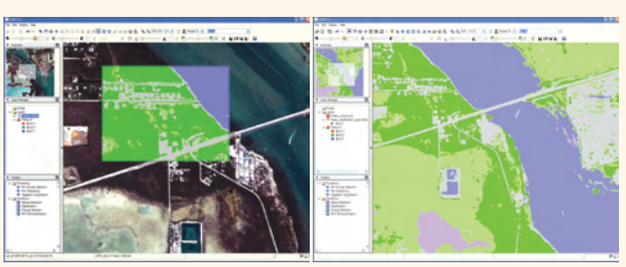
Proven Image Processing and Analysis Engine and Tools

ENVI EX's intuitive interface provides users with easy-to-use tools for displaying, visualizing and manipulating imagery. Based on the popular ENVI dynamic display, ENVI EX lets you load large image files quickly and manipulate the images to focus on an area of interest. ENVI EX supports today's popular file formats for aerial and satellite imagery and data including multispectral, panchromatic, hyperspectral, infrared and more. The product's tools allow users to prepare imagery with pan sharpening, vegetation suppression and anomaly detection prior to further analysis. A special preview window also gives users the ability to preview analysis results for an area and adjust parameters before processing an entire image saving analysts hours of waiting to see analysis results.

New, Automated Workflows Make Image Analysis Easy

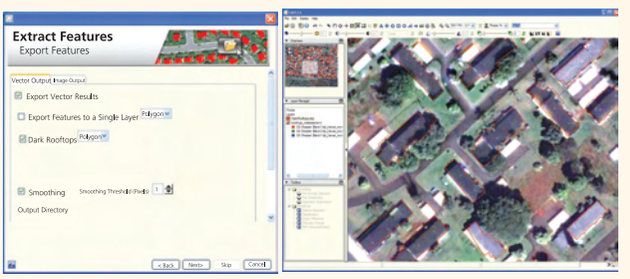
The new, automated workflows in ENVI EX guide users step by step through analyzing satellite and airborne imagery from a wide range of sources. These workflows help solve problems that are common in GIS applications across a variety of industries by providing guided processes for:

- Automatically extracting features of interest from a large geographic area,
- Detecting changes in a region over time,
- Classifying land cover,
- Tying an image to its geographic coordinates for accuracy in mapping and
- Finding anomalous features in an area.



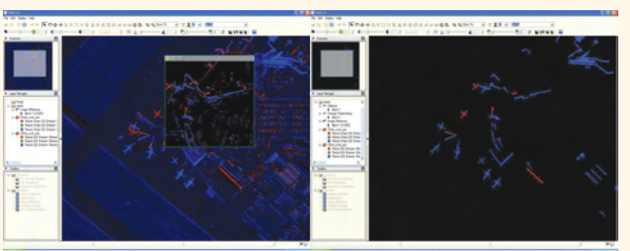
Classification

The Classification Workflow provides supervised and unsupervised methods for grouping pixels in an image into categories in order to identify and extract material or land cover.



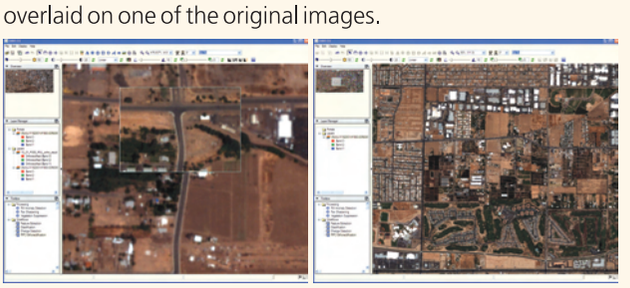
Feature Extraction

The Feature Extraction Workflow provides an advanced approach to feature extraction that saves time and effort, while providing the accurate results you need. Feature Extraction results can be export as vectors, along with all of their computed attribute information, to use in your own analyses, such as an input into an ArcGIS Geoprocessing Model.



Change Detection

The Change Detection Workflow compares images takes at different times or with different sensors and allows you to visualize change over time in an area of interest. The Change Detection results can be seen in the ENVI EX Portal window, overlaid on one of the original images.



Orthorectification

The Orthorectification Workflow accurately registers imagery to a digital elevation map and geometrically corrects it to remove distortions that happen during image capture.

Using ENVI EX's automated workflows, analysts can get information quickly and easily from imagery regardless of imagery experience. Instructions and previews guide users through the process of changing parameters to optimize image analysis results. And, because the workflows are based

To be Continue Page No.10

ArcGIS Online : Find, Share & Create GIS Resources

ArcGIS Online is a central, Web-based repository that gives you immediate access to ready-to-use content that is deeply integrated with ArcGIS. You can directly connect to maps, tasks, and Web Mapping APIs published by ESRI. You can also search for content published by other users and share your own maps, layers, and tools.

With ArcGIS Online, you can

- Access prepublished maps and reference layers; browse templates, user guides, and tutorials; and view metadata.
- Easily organize, find, and share geographic information to collaborate with other users who share a common interest.
- Develop Web applications quickly by leveraging ArcGIS Online map and task services and ArcGIS Web Mapping APIs.
- Jump-start your GIS projects without additional investments in infrastructure or staffing. ArcGIS Online is hosted by ESRI and powered by ArcGIS Server and ArcGIS Data Appliance, and new content is updated and added continually.
- Save money because you don't have to worry about software and data acquisition, management, and updates.
- Save time because you have access to ready-to-use content to build your applications.

Contribute your geographic data content. Let ESRI publish and host your authoritative content as part of a community basemap that ArcGIS users can access freely through ArcGIS Online map services.

ArcGIS Online Sharing

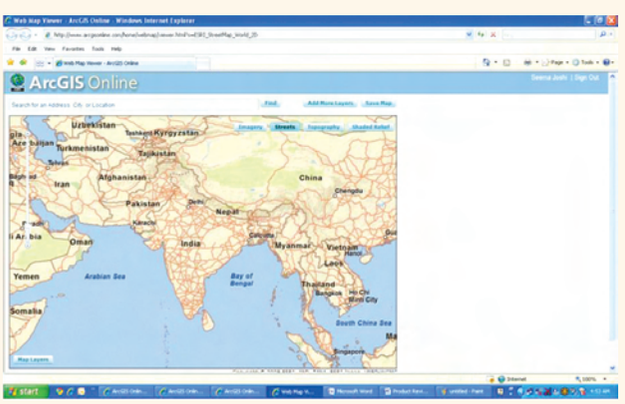
ArcGIS Online Sharing gives you the capability to share and find geographic information. The free Web application makes it easy to upload and share content as well as find content published by ESRI, ArcGIS users, and other authoritative data providers.

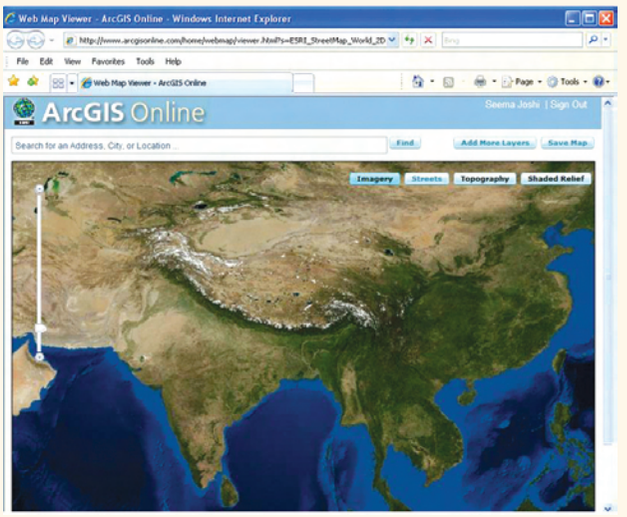
ArcGIS Online Sharing is a free membership system that allows you to create groups, join groups, and control access to the items you want to share publicly or within groups. By joining, you become part of a large community of GIS users who share a common interest in collaborating and sharing their GIS work.

ArcGIS Online Sharing (currently in public beta)

With ArcGIS Online Sharing, you can

- Access a central repository of GIS content and capabilities over the Web.
- Upload, share, and find maps, layers, layer packages, services, and tools.
- Create Web maps with zero programming through the built-in map viewer application and share them with others.
- Save time and money by accessing ready-to-use foundation services with no additional investment in infrastructure.





ArcGIS Online Sharing is hosted by ESRI, so all you need is an Internet browser. Any of the shared items can be executed directly from ArcGIS Desktop or ArcGIS Explorer.

Map Services

Ready-to-use ArcGIS Online standard map services support multiple-scale display and are cartographically rendered and cached for display in 2D and 3D.

ArcGIS Online standard map services are available at no cost for internal (personal or within an organization) and noncommercial, external use. To use these services for commercial purposes, you must purchase an annual subscription. ArcGIS Online standard map services can be used with ArcGIS 9.3 Service Pack 1, and 9.3.1, and ArcGIS Web Mapping APIs.

ArcGIS Online premium map services are available for internal and external, including commercial, use by purchasing an annual subscription.

ArcGIS Online Standard Map Service include

- World Imagery—Satellite imagery for the world and high-resolution imagery for the United States, Great Britain, and many metro areas around the world.
- World Physical Map—Natural earth physical map, plus topographic maps for the United States
- World Street Map—Multiscale street maps for the United States, Canada, Japan, and several countries in Europe and other parts of the world
- USA/World Bundle—Satellite imagery for the world and aerial imagery for the United States, plus street, physical, shaded relief, and political maps for the world
- Bing Maps—Worldwide aerial and satellite imagery, including roads, and hybrid imagery (overlaid with roads and labels)

Task Services

ArcGIS Online task services are geoprocessing services that ArcGIS users can access dynamically over the Web.

ArcGIS Online standard task services are available at no cost to ArcGIS users for internal use (personal or within an organization) and noncommercial, external use. To use these services for commercial purposes, you must purchase an annual subscription. ArcGIS Online standard task services can be used with ArcGIS 9.2, 9.3, 9.3.1 and ArcGIS Web Mapping APIs.

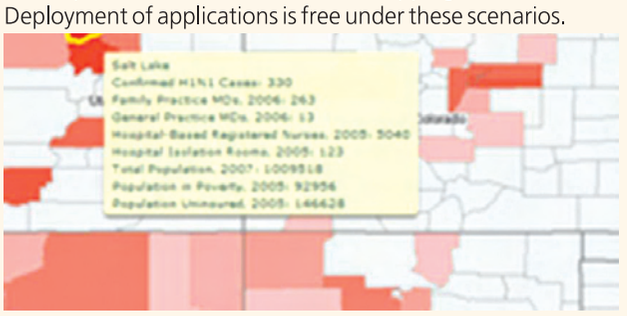
ArcGIS Online Standard Task Services include

- World Geocoding—Address geocoding, reverse geocoding, limited batch geocoding, and place finding
- World Routing—Point-to-point and optimized routing

ArcGIS Web Mapping APIs

Leverage ArcGIS Web Mapping APIs to build and deploy applications that include GIS functionality and Web services from ArcGIS Online and ArcGIS Server. Use ArcGIS APIs for Flex, JavaScript or Microsoft Silverlight to build rich, lightweight Internet applications that you can embed in Web pages or launch as stand-alone Web applications. Use Flex and Adobe Air or Windows Presentation Foundation (WPF) to build desktop applications.

Developers can access ArcGIS Web Mapping APIs at no cost. Deployment of applications is free under these scenarios.

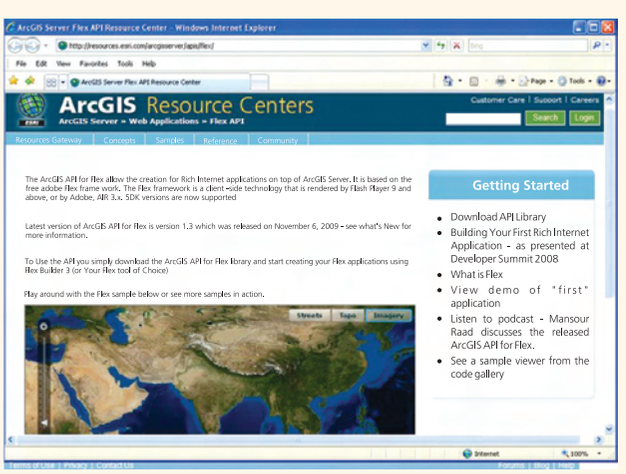


USA Swine Flu and Healthcare Resources (built with ArcGIS Web Mapping API for Flex).

Get started quickly with ArcGIS Web Mapping APIs:

- ArcGIS API for Flex
- ArcGIS API for JavaScript
- ArcGIS API for Microsoft Silverlight/WPF

You have access to Getting Started Web help, API references, code galleries, sample map viewers, and configurable application templates.



With ArcGIS Web Mapping APIs, you can access free, standard ArcGIS Online Map and Task Services, as well as premium, subscription-based services. ArcGIS Online Map Services include imagery, street, topographic, and other high-quality basemaps. ArcGIS Online Task Services include geocoding, routing, and demographic data analysis and reporting.

What's New in ArcGIS Online

ArcGIS Online gives users quick and easy access to a set of foundation services for GIS projects and provides a platform to discover and share geographic information.

Bing Maps now Seamlessly Integrated with ArcGIS

A new agreement between ESRI and Microsoft gives ArcGIS 9.3.1 users seamless access to Bing Maps. ArcGIS Desktop, ArcGIS Server, and ArcGIS Explorer users will be able to directly connect to Bing Maps to enhance their GIS projects.

ArcGIS Desktop

- Free, limited annual allotment for users who are current on maintenance
- Annual subscription with unlimited transactions available for purchase

ArcGIS Explorer

- Access to Bing Maps and ability to share transactions as part of an existing ArcGIS Desktop license installed on the same machine

ArcGIS Server

- Built-in 90-day evaluation of Bing Maps, after which an annual, transaction-based subscription can be purchased

New API

Business Analyst Online API

- Build custom Web applications that include
  - Drive-time, ring analysis, and reporting services
  - Demographic data reports
  - World Imagery, World Street Map, and World Geocoding services

Discover and Share Geographic Information

With the new ArcGIS Online Sharing Web application, currently in public beta, users will be able to

- Search for maps published by ESRI, users, and other authoritative data providers.
- Upload maps and register online map services.
- Organize and control access to shared maps.
- Save Web maps as items for others to discover and use.
- Share layers that reference feature or raster data as a single layer package that comprises both the layer file and data.

Continued from Page No.8

on the proven algorithms and methods that ENVI is known for, they deliver accurate results users can count on.

Automatic Feature Extraction Speeds Analysis with Large Images

The new ENVI EX also includes all the capabilities of ITT's popular ENVI Feature Extraction Module. This object-based feature extraction workflow allows users to easily and accurately extract features of interest across an entire image or a batch of images. The automated feature extraction workflow of ENVI EX delivers four years of feature extraction development including an advanced, patent-pending algorithm; the ability to preview results before processing an entire image; accuracy assessments; and the ability to save parameters and generate a summary of statistics. New feature extraction enhancements released with ENVI EX include improved performance for larger images and new vector editing tools for rectangulating and smoothing vectors that identify features of interest.

GIS: Designing Our Future

GeoDesign borrows concepts from landscape architecture, environmental studies, geography, planning, regenerative studies, and integrative studies. Much like GIS and environmental planning before it, GeoDesign takes an interdisciplinary, synergistic approach to solving critical problems and optimizing location, orientation, and features of projects both local and global in scale.

Design is art within the framework of limitations—limitations that arise as a result of function, world view, bias, and other factors, but also limitations that arise as a result of place. Design considering place was at the core of landscape architect Ian McHarg's beliefs, and it is the basis for our research and development efforts in the emerging field of GeoDesign.

". . . design is always and necessarily an art as well as a problem-solving activity . . ." —David Pye, The Nature of Design

To a certain extent, this is already done today by numerous GIS practitioners in fields like urban and regional planning and environmental management. But GeoDesign makes this easier by making it an integral part of the workflow, both shortening the cycle time of the design process and improving the quality of the results.

Cycle time is shortened because GeoDesign moves analysis to an earlier stage in the design process. Rather than analyzing the potential impacts and effects of a proposed project after the design phase, critical factors are instead taken into consideration up front. The quality of the results improves because the project is designed around, in concert with, and/or to fully leverage certain geographic, environmental, and social features while simultaneously minimizing undesirable impacts to those same features.

What Is GeoDesign?

GeoDesign brings geographic analysis into the design process, where initial design sketches are instantly vetted for suitability against a myriad of database layers describing a variety of physical and social factors for the spatial extent of the project. This on-the-fly suitability analysis provides a framework for design, giving land-use planners, engineers, transportation planners, and others involved with design the tools to leverage geographic information within their design workflows. Fully leveraging geography during the design process results in designs that emulate the best features and functions of natural systems, benefiting both humans and nature through a more peaceful and synergistic coexistence.

GeoDesign involves three activity spaces: the work environment (where designers do their work), the design tools (the tools designers use to do their work), and supportive workflows (how designers do their work). Having one of these out of sync can impede the design process.

- Work Environment—Today's work environment used by geo-based design professionals involves the field, the desktop, connection to enterprise servers and databases, the use of document management systems, collaborative environments (both inside and outside the enterprise), and interaction with outside agencies and organizations.
- Design Tools—Geo-based designers use a variety of tools to assist them as they create their designs. Probably the most frequently used tool, or type of tool, is the drawing tool. The particular type of drawing tool depends on the designer's domain and whether the designer is working in 2D or 3D space.
- Supportive Workflows—Most geo-based workflows, at least at a detailed level, are domain specific. Three workflows pertaining to the use of geographic information stand out, however, as being predominantly genetic: one related to land-use change; one related to the design, construction, and management of built facilities; and one related to the use of 2D CAD.

Early Forays in GeoDesign

Although it might be easy to compare the two, GeoDesign should not be confused with computer-aided design (CAD). In fact, the first geographic design system was ArcCAD, ESRI's earliest attempt to build a dedicated GeoDesign tool. Released in the early 1990s, ArcCAD was the first fully functional GIS system within the AutoCAD environment. While traditional CAD is a useful tool in the architectural design of a building, GeoDesign is concerned with designing that same building in and around the environment. ArcCAD was an attempt to integrate geographic data and spatial modeling into the design process. ArcCAD provided powerful mapping, data management, spatial analysis, and display tools that worked directly with AutoCAD's design and drafting tools.

ArcCAD was followed by other ESRI applications (including SDE CAD Client and ArcGIS for AutoCAD) that allowed designers and others within the CAD environment to leverage the full power of GIS functionality and GIS databases. ArcGIS for AutoCAD, a free downloadable tool that offers seamless interoperability between AutoCAD and the ArcGIS platform, is used widely today. ArcGIS for AutoCAD users are provided with quick and easy access, within the AutoCAD environment, to enterprise GIS data published by ArcGIS Server. This tool lets designers include the results of GIS analysis in AutoCAD designs, as well as create, manipulate, and define how CAD data is organized and attributed as GIS content.

Design professionals are creative and rely heavily on intuition, a gut feeling that something is right. GIS professionals providing input to a creative process rely heavily on analysis and science. With GeoDesign, GIS becomes a tool for designers; they can move rapidly through an iterative design process while leveraging the full analytical power of the geodatabase. Bringing together the worlds of design and analysis under one common information system framework will have huge implications.

In 2005, Bill Miller, ESRI's engineer/architect, led a small team to develop a free sample ArcGIS extension that was the first step toward true GIS-based GeoDesign tools. Released in 2006, the extension allows you to quickly create features in the ArcGIS Desktop ArcMap application with easy-to-use sketch tools. You simply select a sketch tool and an associated symbol and then draw the feature. This simple design tool automatically manages the drawing environment, allowing you to conceptualize what to draw, as opposed to how to draw it. With ArcSketch, you can sketch a set of alternative land-use concept plans, quickly lay out the spatial components of a disaster response plan, sketch out the location of a highway, or lay out a site master plan.

As a geographic sketching tool that allows users to sketch

initial designs on top of GIS-based maps and imagery, ArcSketch was useful to many users, but it is only the beginning. Functionality similar to ArcSketch will be further enhanced and integrated into the core software system in the ArcGIS 10 release. And subsequent releases of ArcGIS promise even more support for the use of GIS for design.

ArcSketch tool-style editing in ArcGIS 10 will make editing simpler, with new streamlined functionality making it easier for you to complete your work.

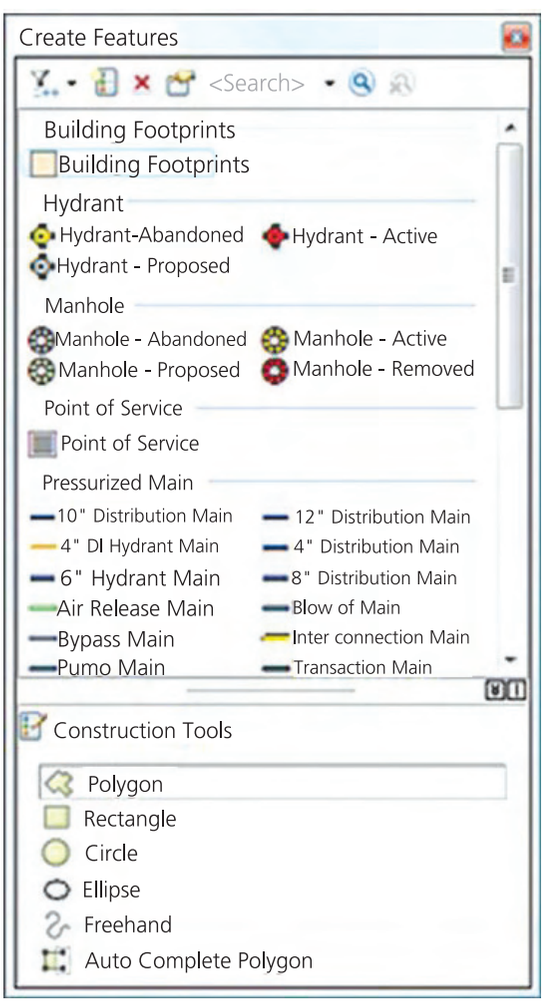
Design Tools in ArcGIS

Creating features is accomplished through the use of feature templates. To get started with templates, you just need to start editing, which launches the Create Templates wizard. The wizard will quickly help you build a set of feature templates you can use to create new features. Once you finish, the Create Features window opens with a list of templates.

Feature templates define all the information required to create a new feature: the layer where a feature will be stored, attributes new features will be created with, and the default tool used to create that feature. In the Create Features window, choose the template in which to store the new feature, click a construction tool from the palette at the bottom of the window, and click the map to digitize the shape of the feature. In ArcGIS 10, the edit sketch will show a WYSIWYG preview with the symbology used for that template (layer).

Snapping is now enabled by default and has been broadened from being within an edit session only to being available across ArcMap. To this end, all the settings you need to work with snapping are located on the new Snapping toolbar, including turning on and off snapping types (edge, vertex, endpoint, and so on) and customizing the appearance of the cursor and SnapTips.

The Fields tab on the Layer Properties dialog box has been redesigned for 9.4, making it easier to reorder fields, turn them on or off, sort them, and set other display and formatting properties. These properties will be used throughout ArcMap, including the editor's attributes dialog box, table windows, and the Identify dialog box.

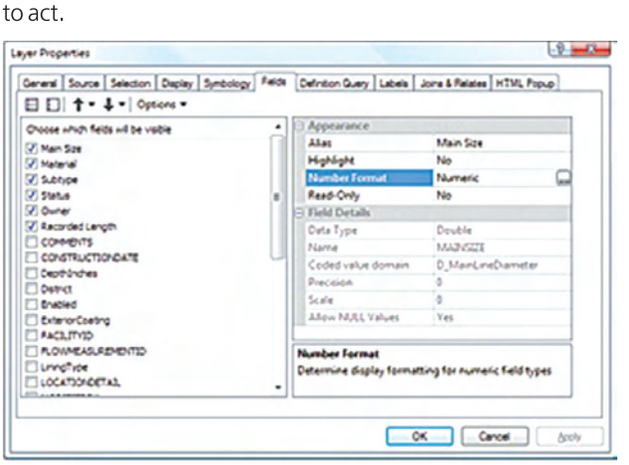


Meeting the Challenge with GeoDesign

Integration of design tools with existing GIS functionality is important, but it's only the first step. Ultimately, the vision is to expand the utility of GIS to the point that it is a foundational design system. As humanity comes to grips with its overwhelming impact on the natural world, we are also gaining a much better appreciation for our inextricable link to nature. And with that, of course, comes an enormous responsibility—a responsibility made all the more gargantuan by the fact that we still have a long way to go toward fully understanding the dynamics of the various systems and developing a robust suite of comprehensive models and other tools to support these activities. As Richard Neutra did with architecture in the 1950s, we need to advance a framework for design and planning that not just incorporates but also embraces technology; science; and, ultimately, nature in a system that helps us design and choose the best alternative futures.

Imagine if your initial design concept, scribbled on the back of a cocktail napkin, has the full power of GIS behind it: the sketch goes into the database, becoming a layer that can be compared to all the other layers in the database. The experience ESRI has gained while developing CAD integration tools, ArcSketch, and the new tools in ArcGIS 10 has led to an appreciation of the power that could be derived by associating drawing tools, symbology, data models, and process models into one integrated framework for doing GeoDesign. Having "back of the napkin" design sketches available for immediate analysis and feedback is one of ESRI's primary areas of research and development over the coming years, and our users will see the results of these efforts in upcoming releases.

And the need for such tools has never been greater. We live in an ever more complex world, where our impact on the natural environment is massive and can no longer be ignored. People are starting to recognize the importance Neutra placed on the inseparable relationship between humans and nature and to realize McHarg's vision of design with nature, and they want to act.



Urgent Need for GeoDesign

The summit brought together thought leaders in GIS, architecture, design, conservation, and many other fields

including Michael Goodchild, professor of geography at California State University, Santa Barbara; Carl Steinitz, research professor at the Graduate School of Design, Harvard University; Kim Tanzer, dean of the School of Architecture at the University of Virginia; and William B. Rogers, president and CEO of the Trust for Public Lands.

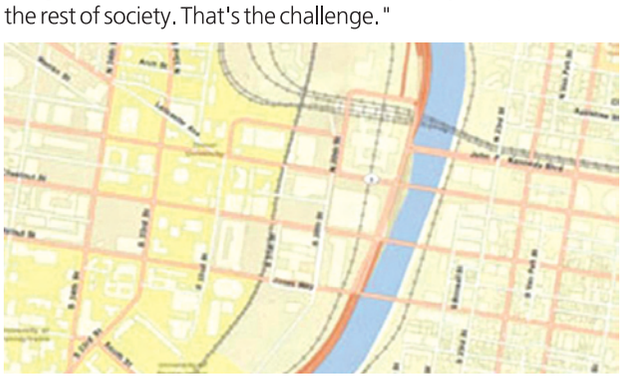
They spoke about how GIS is being used in design today and the even greater potential to integrate the creativity of design and the science of GIS.

Fisher from the University of Minnesota spoke passionately about how there's little time to waste. Citing ideas put forth by the Pulitzer Prize-winning author Thomas Friedman and professor of psychology David Barash at the University of Washington, Fisher argued that humans have created a giant Ponzi scheme with the planet over the last several hundred years, sucking resources and exploiting labor to maintain a certain way of life.

This leads to the creation of what Fisher described as "fracture-critical systems" like the one that led to the collapse of the Interstate 35W bridge in Minneapolis, Minnesota. Other fracture-critical threats include the exponentially increasing atmospheric carbon accumulation and rapidly declining biodiversity. "Even the recent financial crisis grew out of a fracture-critical system," Fisher said. "We designed financial products such that we increased the debt . . . where a few investment banks go down and they bring the entire global financial community down with [them]," Fisher said. "It's a classic collapse of a fracture-critical system. There is a spatial component to this. The banks do not know where the debt lies. Here, too, GeoDesign can help us understand the flows of money spatially across the planet.

Fisher called a fracture-critical system a metaphor for the world humans have designed for themselves. But he pointed out that innovations such as GeoDesign can help reverse the course.

"A lot of what we have been designing—our cities, our buildings, our landscapes—have been designed without a lot of information about the consequences of our actions on other species, on distant populations, on future generations," he said. "As GeoDesign can bring data to bear on those design decisions, it will profoundly change the way we live and inhabit the planet. Through innovation, we can rethink the way in which we inhabit the planet, we can rethink the way we use resources, and we can prolong our ability to sustain ourselves. GeoDesign's time has come, and it's none too soon." Dangermond concurred. "We need this right now," he said. "We need to not only understand what's occurring on the planet, but we also need to take more proactive involvement in designing what occurs. Then we have to promote those designs, those creations, those in our mind's eye expressions, to the rest of society. That's the challenge."



The new World Street Map service from ArcGIS Online provides highway-level data for the world and street-level data for North America, Europe, Southern Africa, and several Asian countries.

"One of the powers of GeoDesign is it makes these problems visual," he said. "They are easier to ignore when they are abstractions. Because we have been designing the world without data-rich knowledge of consequences, we've created a situation where we've made ourselves vulnerable as a species, which to me gives urgency to GeoDesign. This is something we don't have a lot of time to develop."

The purpose of the two and a half-day summit at Redlands, California was to

- Define and formalize the term GeoDesign and its methodology.
- Promote and advance GeoDesign research and education.
- Discuss how to go about creating better GeoDesign technologies/tools.
- Talk about how to more deeply couple design with GIS and other geospatial technologies.
- Prepare a set of use cases to show what GeoDesign can accomplish.

In his opening remarks, Dangermond spoke about the great potential for GeoDesign, described by some as a pairing of design and GIS. It unites the art and creativity of design with the power and science of geospatial technology. As one, GeoDesign can produce more informed, data-based design options and decisions.

"The notion of integrating these two fields is very exciting to me. We have a kind of continuum from measurement to making decisions that integrates all of our ways of doing things into new processes," Dangermond told the gathering.

Dangermond said fast accelerating improvements in geospatial technologies will, consequently, hasten advances in GeoDesign. New design-friendly capabilities and tools in the upcoming release of ESRI's ArcGIS 10 will help professionals apply GeoDesign methodologies to problems and challenges related to anything from climate change to pandemic diseases, environmental protection to food production, and resource conservation to infrastructure improvements.

"Geospatial technology is migrating to the Web and will be used by practically everyone in some way or other," Dangermond said. "This environment is a new style for how geography will be served and how it will affect us. It will touch not simply a few researchers, GIS professionals, or those who work with geographic information, but it's infecting and affecting virtually everything that people do." Improvements in GIS, the explosion of location-based services (LBS), faster computers, more bandwidth and storage, a boom in mobile devices, and the emergence of cloud computing will also speed GeoDesign along, according to Dangermond.

ESRI president Jack Dangermond stressed the importance of integrating design with geospatial technologies.

Designer-Friendly GIS Technology

During the GeoDesign Summit, Matthew Baker, Nathan Shephard, and Bern Szukalski from ESRI demonstrated to the current tools and services and soon-to-be released technology that will assist designers in their work. Baker's demonstration focused on the modeling, sketching, and feedback capabilities in ESRI's ArcGIS Desktop 10, set for release in the second quarter of 2010. To find the best areas suitable for redevelopment in Detroit, Michigan, he created a model that used public GIS data and extracted block group parcels in the city that met criteria such as high poverty rates, vacant properties, and high unemployment.

"The results of the model pointed me to key redevelopment areas," Baker said. He used basemaps available from ArcGIS Online, an ESRI Web site that provides free maps and other resources for GIS applications.

Baker then began sketching a new neighborhood using standard land-use symbols for neighborhood design, which will be available in feature templates in the ArcGIS 10 editing tools. He received instant feedback in the form of pie and bar charts on the suitability of his designs, based on the features sketched using an ArcGIS 10 add-in called the Dynamic Charting tool. Every time new features are added to the map, the Dynamic Charting tool provides additional updates.

Shephard demonstrated new design-friendly capabilities in the 3D Analyst extension of ArcGIS Desktop 10 such as

- Template-based (sketch) editing in 3D.
- 3D vector analyses of line-of-sight, 3D object intersections, and skylines.
- Volumetric analysis of buildings, shadow impact, and visibility zones.
- A template of a virtual city, which provides a useful example of a well-defined 3D city.

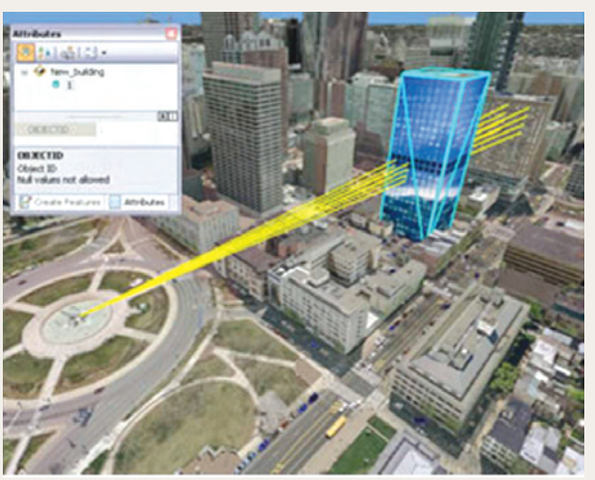
The four key elements of such a city include a topographic basemap, high-resolution imagery, an elevation surface, and 3D buildings. If the data is available, users can add other elements such as vegetation, streetlights, and furniture such as park benches.

"These new capabilities allow you to quickly and accurately solve 3D GIS problems, such as assessing the impact of a proposed building on your city or identifying areas of concern based on 3D topography," said Shephard.

Szukalski showed the audience ArcGIS Online resources that, for GeoDesigners or Web Mappers, serve as what he calls an "excellent substrate" of content such as

- The World Topographic Map service, which includes boundaries, cities, water features, physiographic features, parks, landmarks, transportation, and buildings.
- The updated World Imagery map, which compiles the best available imagery for the United States and many cities around the world including London, England, and Geneva, Switzerland.
- Bing Maps for Enterprise, aerial, hybrid, and roads.
- The new World Street map, which includes building footprints for major cities. Contributions come from a variety of sources including ESRI users.

"These new basemaps and others provide great maps you can use as is or to represent a great canvas for design or GIS work," said Szukalski.



Using ArcGIS 3D Analyst, you can place proposed buildings directly into the GIS and run a 3D analysis such as a line-of-sight impact study.

Next Steps in GeoDesign

- GeoDesign—as a discipline, a field of study, and a practice—continues to evolve. By the end of the 2010 GeoDesign Summit, the group that met decided to
- Obtain a broader consensus about GeoDesign. Everyone is invited to participate in this discussion at http://participatorygeodesign.ning.com/ and http://en.wikipedia.org/wiki/Geodesign.
- Identify the new geospatial functionality, tools, and technologies needed to support broader adoption of GeoDesign.
- Hold a GeoDesign Challenge, with a cash prize, to encourage the development of real-world GeoDesign projects.
- Publish a book of GeoDesign case studies.
- Determine the optimal methods of teaching design principles to geospatial professionals and develop a GeoDesign curriculum.
- Hold another GeoDesign Summit in early 2011 to review the progress made.

Designing GeoDesign

At the world's first GeoDesign Summit last January, ESRI president Jack Dangermond said the concept of incorporating geographic knowledge into design has been happening for a very long time.

"GeoDesign is going on. It has been going on for hundreds of years," he said, pointing to examples in farming, urban planning, and site selection for stores. Farmers, for example, have always taken geography into account when deciding what crops would be appropriate to grow on their land and where to locate their farms (e.g., near a water source for irrigation).

"We are at the beginning of what many of us see as a new field," said Thomas Fisher, dean of the College of Design at the University of Minnesota, in his keynote address. With the world facing what he called "exponentially increasing stress on the systems we depend on" such as natural ecosystems and building infrastructure, a great need exists to use spatial data and technologies in planning and design to tackle problems such as those associated with global warming, threats to species, and poorly designed infrastructure.

Using Information from Imagery in GIS

Introduction

Today people rely on GIS for information needed for decision making. Information from GIS is used for a wide variety of applications from urban planning to agriculture to medicine. It is increasingly important that government organizations and commercial companies making decisions use accurate and up-to-date information. In many instances, aerial or satellite imagery can provide a current source of data for a geographic area of interest, which helps to ensure accurate and reliable GIS-based decisions.

There are many situations, such as natural disasters and other large scale emergency response events, which require up-to-date information to enable quick response times. In these situations the most current information is invaluable to rescue efforts on the ground. A traditional GIS may often not contain the timely information required for this type of situation. Satellite and airborne imagery, which was once considered a simple backdrop to maps, is now readily available, more affordable and a great source of valuable data to add more timely information to GIS applications.

To date, using the important information that could be found in imagery was a challenge for GIS professionals. Standard image processing and analysis methods and software were difficult to use, time consuming and required a background in image science to use effectively and accurately. Advances in image processing and analysis such as easy to use, automated workflows found in ITT's ENVI EX, now allow GIS professionals to quickly and easily get accurate and timely information from imagery to easily added to a GIS. .

Applications for Geospatial Information from Imagery

In addition to emergency response situations, a growing application of information from geospatial imagery is as a data source to populate, update and assess the quality of GIS databases. Map-accurate orthophotos or satellite images are being used to collect (digitize) features such as road centerlines, land use areas, building footprints and utility infrastructure. The availability of up-to-date imagery makes it easy to identify areas of development that may not yet be captured in the GIS database. Additionally, automated image processing methods tailored for feature extraction, such as the ENVI EX feature extraction workflow, can be used to reduce the effort of often tedious, manual digitizing processes.

Other applications of image analysis include using an image's spectral content – the images varying wavelengths – to assess land use and to map land cover; to measure, monitor and assess environmental conditions; to assess the condition of pavement and other public works assets;

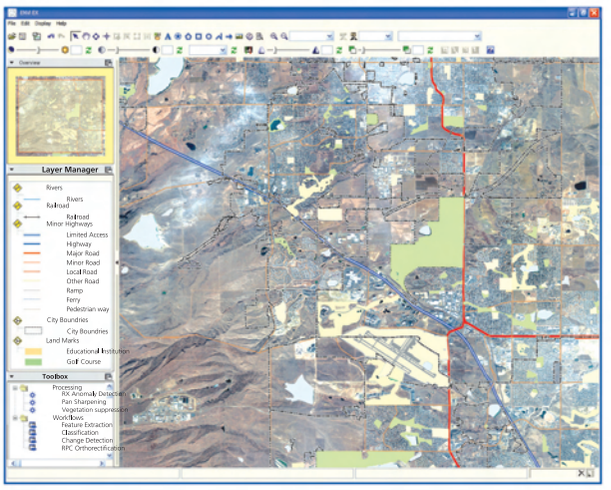


Figure 1: New image processing technology allows GIS users to easily integrate information from geospatial imagery with vector layers, as seen above in a screenshot from ENVI EX, an image processing software package designed specifically for GIS users.

and to identify building materials. Detecting change that has occurred in an area is also possible when imagery is collected over time. Gaining knowledge from analyzing imagery and data can be achieved with ENVI EX, and can be a valuable addition to many GIS-based processes including land development models and forecasts, planning exercises and environmental impact assessments.

Streamlined GIS and Imagery Integration

In order to realize the benefits of using imagery as a source of geospatial information, GIS professionals need a solution that easily integrates the information contained in imagery into GIS workflows. ENVI EX, a new software

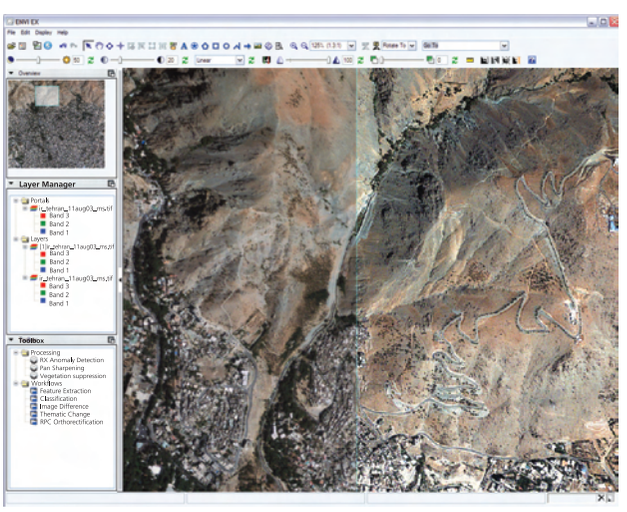


Figure 2: Example of a sharpened image in ENVI Ex. The display on the left is the original multispectral image. The display on the right contains the sharpened image result. Data courtesy of DigitalGlobe.

product from ITT, provides a complete suite of tools based on proven scientific methods to help GIS professionals view, manipulate, process and analyze imagery.

Advanced Image Viewing and Manipulation Capabilities

ENVI EX was specifically designed for GIS professionals. The desktop toolbox and layer manager in ENVI EX allow users to visualize imagery and data, and to create representations that are clear and easily interpreted. Advanced manipulation tools allow users to stretch, sharpen, blend, rotate, adjust brightness, transparency and contrast, create histograms and add annotations to imagery.

The ENVI EX portal view allows users to display an image or a layer in ESRI's ArcGIS, select an area of interest, and quickly visualize the selected area using manipulation tools. ENVI EX also gives users access to vector editing tools to "clean up" visualizations and make features more true to life.

Image Processing and Analysis Tools for GIS Professionals

ENVI EX provides support for a variety of GIS image processing tasks, using all types of widely available satellite and airborne imagery. ENVI includes new, easy to use workflows for standard image processing and analysis tasks including change detection, image classification, orthorectification and feature extraction. The software also includes robust vector support to compliment GIS systems, including tools for the conversion and editing of common vector data formats, full geodatabase support, and the ability to drag and drop layer files between ENVI and ArcGIS. All results from ENVI EX processing and analysis can be saved to the geodatabase or can be output directly using the ArcGIS map and printing dialogs.

The tight integration of ENVI EX with ArcGIS allows users to easily exchange data files and layer files between the two software tools by selecting an image in ArcGIS and dragging and dropping it into ENVI EX. Users can also view and interact with ArcGIS layers in ENVI EX while viewing vector information with the same symbology, styling and rendering as ArcGIS. A typical work project now facilitated by the integration of ENVI EX and ArcGIS may include performing image processing tasks in ENVI EX, making changes to the parameters on the fly, and viewing the changes as the user moves between ENVI and ArcGIS.

Automatically Extract Features of Interest

New technology advancement, available in ENVI EX, now allows GIS professionals to quickly and accurately locate, extract and identify features of interest in imagery. Manually locating and digitizing features is often tedious and time consuming, especially over large coverage areas. In addition, limited spectral content may make standard pixel- based extraction approaches inaccurate..

The ENVI EX feature extraction workflow allows GIS professionals to automatically extract spatial objects from imagery and reduce the time spent on manual processes. The ENVI EX feature extraction can be used to extract a wide variety of features such as vehicles, buildings, roads, bridges, rivers, lakes and fields, and is optimized for extracting information from high-resolution panchromatic and multispectral imagery based on spatial, spectral and texture characteristics. The ENVI EX feature extraction workflow uses an object-based approach that can be used on high spatial resolution imagery with limited or no spectral content.

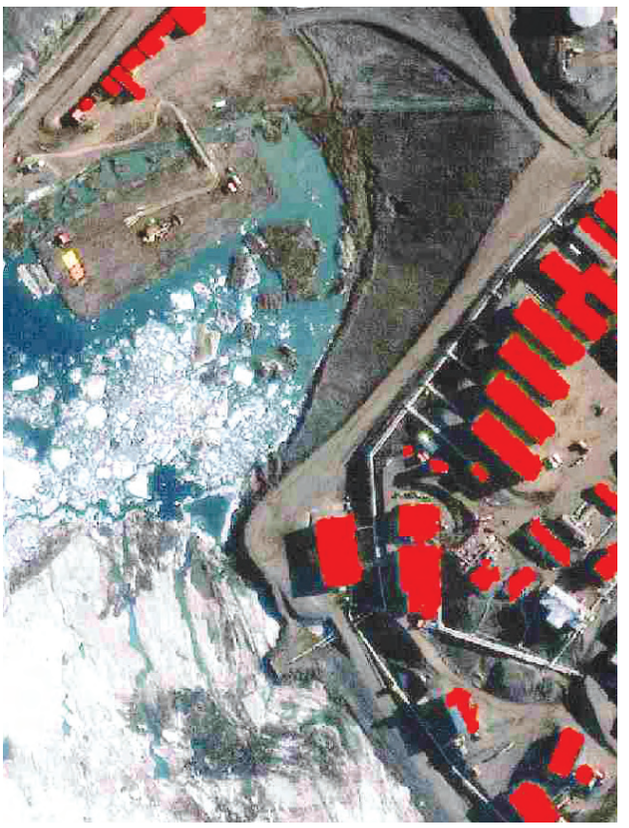


Figure 3: Example of feature extraction performend in ENVI EX. Red regions are a building footprint layer extracted from the underlying multispectral image. Data courtesy of DigitalGlobe.

Conclusion

GIS professionals worldwide are beginning to understand the importance and benefits of extracting geospatial information from imagery to complement and enhance GIS applications. The growing availability of imagery and recent advances in image processing and analysis technologies, such as ENVI EX are making it easier for GIS professionals to get important information from imagery for a wide variety of applications.

As the need for adding more timely and accurate information grows, so too does the need for solutions that make it easier to get information quickly and easily. ENVI EX, designed for for GIS professionals, delivers accurate results based on a solid scientific foundation and provides step-by-step workflows that quickly and easily guide users through advanced image processing tasks, regardless of experience level. ENVI EX is also fully integrated with ArcGIS to allow information from imagery to be seamlessly integrated with the GIS

For more information on ENVI visit www.ittvis.com/ENVI or email Rolf Schaeppi at rschaeppi@ittvis.com.

Mr. Jack Dangermond

Founder & President ESRI Inc.

The technology and applications of GIS has come a longway in its past ~50 years of development. ESRI has a pioneering role in these 50 years in developing the technology and positioning a pre-eminent position for GIS in the world – especially through its state-of-arc ArcGIS technology. ArcGIS has come a long way from its modest DOS-based versions (in 1980s) to the present Server version which is revolutionising the web and internet mode of Mapping and enabling many an Enterprise in positioning unique GIS Applications. The man behind this is a personification of technical brilliance, an entrepreneur par norms, a humble person, a person that everyone wants to relate to in the GIS field. Mr Jack Dangermond. ArcNews India and ESRI India is happy to bring Jack to India once again for the ESRI India UC in April, 2010 and also feature him in this "very thought provoking" interview. Talking to Jack is always a pleasure – but more enriching is reading and learning his views, his vision and his futuristic perspectives of what GIS will be. In this exclusive interview conducted by Mukund Rao, we bring Jack to all of you and a deep insight into his thinking, his belief, his vision and his passion for the world that we all are in – GIS, ArcGIS, ESRI and at a broader level of how GIS is (and will) impact Society and its well-being. We expect that there will be more direct interaction that all of our users can have with Jack – at the UC. So read on ….. know what the future of GIS will be. Also get ready to participate in the UC and meet Jack himself.

Q. What are the challenges and opportunities that GIS faces today especially in it's positioning as a socially relevant and economically enabling technology?

GIS, from its early origins, has been socially relevant. The evidence suggests that GIS has had considerable affect on the economies of local, regional, and national governments. It has affected the entire world economy by creating greater efficiency, more communication, and better decision making.

GIS technology is currently going through a major transition to a new platform – the Web. This transition is interesting because the Web is faster and adds something that we have never had, the ability to connect to all of the knowledge of the people who are connected with the Internet. That is to say we are moving from the client/server model that has been so significant in personal and enterprise computing to a platform which virtually connects all servers, desktops and mobile devices. This shift means that we are becoming more connected to each other's work, and with the aid of powerful GIS enabled server technology and the Web itself, we are becoming better able to "serve" each other. That means the fundamental values that we have developed and promoted within the geospatial community of sharing our knowledge are becoming even more important.

From a technology perspective, what's being added is the GIS Web component that works with any type of client—desktop, mobile or Web. While some have described this transition as disruptive, it is actually expanding our field. GIS users are creating geographic knowledge—maps, models and various types of workflows—using desktop and traditional client/server architectures. The full web integration will make that knowledge pervasive. Geo web services and applications built on top of them will deliver this knowledge to everyone and make the world a better place.

Another dimension of this technology is simplification. We are seeing a shift towards easier applications and easier free tools to develop applications. New rich APIs available in Javascript, Flex/Flash, and Silverlight are all integrated with enterprise systems such as Outlook and SharePoint, which means Geo is easily integrated with traditional IT systems. These API foundations open up access to server-based knowledge so that developers can make it available to anyone, opening up the treasures of geographic knowledge for all of society.

Q. For several years, you have been promoting the concept of designing our future using GIS. Could you kindly elaborate on this concept? How is ESRI taking on

> **"….set of methods, tools and concepts that integrate geographic knowledge (often created and maintained in GISs) with the creative design process, which looks to create new geographies that respond to human needs and trends"**

geodesign as a fundamental element of the future GIS solutions?

Geodesign today is just in its beginning stages. It is defined as a set of methods, tools and concepts that integrate geographic knowledge (often created and maintained in GISs) with the creative design process, which looks to create new geographies that respond to human needs and trends. Geodesign is both an old idea and a new idea and envisions the integration of nature and culture into the way that we plan and create our future.

At ESRI, we have built fundamental enabling tools and processes into ArcGIS at version 10, including the ability to interactively sketch alternative geographic designs on top of GIS maps and images. This includes sketching designs on top of land suitability and capability maps that are multi-layer analytic models that interpret geographic information. These sketches can also be used to dynamically evaluate GIS based evaluation models. For example, when sketching out land use development, the designer is given immediate feedback with respect to the impact of these designs, i.e. increased run off, biodiversity impacts, increased traffic, and so on. Ideally speaking, geodesign will be a foundation for future planning and engineering and will improve the way that we make decisions about virtually all the changes that we make on geography.

Some have suggested that GeoDesign will be limited in focus to the traditional design professions of land use planning, city and urban design, landscape architecture, etc. My own interpretation is that geodesign will affect virtually all kinds of geographic planning; work done by developers, industries, commercial development, transportation designers, etc. It will also extend into administrative management design - like sales territories, laying out police and school districts, and strategies for homeland and security defense. I very much like this idea because it focuses our attention on creating future geographies which are sustainable and integrate all the factors that are representative of GIS databases.

Q. In India, a lot of GIS is for governance and social development. What are your views on GIS for governance? What will be the focus in this arena according to you?

GIS has been created as an information technology for managing and applying geographic data to many applications. These include managing land records, developing land use plans, zoning, record keeping, planning social and transportation investments, etc.

Today, there is new talk of government being a platform for society at large. This means that government based information and government IT can be thought of as a platform much like we think of the internet or operating systems and other sorts of IT as a platform. By leveraging government IT correctly we can have a better business atmosphere, more prosperous economic development, consider the environment more effectively, and have open communication and citizen engagement with government agencies. We're still in the early stages of this movement, but certainly GIS will play a significant role in it as it will help facilitate the visualization and communication between government agencies and the rest of society.

> "GIS will play a significant role in it as it will help facilitate the visualization and communication between government agencies and the rest of society"

Q. Can you kindly tell us about ArcGIS 10 and its innovative improvements? What, according to you, is the differentiator that ArcGIS 10 will bring about to users?

Version 10 is a big step for ESRI users and for the world. At the grandest vision, it will extend the reach of GIS to everyone beyond the GIS community. Some of the enabling tools for this are:

1. ArcGIS.com, which is a global, cloud-based system for geospatial web services and the exchange of applications and maps. It will create a social network of different communities of GIS users that promote the sharing and application of GIS globally.
2. ArcGIS 10 is also much simpler to use. This simplification is implemented in the Desktop version as well as new free web applications and improved APIs for developers to build rapid web applications. Finally it provides new access through smart phones (like the iPhone) so that GIS users can publish their information for use by virtually everyone: executives, citizens, knowledge workers, and specialists.
3. While GIS becomes radically easier to use, geographic science enabled by new technologies also continues to advance. Version 10 integrates new visibility tools, much faster display technology, 3D capabilities, and temporal capabilities. People who create and manage geographic knowledge will become more capable and this knowledge will be more available for others to use.

> "Now that this technology is available, this will happen very quickly around the world, realizing many of the visions of a national spatial data infrastructure (NSDI) that were considered almost technically impossible in the past"

Q. You have talked about a national GIS. In India too we have been pushing the concept of a national GIS. What are your views on national GIS? Why do you think it's important?

There are certain sorts of problems that require national planning and management for which a national GIS is absolutely critical. Over the years many people have conceived of national systems that would incorporate all of the geographic information for a country and provide the same kind of information platform as we have had at the state and local level. This is now becoming possible for a variety of reasons. First, the technology is becoming faster and cheaper at such a rate that it can handle the very large databases that are necessary for a national GIS. Second, the model of

distributed services that can be dynamically mashed up and applied for various kinds of applications has now arrived with ArcGIS Server (particularly Version 10) and also its deployment in the cloud. We can conceive of distributed national agencies such as forestry, water, planning, each having large repositories of data which they create and maintain and at the same time share/serve to other agencies so that web-like applications can bring together this information for complex application. Now that this technology is available, this will happen very quickly around the world, realizing many of the visions of a national spatial data infrastructure (NSDI) that were considered almost technically impossible in the past.

Q. How do you see the importance of content in GIS arena today? What is ESRI doing in this area especially the focus on ArcGIS Online and its resources?

Content is fundamentally important for GIS and always has been. The web is allowing us to serve very large volumes of content with specialized map and analytic services and make them available as fast and easy to use applications. We envision a world where there will be thousands of content services each being supported by different local, state, and national governments as well as private enterprises. ESRI itself is also setting up a series of web services for imagery, topographic mapping, street mapping, and in some regions of the world demographics. We are developing these content services in cooperation with authoritative source agencies. This is requiring the use of standardized templates for both map rendering and related applications. These "basemap" services are being made further available to our users as both background basemaps for their GIS applications as well as foundations for building API based applications for all sorts of fields. ArcGIS Online also has a sharing environment which is described as a kind of "geoflickr," where users can share their layers and maps in an easily discoverable and downloadable environment. This is becoming very popular among users as they create maps and datasets that they wish to distribute. ArcGIS Online/ArcGIS.com is a platform site to do just that.

> **"....GIS is fundamentally the introduction of space and spatial thinking into IT and will continue to evolve in the full stack of IT applications"**

Q. You started off the GIS tryst many years ago. How do you visualize the future generations look at GIS and use them?

GIS is just beginning. We are now recognizing its value in hundreds of thousands of organizations who regularly create and maintain billions of dollars worth of geospatial information. This information is beginning to become available as services that will be embedded in virtually everything that humans do, both in their professional government/business life as well as in their consumer life. ESRI will continue to build technology that provides platforms for organizations who leverage this information into a host of applications; applications that are no longer described as being a GIS, but rather embedded geospatial applications that provide location in everything that we do.

Q. What is your vision of the future of GIS - say if you were to look at 5, 10, 20 years ahead of now?

This is difficult to say. We will continue to make progress in building more systematic measurements of the planet at all scales and the applications of this knowledge will be embedded in everything from consumer technology to advanced scientific efforts. GIS is fundamentally the introduction of space and spatial thinking into IT and will continue to evolve in the full stack of IT applications. Today we are already seeing the integration through web services and mash ups of geospatial thinking in other applications. This is only the beginning.

Q. Do you think sufficient research is happening in improving algorithms and performance of models in GIS? What is ESRI doing in this regard?

The sophisticated spatial analysis and modeling work is continuing to advance. We are seeing the integration of time and space as most dynamic feedback modeling within GIS itself. Also (with the release of version 10) we see the imbedding of a full scientific programming language (Python) at the heart of GIS itself. These are technology advancements that certainly advance the scientific method as it relates to space and space time analysis.

Algorithm development improving performance and scalability is also one of the underlying themes of ESRI's ongoing efforts at improving its tools. At the same time however, the enormous improvements in computational performance, virtualization, and distributed processing is making this field less important than advancing fundamental thinking and methods development.

Q. How has been the ESRI model to overcome the recession trends in the recent past and in what way do you see the growth in the industry in the coming days?

ESRI has weathered the recession over that last several years

> "..... Our success results from a culmination of factors i.e. the desire to make a difference, the need for GIS, a group of support people who work hard, good software engineering, thousands of business partners, and a dedication to serving our users."

quite well. The last 2 years our growth rate has been about 7%, which for a global IT company has been above average. We foresee a return to double digit growth starting next year and into the future as our technology expands in functionality and also extends its reach into more applications and fields. While GIS as a core enabling technology is focused primarily on the management and exploitation of geographic data, a very large 10+ billion dollar industry has developed around our product as other companies build extensions of our core tools into specialized applications and workflows. This is modernizing many aspects of our global society. This growth is happening at an even faster rate than the core platform technology itself and with the migration of GIS to the web, this is expected to grow exponentially in the next several years.

Q. What is your vision for ESRI?

ESRI will continue to be a strong geospatial software provider and enrich both its end users and business partners with strong support at the technical and application level. It has been successful in developing a global community of hundreds of thousands of users who enjoy common methods and standards for approaching problems in many complex areas. We see ESRI remaining healthy and growing with its focus on customer assistance and also being a good place for our employees to work while we continue to achieve strong financial performance. But financial success is not our focus or purpose. Our success results from a culmination of factors i.e. the desire to make a difference, the need for GIS, a group of support people who work hard, good software engineering, thousands of business partners, and a dedication to serving our users. These components allow us to serve our customers better and push and advance the technology as we have in the last four decades.

In the next four decades, ESRI will continue to grow and be focused on similar sorts of endeavors, the advancement of technology and its application in many fields. ESRI has been a leader in this respect for decades and looks forward to continuing to have the opportunity to support its users. Nevertheless we don't take this for granted and we work very hard to ensure that the quality of our tools is responsive to what our users need and want.

Q. How do you visualize the perceptual changes in user's needs – which is solution centric. How do you think GIS technology is most focused on resolving this solution centric problem and building a model of meeting any and all needs of user's solutions?

This, by any measure is a substantial job and ESRI doesn't do it alone. We have business partners and other organizations that are helping advance our solution offerings on many fronts. Fundamentally, users need solutions and while we promote building enabling technology, end user solutions are increasingly important. We also have thousands of business partners who extend our core foundation technology into end user applications and workflows. For example, Telvent is a significant player in the utilities industry and has been very successful in electrical utilities in India by providing solutions focused on end users requirements. They fill the gap between generic capabilities of ArcGIS and the end user requirements that are necessary to achieve the largest benefits possible.

Another way that we accomplish this is through multiple users conferences both at the international and national scales. We listen closely to what our users ask for and incorporate it into new releases every year or two. While there are faster ways to do this with very focused pieces of code, we find that our incremental development and release cycle of tools continues to be appreciated by customers, particularly those that have (or support) large scale and enterprise applications.

This summer we are releasing a new "Ideas Portal." This portal is being managed by our software development team and is intended to acquire direct feedback from end users who are facing solution problems which require adjustments to our core technologies. We think this will become an "electronic user conference" for better supporting our users.

Q. What is your view on ESRI in India and the usage of GIS in India? What would the message to Indian GIS community from your side be?

First, I have watched India develop over the last 25 years. My first visit to India in 1985 was to a very different country, one that was not advanced technically in the IT space. At that time ESRI donated 100 copies of our software to the Indian government and this started to create a basic awareness around the country of the power of GIS (beyond simply automating the mapping work). The efforts of Rajesh Mathur, working over the decades to both promote the GIS vision and then build an Indian based company for representing our work, have been remarkable. Today there are thousands of organizations that have embraced the geographic method and are deploying the technology at many scales of activity ranging from management of utilities to land use planning and environmental conservation. I am excited about this, and while ESRI India approaches implementations differently than almost any other country, they are also increasingly making advancements in knowhow and ability to support our users there.

My message to our users is to grow their knowledge rapidly. Their work is very important to the future of India and its development.

In the early years, many people in India who were attracted to our technology had the idea that they could develop services companies, data conversion applications, and software development to sell overseas. While this certainly has had an impact, I believe a stronger and much more interesting focus is now occurring which is developing the application of GIS for the growing Indian market and the sophistication of society at all levels. People are embracing this technology because it represents for them the first and perhaps only technology that has significant power of information and integration. This, I believe, will continue to be a strong platform for Indian economic development (while at the same time considering of all the environmental and cultural factors into the decision making cycle).

NIIT GIS gets Laurels at Map India 2010

NIIT GIS Ltd. recently participated at the Map India 2010 Conference & Exhibition from 19 – 21 January 2010 at Epicentre Gurgaon. NIIT GIS also known as ESRI India had been the forefront in the field of GIS implementation in India. Map India 2010 conference opened with a Vision for the Country. The Map India 2010 conference witnessed a large participation from the Government sector and the GIS Community nationwide.

During the Occasion NIIT GIS won couple of Awards bringing laurels to the NIIT Group.

- Best Exhibitor Award
- GIS Software Company of the Year 2009 – 2010 – ESRI
- Geospatial Personality of the Year 2009 - 2010 - Dr. Mukund Rao

"Geospatial technology is fast maturing and government will facilitate the speedier development of this industry in the country," pronounced Prithviraj Chavan, Minister for Science and Technology and Earth Sciences. "Today, we see technology converging at various levels, be it hardware, software or databases and expanding the scope of geospatial. We also see the 'e' and 'g' technologies are working hand in glove seamlessly. Though much is achieved," Chavan said, "there is a long way to go. It is the role of the government to help the industry grow, to improve g-literacy and to mainstream geospatial technology into development process."

On the occasion Mr. Rajendra S Pawar, Chairman and co-founder, NIIT group, had a bottom-up prescription for GIS in India. He stressed on the need to empower the grassroots user, say a farmer, with information so that he can identify the land that best suits him, choose the right crop for his land, get agro advisories, weather and market information timely so that he gets proper return on his investment and effort." He also visioned that the information can be brought to the farmer through information kiosks or even hand held devices and call it GIS at level 1 or simply GIS1. GIS 2 can be built at the village or panchayat level, extracting data from the warehouses on land, health, education, power, water etc and making it accessible to the farmer at the right time. This way, a correlation at the most fundamental level can be built with data pertaining to the village and through local governance, between the user and the data.

Other Guest Speakers were Dr. K Kasturirangan, Member Planning Commission, Prof. Yash Pal, Former Chairman UGC & Former Secretary, Department of Science & Technology, India; Dr. Shailesh Nayak, Secretary, Ministry of Earth Sciences, India. Mr. K K Singh , CMD Rolta Group and Maj. Gen Siva Kumar, CEO NSDI.

Addressing the Plenary address on Geospatial Applications, Dr Mukund K Rao, President and COO, ESRI India, presented his vision of how GIS can enable design of future communities in India presenting the status of today and possible scenarios for tomorrow with the result that GIS. On the technology front, he said, while geospatial technologies are getting more user-friendly, a lot of scientific programming, fast visualisation, and time profiling, 3D analysis are making these versatile by the day, GIS will no more be just maps and images, it will be a third generation boost to GIS.

Mukund called on all the stakeholders of geospatial to come together and build a national GIS for India that can provide a common framework in the country. He also envisioned a city GIS for the scores of Indian cities under the much talked about project JNNURM. One of the many ways to touch an individual's life is through his land/property. Mukund said a national G-cadastre can accrue immense benefits to individuals. NSDI cloud and integrated NSDI policy are few more initiatives which Mukund believes will bring a sea change the way geospatial is dealt with in the country and can spin-off a variety of applications.

SAP-ESRI GIS Integration – A Future GIS Prospective

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Abstract

Enterprise Resource Planning (ERP) is a computer program that integrates enterprises' data, business processes, workflows and interfaces with the stake holders' external processes. ERP helps in managing assets, resources, projects, services and finance. Most aspects of an ERP system has a geographic component to it, however hardly any of the leading ERP providers are providing an in-built tool to analyze information vis-à-vis its spatial context. At the same time Geographic Information System (GIS) provides a set of technological tools that enable clients to take geographically informed decisions by facilitating better interaction with time and space. Making the GIS tools and data available in ERP through an integration framework certainly enhances ERP users' decision making abilities in their day to day activities. In the context of this technical paper we discuss various aspects of integration between SAP's ERP and ESRI's GIS; both are world leaders in their respective fields. Over the last few years advancements in ESRI Technologies have made sure GIS is no more limited to the desktops of GIS professionals, geographers and geologists, but can be extended to and integrated with any other enterprise systems such as SAP. Such advancements from SAP and ESRI GIS have made integration of these systems a reality and highly beneficial option. Major challenges being linking each object in SAP to its corresponding object in ESRI GIS, synchronizing both systems at an optimal interval and adopting workflows that are understandable to both systems.

Introduction

Utility companies across the country are in a race to provide uninterrupted, affordable and customer-focused services. IT Modernization is at top of their agenda to strive in the competitive world. Technologies such as ERP and GIS are commonly adopted by such organizations to optimize their workflows and increase overall efficiencies. ERP integrates business processes and facilitates flow of information within the organization and with concerned external agencies . GIS helps the organization to visualize its assets, customers, service orders, shipments on an intelligent map-based computer application. Most of the information that ERP processes have a spatial component to it such as assets, customers, service notifications, work orders, field crews and so on. Unfortunately ERP software packages from dominant players do not provide a platform to store, analyze and display this information where an end-user can draw geographic advantage to make more informed decision. GIS has the capabilities to spatially analyze all location-based information and provides a visual aide to the decision makers. ERP and GIS are two distinctly different applications. Leveraging GIS functionalities for ERP processes involve many tedious manual processes and redundancy. For example if a new customer is added in ERP, the same information has to be circulated to GIS technicians through emails/hard-copy memos who will manually update GIS database. This not only takes longer time to complete, but also give rise to duplicate and erroneous data. Benefits from an integrated ERP and GIS are tremendous where information can easily flow between them, where both systems can be kept in sync with each other, where an end-user can access, analyze and update information from both systems from a single platform. When benefits can be easily envisaged, challenges to achieve such an integration need to be given due consideration. In the context of this paper, such integration between SAP and ESRI GIS is discussed. Both SAP and ESRI are industry leaders in their respective fields having major market shares2,3. Two scenarios (Enterprise Asset Management and Customer Relationship Management) are chosen to be described here.

Business Needs and Pain Areas

Enterprise asset management (EAM) means the whole life optimal management of the physical assets of an organization to maximize value. It covers such things as the design, construction, commissioning, operations, maintenance and decommissioning/replacement of plant, equipment and facilities. "Enterprise" refers to the management of the assets across departments, locations, facilities and, in some cases, business units1. Utilities are capital-intensive organizations where physical assets such as utility network (Water, Gas or Electricity) require major portion of the investments. Managing life cycles of the physical network is of paramount importance in the organization's success.

There are four main phases in SAP EAM4. 1) Investment Planning, Asset Specification, and Design 2) Procurement and Asset Construction, Installation, and Implementation 3) Maintenance and Operations Management 4) Decommissioning and Disposal. Each of these phases are executed in order for a new organization where as for an existing operator Maintenance and Operations Management features prominently in an EAM workflow, though phase 1 and 2 still continue hand-in-hand when the existing operator expands its geographic extents of operation. Maintenance, repair and operations (MRO) is part of daily workflows and crucial for the success or failure of an operational Utility company.

Customer relationship management (CRM) is a broadly recognized, widely-implemented strategy for managing and nurturing a company's interactions with clients and sales prospects. It involves using technology to organize, automate, and synchronize business processes—principally sales activities, but also those for marketing, customer service, and technical support1.

A typical ESRI Geodatabase for utilities stores all elements of a physical network such as mains, laterals, valves, fittings, hydrants, meters etc and groups them together in a feature dataset. A logical network (geometric network) having rule-based connectivity between all network elements resides in the same feature dataset. The geometric network helps in tracing the network as it maintains connectivity. Whereas the rules help in automating some of the editing activities. Some utilities do store and maintain customer information as a table or feature class with point geometry in their Geodatabase.

Examples of typical SAP and ESRI GIS workflow prior to Integration:

i) Adding a new customer: A new customer is added in SAP.

New customer's address with other relevant information is given to GIS where the same customer is created manually by GIS technicians. A map containing approximate customer location, land-base features and network features of adjoining localities is printed by GIS division and returned back to ERP division. ERP division makes arrangement for the new connection. Any further changes to the customer in SAP EAM during installation are provided to GIS again. There are several stages where information is exchanged back and forth leading to duplicities, inconsistencies and data loss.

ii) Registering a complaint: Registering complaints from customers is part of Work Order Management process in SAP. When a new complaint is received, a new service notification is created by the CSR/receptionist associating it to the customer account number. At this time, the receptionist has no access to visualize the location of the customer. In a disconnected environment the Utility workforce is not capable of diagnosing if a number of complaints come from the same region and probably can be associated with same set of faulty equipments. GIS is completely unaware of these service notifications. Manual, inter-departmental and time consuming steps are adhered to analyze the complaint locations in GIS.

iii) Locating faulty equipments: A passerby called-up a water utility company and reported a huge water leakage at a certain street. This is kind of problem, an isolated SAP system find difficult for immediate response. It's not associated with a customer; it's associated with equipment which could be a broken pipeline. To narrow down the location, SAP depends on GIS. Descriptive information on such a leakage is manually provided to GIS division. These descriptions sometime lack clarify and often identifying the faulty equipment takes lot of time. Hence it brings undesired revenue loss to the company.

iv) Work Order creation and crew assignment: Similarly the supervisor who logs in to see list of service notifications to assign the same to appropriate crew members have no means to visualize the location of the notifications. Though SAP CRM provides a resource planning board to help the supervisor while assigning service orders to appropriate crew members, there is no platform available inside SAP to understand the spatial distribution of notifications and crew members.

v) Locating customer on a map before servicing: Once a crew is assigned to a few service/work orders; he/she drives to those locations based on his/her own experience. In a tight situation, it asks the GIS division for a hard copy map of the adjoining areas. Often the crew drives more miles than optimal. Naturally operation cost is higher as the crew travels more and end up serving fewer customers in a day.

vi) Mobile applications as a supplementary aide to Field Crews: Technologically advanced utility companies do provide mobile devices to their crew members to assist in recording the service details while at service location. Again the changes made to the network and recorded in mobile devices have to be manually communicated to the GIS division for updating Geodatabase. Often these processes lead to a situation where SAP system and GIS becomes out of sync.

vii) Identifying problematic zones: Having an updated and synchronized Geodatabase can easily help the management to identify problematic zones where a number of complaints are coming from. It can be an invaluable tool to understand spatial distribution of customers, complaints, equipments. Thus helping in budgeting for maintenance and future expansion of the company. At the same time an out-of-sync Geodatabase would not provide a correct picture and may mislead decision-makers. Below (Figure 1) is a comical representation of current pain areas are provided along with benefits from an integration.

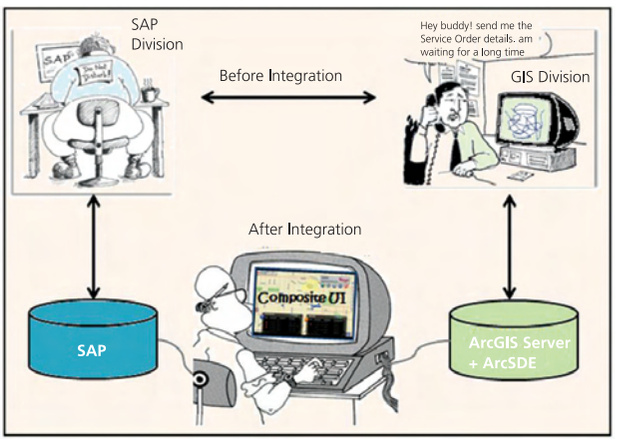

Figure1. A comical representation of pain areas of isolated systems and benefits from Integration

Integration Approach

Integrating two enterprise systems with distinct business processes, technologies and databases is a very complex exercise. One needs to understand the existing systems, expectations from an integrated system prior to attempt such a process. Followings are bare minimum items that need to be clearly understood:

i) What is to be integrated? This is the most important question to begin with. As we have seen from previous discussions SAP's landscape is huge. Our focus is not just integrating data, but integrating business processes also. Understanding the entire business processes that are captured through SAP is of paramount importance. From the broader level, we need to narrow down the processes which can be beneficial by embedding a spatial dimension. E.g. let's take the example of a water utility. There are some business processes that can be integrated with GIS such as move-in. move-out, disconnection, re-connection, new connection etc. On integration with GIS, locations of these processes will be displayed on a Map along with appropriate status in real-time. A glance at the real-time GIS map reveals status of processes of an entire area. Our first exercise is to identify SAP business processes and operations that need to be displayed in GIS either in real-time or within a scheduled interval. Similarly identify what all processes/ operations in GIS need to be propagated to SAP either real-time or within a scheduled interval.

ii) Now we know what to Integrate, but do we have the pre-requisites to support the integration? Let's say I am interested to show all customers who have been moved-in today? In order to execute this operation in GIS, we need to have one-to-one relationship established between customer information both in SAP and GIS.

iii) Unique key for data linking: Unique Keys such as customer account number is required to establish one-to-one relationship between identified feature classes/tables in Geodatabase and corresponding object in SAP.

iv) Determine direction of data flow (unidirectional from SAP-GIS, unidirectional from GIS-SAP, bidirectional): Depending on the organization's business processes, we need to determine 'System of Records' for each object. Let's say SAP is the system of records for customer data,

that means customer data can only be edited from SAP. Whether it's addition of a new customer, or change in some fields for an existing customer, it needs to be done from SAP. Synchronization process (whether real-time or a scheduled task) will update the same in Geodatabase. At the same time when we say that GIS is the 'System of Records' for all mains, i.e. any change to mains has to be initiated from GIS. There could be some other instances where both SAP and GIS will be the 'System of Records' for a specific object/feature class.

v) Frequency of Synchronization: Often updated data associated with certain operations in a specific system cannot immediately be sent to the other system and updated. E.g. A new service lateral created in SAP. In those circumstances (that usually involves a semi-automated approach); a process can be scheduled to synchronize both systems with manual interferences at specific intervals.

Broad level Architecture:

Different architecture can be designed on case-to-case basis depending on the exact requirement, system landscapes and expectations from integrated solution. SAP provides many products/platforms such as Exchange Infrastructures (SAP XI), SAP Master Data Management (SAP MDM), SAPI Business Application Programming Interface Webservices (SAP BAPI Webservices) to facilitate integration of SAP Objects with external systems such as ESRI GIS. Integration architecture is designed leveraging advanced functionalities of ArcGIS Server. ESRI's ArcGIS Server provides application programming interfaces on third party SDKs such as Flex and Silverlight for developing rich internet applications. ArcGIS Server exposes powerful GIS functionalities/tools to be available on web applications. Besides, ArcGIS Server seamlessly connects to ArcSDE Geodatabase, publishes both simple and complex data, analyzes and manipulates the same data over the web. A pictorial representation of simplified integration architecture diagram is provided below (figure 2). It's a three layered architecture i.e. data and base layer, business layer, and presentation layer. Both ArcSDE Geodatabase/ArcGIS Server and SAP R-3 are placed in the base layer. A custom .Net program is placed in the middle layer that basically facilitates the integration. The presentation layer consists of a SAP client having embedded maps/GIS applications; a ArcGIS Desktop with data synchronization capabilities and most importantly a single-unified dash board application (developed using ArcGIS Server Flex API).

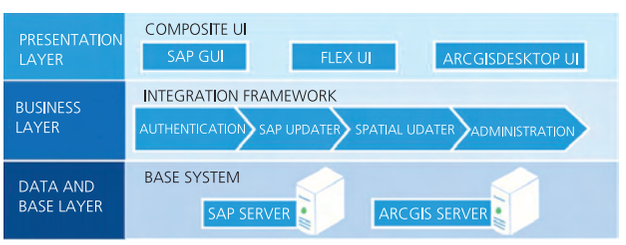

Figure 2: Broad level architecture diagram of a SAP-ESRI GIS Integration

Challenges and Benefits

Challenges and benefits go hand-in-hand while integrating distinctly different enterprise systems. Some of the challenges are:

i) Understanding business processes and workflows implemented for SAP and GIS.

ii) Identifying system of records for each object class to be linked

iii) Identifying, generating and populating unique keys on corresponding objects that need to be linked

iv) Designing the architecture to fulfill requirements, cost and return on investment

v) Keeping both systems synchronized

Benefits are a plenty as we are discussing from previous section. We will evaluate a few of the benefits here.

i) Unified Work Order Management System: Imagine an intuitive, user friendly and rich looking application where you can display information from SAP on a GIS Map and enables you spatially analyze your SAP tabular data. It asks you to authenticate using a single userid to access both SAP and GIS. It provides you tools to undertake SAP business processes such as creating a notification, assigning to crew and generate work orders, finding optimal routes to attend a number of work orders in a day and so on. There are tools available for everybody whether you are a CSR/receptionist, a supervisor, a crew or an executive. Navigate to specific area in GIS Map, click on an equipment and you can see the work-order history belonging to that specific equipment. Identifying faulty equipments is easier through visualization. Integration allows creating a notification by clicking the identified equipment then and there. It increases efficiency in manifolds. An executive logs in to see spatial distribution of priority orders and also can further prioritize them if the business demands so, also he/she can generate a report on order status.

ii) Asset Data Management to keep them in Sync: To sustain the benefits we discussed in work management system, both the systems need to be in sync. If new equipments are added to SAP, same has to be added in the Geodatabase and linked to SAP. Similarly if a service lateral is split in GIS, the updated information should be passed to SAP and updated.

iii) Advanced GIS functionalities in the Integrated Platform for spatial analysis of SAP Data: ArcGIS REST APIs provide whole lot of advanced functionalities such as clustering, heat map, drive-time analysis that can be easily exploited to derive maximum benefit to the utility companies from a single-unified platform. For example if an executive wants to know quick spatial distribution of work orders, a heat map on work orders will help tremendously. To represent customers from a multi-storied apartment complex, clustering is helpful.

Conclusion:

Above all Integrating SAP business processes with ESRI GIS enhances operational efficiencies, reduce maintenance cost and increase response time to customer problems. Comparing to the risks, challenges and implementation cost; benefits weigh higher. As most of the utility companies have already implemented ERP and GIS, it would be sooner they will be looking forward for an integration partner. ESRI's ArcGIS Server provides an ideal platform to not only embed GIS data in external systems, but also to expose core GIS functionalities in external systems through REST and http protocols.

References:

1.http://en.wikipedia.org/wiki/

2.http://www.sap.com/about/newsroom/press.epx?pressid=9913

3.http://www.esri.com/about-esri/about/history.html

4.Sap White Paper: Enterprise Asset Management Maximize return on assets with End-to-End Solution

A GIS approach on Landscape Assessment with integration of various parameters of Watershed Development Program in Kalyanpura Watershed, Bhilwara, Rajasthan.

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Abstract:

Watershed development and management is consisting of various parameters which directly influence the daily life of local people. Watershed development program includes social development of the community in each and every aspect and simultaneously the natural resource management by considering ecological health. By word, it is easy to describe all these parameters, but, in real sense it is difficult to play with by understanding the influence of each and every parameter to each other. It is because of one parameter is complementary to another. Land and Water are the main influencing zone to restore and managing natural resources. To deal with various phenomenon of land and water, a brief and regional set up of the earth sciences in a broad sense of the watershed area has to be taken in project objectives and if required, detailing of the related parameters also. Scaling and integration on a spatial platform has been established through GIS approach for such case and that has been overlaid on revenue maps. Geological (geo-hydrological) parameters of the area have been linked with physiographic pattern of the area and then land use classification has been established by using Remote Sensing techniques. These all are cross checked with field reality and finally has been put in a single platform of GIS and analyzed with all spatial and temporal scale. The treatment plan has been developed on the basis of above mentioned parameters and revenue maps have been geo-referenced and digitized to overlay on the final output. The final map is showing the treatment plan for each and every land for best possible development in terms of betterment of natural resource management.

Introduction:

Landscape assessment and management planning by considering the possible parameters of it is not only difficult but also it is complex. There are various processes of integration of social science, technology and natural resources in a single platform to understand an area at any temporal and spatial scale, but these processes are more conceptual and difficult to translate at every level. Assumptions and ambiguity decrease the originality of the main theme. With help of Spatial analysis by Geographic Information System of the different data set, an approach has been made to integrate different data set in a single platform with correlations to each other and that yield a better picture to make understanding of the area and therefore conservation measure planning depending upon the themes.

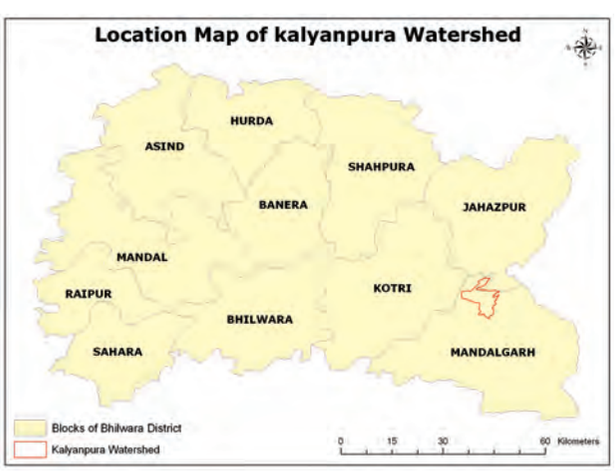

Figure1: Location map of Kalyanpura Watershed in Bhilwara district

Project Details:

Watershed development programs for sustainable development in different aspects of rural part of any country consisting of betterment of water regime, natural resources and other inter related functions which are directly or indirectly relating the local livelihood components and also the health components. Since it is linked to natural resources, and unit is being considered as a geographic boundary, the planning would be towards the landscape where the linkage between land use and land cover with other components can be integrated. In landscape management, ecology is another component which is one of the main objectives to protect and restore the nature. Therefore linking of different components is necessary during planning and interventions. Still it is difficult to deal with all the parameters of watershed management and putting these in a single platform. Conceptually, the planning can be done by understanding a unit area with every possible parameter, but that is difficult and translation of this concept by any means is more complex. In Geographic Information System (GIS) integration of parameters with help of other technologies like Remote Sensing, Scientific research can be done by putting them in a single platform. In the following section, the methodology of the landscape assessment has been exemplified with an example of watershed program. Kalyanpura watershed is situated in Mandalgarh block of Bhilwara district in Rajasthan. The project initialized in the year 2006 with Public Private Partnership between Govt. of India, Govt. of Rajasthan and Indian Tobacco Company (ITC). This is a watershed of approximately 5000 hectare area and drainages are tributary of river Mej (a tributary to Chambal). During planning of the interventions, different surveys have been conducted in the area. Mainly land use, land cover of the area have been classified, topographical and geological survey have been done, ecological parameters have been taken under consideration after a detailed ecological survey, local livelihood pattern and socio economic condition have also been considered during planning. Then all these data have been converted to the spatial database which has been used in GIS to analyze and integrate as different layers. Finally five types of spatial database have been constructed, Topographic

data, Geological data, Ecological data, Demographic data and Socio-Economic data. The method described here is showing the integration process of first two data types and intervention planning according to these data. More on it, the revenue maps (cadastral maps) have been geo-referenced and digitized and have been overlaid. These maps give the detail planning on revenue land no wise map with each and every aspects with respect to topography, land use land cover and geo-hydrology.

Parameters & Method Used for Integration:

1. Topography: In topographic data, mainly, contours and drainage lines have been digitized in ARC-Info (ARC-GIS 9) from the Survey of India (SOI) topo-sheets and then digital elevation model has been generated with help of ARC (command prompt) and Spatial Analyst tool has been used. With the help of Spatial Analyst, from the digital elevation model, the total area has been classified according to its slope variation.

The 0-1% of slope has re-coded by number 1, 1-3% slope by 2, 3-5% slope by 3, 5-10% slope by 4, 10-25% slope by 5, 25-50% slope by 6 and >50% slope by 7. By this way, the total watershed area has been classified with 7 class intervals. In ARC-GIS, by using classification tool, the polygon coverage have been constructed after classify the area according to these 7 categories.

2. Land use land cover: Secondly, the Land Sat imageries have been classified in three categories, Agriculture land, non agriculture land (all types of land except agriculture and water body) and Water body with the help of Erdas Imagine software. The LISS3 and PAN images have been classified and ground truthing has been done with GPS survey of the area. These three classified land use also again recoded by 1,2 and 3 respectively. Again with the help of ARC-Toolbox, the raster images have been converted to the polygon coverage for this area, according to the recoded numbers.

These two polygon coverages or layers then spatially integrated with help of GIS. In background, a matrix has been designed. Combination of the numbers in two layers gives the influence of slope and land use in a single platform. 7*3= 21 types of combinations classify the area with 7 classes of slopes and 3 types of land use.

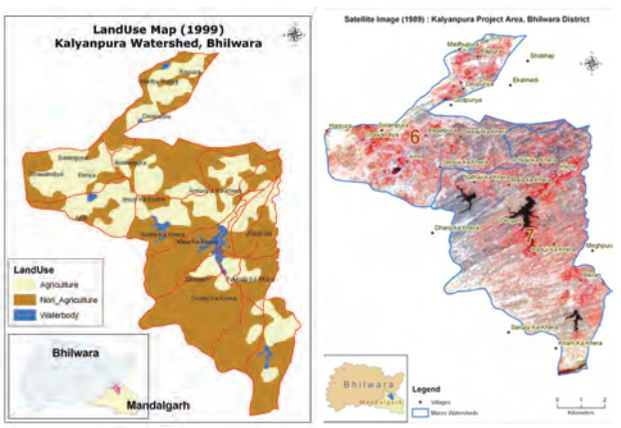

Figure 2: Land use Classification Map

Table 1: Matrix Table for Integration of Land Use and Slope.

LAND USECODE	SLOPECODE	Luse & slope Combinations	Combination actuals
1 (Agriculture)	1 (0-1% slope)	11	Agriculture with 0-1% slope
2 (Non Agriculture)	2 (1-3% slope)	12	Agriculture with 1-3% slope
3 (Water Body)	3 (3-5% slope)	13	Agriculture with 3-5% slope
	4 (5-10% slope)	14	Agriculture with 5-10% slope
	5 (10-25% slope)	15	Agriculture with 10-25% slope
	6 (25-50% slope)	16	Agriculture with 25-50% slope
	7 (>50% slope)	17	Agriculture with >50% slope
		21	NonAgriculture with 0-1% slope
		22	NonAgriculture with 1-3% slope
		23	NonAgriculture with 3-5% slope
		24	NonAgriculture with 5-10% slope
		25	NonAgriculture with 10-25% slope
		26	NonAgriculture with 25-50% slope
		27	NonAgriculture with >50% slope
		31	Waterbody with 0-1% slope
		32	Waterbody with 1-3% slope
		33	Waterbody with 3-5% slope
		34	Waterbody with 5-10% slope
		35	Waterbody with 10-25% slope
		36	Waterbody with 25-50% slope
		37	Waterbody with >50% slope

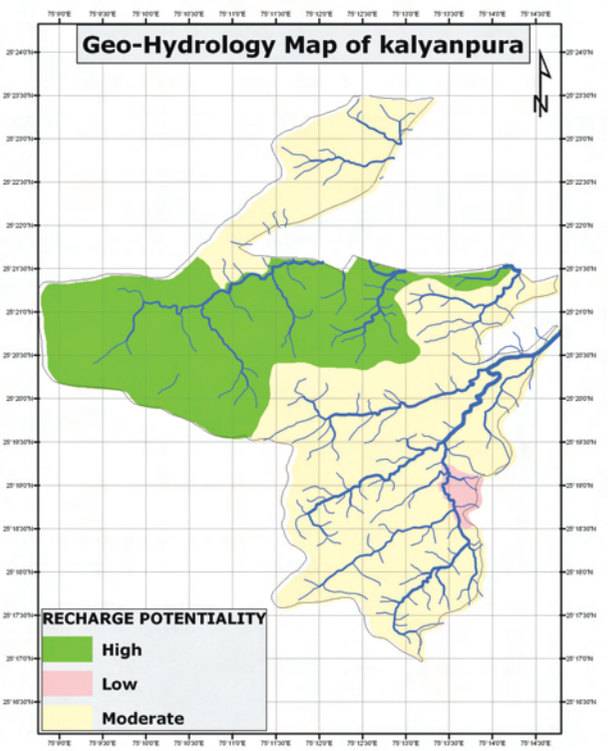

Figure 3: Geo-Hydrology map of Kalyanpura Watershed

Table 2: Matrix Table for integration of land use, topography and recharge potentiality.

SLOPE		COMBINATION OF LANDUSE & SLOPE	RECHARGE CODE	COMBINATION OF LANDUSE, TOPOGRAPHY & RECHARGE POTENTIALITY		
PERCENTAGE	RECLASSIFIED CODE	11	1	1101	1102	1103
"0-1"	1	12	2	1201	1202	1203
"1-3"	2	13	3	1301	1302	1303
"3-5"	3	14		1401	1402	1403
"5-10"	4	15		1501	1502	1503
"10-25"	5	16		1601	1602	1603
"25-50"	6	17		1701	1702	1703
>"50"	7	21		2101	2102	2103
		22		2201	2202	2203
LANDUSE		23		2301	2302	2303
TYPE	RECLASSIFIED CODE	24		2401	2402	2403
Agriculture	1	25		2501	2502	2503
Non -Agriculture	2	26		2601	2602	2603
Waterbody	3	27		2701	2702	2703
		31		3101	3102	3103
RECHARGE POTENTIAL		32		3201	3202	3203
TYPE	RECLASSIFIED CODE	33		3301	3302	3303
High	1	34		3401	3402	3403
Moderate	2	35		3501	3502	3503
Low	3	36		3601	3602	3603
		37		3701	3702	3703

3. Geo-Hydrology: The geological study has been conducted in a grid based pattern with 30" by 30" interval. The base map has been generated by ARC-GIS to make the grid maps where digitized watershed maps have been considered for reference in field. Within the Geo-hydrology study lithological mapping has been done with 1:10000 scale and then drainage analysis has been conducted. Detailed 2D mapping has been done and rock samples have been collected from different grids. These samples have been analyzed under polarized microscope for better understanding of the rock properties. After completion of surface mapping, geophysical survey (Resistivity survey) have been conducted and simultaneously pumping test has been carried out in different grids to identify the aquifers and the flow path, recharge capacity of the area. Storativity, Transmissivity and specific yield has been calculated and aquifer boundaries have been delineated. There are 4 unconfined aquifer systems have been identified on the basis of geo-hydrological survey. These aquifers are having different storativity and transmissivity. The recharge paths are trending towards north-west direction. These paths are due to secondary porosity along the fractures which developed along the foliation plane. This area is highly foliated and the slope of the fractures is gentle at shallow depth and steeper at greater depth. Very local scale foldings are present and enormous quartz vein intrusions made the area complex in terms of ground water movement at local scale. But regionally the ground water flow direction is almost North-West trending.

Analyses of all the possible geological and hydrological parameters classify the area in three categories, High recharge area, Moderate recharge area and Low recharge area. This recharge area again recoded by 1, 2 and 3 numbers respectively and polygons made by ARC-Info with these three categories. The study also found a special case in terms of ground water flow which indicates the surface runoff direction and ground water flow path are at almost right angle to each other.

The earlier matrix again spatially integrated with the geo-hydrological layer (with three recoded categories). In this matrix, the earlier 21 combinations of land use and Topography have been combined with 3 classes of recharge potentiality and a new layer has been generated with 21 * 3 = 63 possible combinations. This integrated layer is giving the details of the area pixel wise on the basis of topography, land use and recharge potentiality.

Based on the above mentioned parameters, 14 types of watershed intervention plans have been designed. It has been observed that some combinations can be treated with same types of interventions. Accordingly the 63 combinations of the integrated layers have been recoded with these 14 types of interventions and Polygons have been assigned with these intervention codes with the help of ARC-GIS tools. Finally, the intervention map has been generated on the basis of Land Use, Land Cover, Topography and Recharge potentiality of the area.

Revenue Details:

Revenue maps (1:4000 scale) have been georeferenced with the help of Garmin GPS in field survey and ARC-GIS georeferencing techniques have been used for georeferencing of these maps to put revenue details in spatial and digital format. As it has been georeferenced and digitized, the digital geo-coded revenue maps have been overlaid on the intervention map which made on the basis of land use, topography and recharge potentiality. This final map indicates the best intervention plan on different land and therefore one can easily make the plan of watershed project on the land of each and every individual.

Table 3: Intervention Matrix

CLASS CODE	COMPOSITION			CONSERVATION MEASURE
	LUSE CODE	SLOPE	RECHARGE POTENTIAL	
1	1	1,2	1,2	Maintanance of bunds, supply of fertiliser and good for irrigation
2	1	1,2	3	Grassland development, construction of farm pond
3	1	3,4,5	1,2,3	Cultivation with terracing and agroforestry
4	1	6,7	1,2	Increase of time for surface water availibility for recharge by structures
5	1	6,7	3	Surface storage structure for soil moisture, irrigation and domestic uses
6	2	1,2	1,2	Afforestation with suitable spe cies
7	2	1,2	3	Bunding, terracing shallow rooted low water requirement short duration crops
8	2	3,4,5	1	Afforestation with contour trenching
9	2	3,4,5	2,3	Bunding, shallow rooted crops with irrigation facilities
10	2	6,7	1	Afforestation with contour trenching
11	2	6,7	2,3	Spot planting in crevizes of rocks having soil
12	3	1,2,3,4,5	1,2	Construction of new wells near by the waterbody (after checking the GW flow path)
13	3	1,2	3	Plantation of trees surround the waterbody to low down the evaporation
14	3	3,4,5	3	Construction of WHS at the outlet to maximize the storage

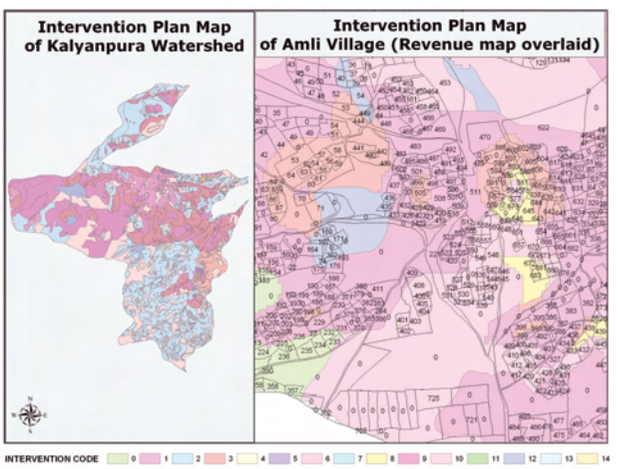

Figure 4: Intervention Map based on Land use, Topography, Recharge potentiality

Conclusion: This final layer is actually showing the exact intervention planning to the particular land. This will help the planners to make the plans according to the land use, topography and recharge potential at village level. Land number wise details (owner of land, agriculture status, irrigation etc) would be merged during the planning of watershed intervention. By this way, the other different spatial and non spatial data set layers (exmp: ecological variations, biophysical parameters, demographic data, and socio-economic conditions) can be integrated as one by one layer and more combinations can be generated in GIS in a simple way which will describe the area in more details. With these layers, a complete development plan can be retrieved out for enhance the livelihood of the local people with considering ecological health of the area with proper management of natural resources. This kind of planning is necessary to reduce land degradation, positive impact of soil and water regime and environment. By this way, best possible techniques through integration of several important spatial and non spatial data can be put in a single platform to understand the area with help of GIS technology.

For References & More information please contact:

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Centre for Remote Sensing
Khajamalai Campus, Bharathidasan University

Realizing the importance of premier Earth Sciences and its rapidly expanding scope after the invention of Earth observing satellites, the Bharathidasan University has established the School of Earth Sciences in the year 1987. Duly recognizing the astonishing outpour of newer information from the "Remote Sensing Team", the "Centre for Remote Sensing" was established in 1994 as a part of the then School of Earth Sciences. The centre instantly on its birth, has carved out its Remote Sensing and GIS path in the discipline of Earth Sciences in the focused areas of

- Geological resources (Mineral, Water, Oil & Energy resources)
- Modelling of Geological processes and the Ecosystems and
- Natural disaster mapping, mitigation and management

And thus the centre has made rapid strides in multiple fronts of academia & research during such short span of nearly 16 years viz:

Fact Profile of Centre for Remote Sensing

- Four Hi-Tech academic programmes
- M.Tech in Geological Remote Sensing and Geoinformatics
- 6 year Integrated M.Tech in Geotechnology and Geoinformatics
- M.Sc in Geoinformatics
- B.S in Geosciences
- Over 30 research projects funding to the tune of 10 Crores including an exclusive grant of over 5 Crores from OIDB (Oil Industry Development Board, New Delhi) for hydrocarbon inventory in selected frontier basins of India
- Over 60 extension academic programmes etc.,
- Doctoral research: Over 18 scholars have completed their PhDs and 20 scholars are currently pursuing their Doctoral research in the frontier areas of Hyperspectral Remote Sensing, Digital Image Processing, GIS based visualization and modeling, etc., on Earth System Dynamics and the related Natural Resources, Ecosystems and Natural Disasters.
- GIS Softwares used are ESRI ArcGIS Suite.

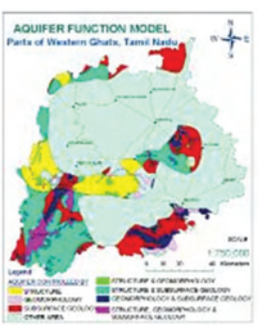

Figure 1: A new GIS based Aquifer function model of parts of Western Ghats (Project – WEGHARIS)

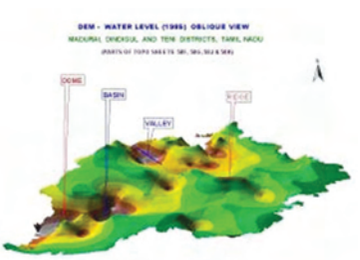

Figure 2: First time concepts on the 3D visualization of Water levels (Project – WEGHARIS)

Research Projects Done @ the Centre.

Through various research projects scintillating packages of newer information have been / are being brought out for the Indian subcontinent in general and Tamil Nadu in particular and significant amongst them are:

- Optimised spectral bands in VIS & NIR regions for mineral and rock type mapping.
- Newer vistas of Hyperspectral Remote Sensing in rock types and mineral mapping
- New concepts of Digital Image Processing of satellite data for lithological and structural modelling

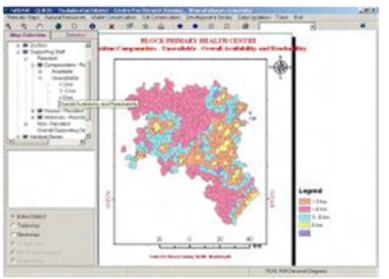

Figure 3 : Planner oriented Spatial Decision Support System (SDSS) – Pudukkottai District (Project – NRDMS)

- GIS based concepts of shaded relief mapping for lineaments and tectonic mapping.
- A first time model on the tectonic evolution of South India through lineament tectonics.
- Newer concepts of GIS visualization of Hydrocarbon bearing structures
- A new revealing model on the Active tectonics of South India and its control over Natural Resources, Ecosystems and Natural Disasters.
- Remote Sensing based life history of River Cauvery and its consequences in water resources, disasters etc.,
- New genetic model on the land - ocean interactive processes of Tamil Nadu coast and its implications.
- Hierarchy of models on the Water Resources Management, including inter basin water transfer.
- GIS based 3D visualization of Ground Water Levels / Aquifer systems
- GIS based Visualization of impacts of sea level rise.
- Various Natural Disasters mapping, mitigation and management models viz:
  - Seismicities
  - Landslides
  - Floods
  - Tsunami etc.
- Planner Oriented Spatial Decision Support Systems etc., for developmental planning.

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Creating a realistic 3D view: A walkthrough

Imagine that you are an urban planner and are interested in constructing a realistic 3D model of a neighborhood. The staff of the planning and transportation departments has created GIS datasets for the building footprints, streetlights, trees, and sample vehicles for this area. You also have imagery of the area, and an architect has supplied a set of photorealistic building models.

You want to combine the GIS data with the image and the building models in ArcGlobe to develop a realistic urban model. This model will help decision makers visualize proposed buildings and their associated views. Such models can also be used to study spatial awareness or to simulate urban features, landscapes, landmarks, or tourist attractions for students or tourists.

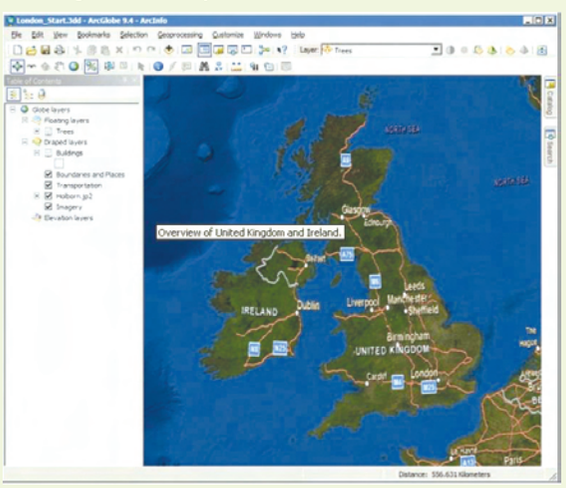
This is an advanced exercise illustrating how to use 3D Symbology and 3D graphics tools to create a realistic-looking view of a study area in London.

Opening the Globe document

Steps:

1. Open ArcGlobe.
2. Click File and click open for opening an existing document (for example London_Start.3dd from exercise 9)

The ArcGlobe document contains high-resolution images (courtesy of DigitalGlobe QuickBird), one 3D feature dataset symbolized with tree symbols, and one 3D textured multipatch dataset representing the buildings in the study area.



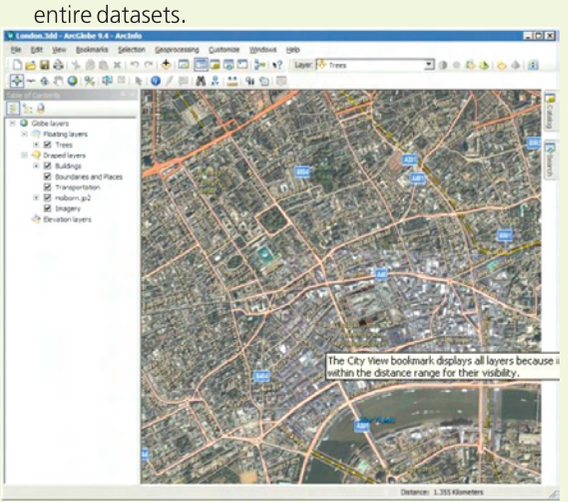
Setting the visible distance range of a layer

You can optimize the performance of an ArcGlobe document by setting an appropriate visibility distance for each layer. Specifying the visibility distance range lets you control when a layer becomes visible as you zoom in or out. You can either set the minimum and maximum distance for an entire layer, or you can base the layer visibility on individual tile distances.

The checked box beside the Buildings layer is unavailable in the table of contents. This means the display currently exceeds the layer's maximum visibility distance. You will change the maximum visibility distance for a couple of other layers later in this exercise.

Steps:

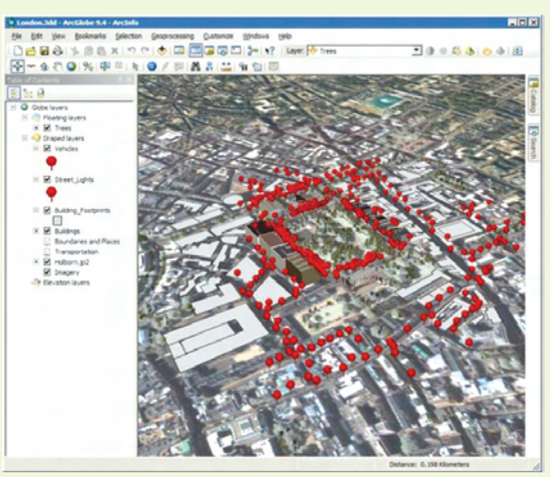
1. In the table of contents, right-click the Holborn.jp2 layer and click Properties.
2. Click the Globe General tab.
3. Click the Don't show layer when zoomed option.
4. Type 5 in the Out beyond text box. The units used for this distance are kilometers.
5. Check visibility based on each tile distance to enable distance visibility for discrete parts of the layer. This setting, although not enabled by default, further improves performance. When enabled, discrete tiles of data appear visible when navigating near their layer's distance threshold.
6. Click OK. The layer will be visible between the minimum and maximum distance.
7. Click Bookmarks and click City View OR display entire datasets.



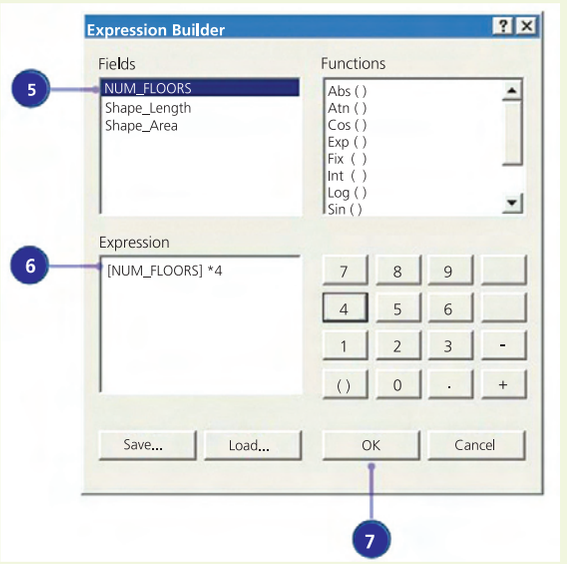
A layer's visibility range can also be set according to current display distances. Right-click a layer in the table of contents, point to Visible distance range, then use the Set Maximum Distance and Set Minimum Distance commands to capture display distances.

Adding feature data

To create 3D objects on your model, you will add some local data to the area. Using Add data button, please add Building_Footprints, Street_Lights, and Vehicles feature classes.



Now you can see all the layers you have added to the study area. The table of contents indicates that these feature layers have been added as draped layers in the 3D view.



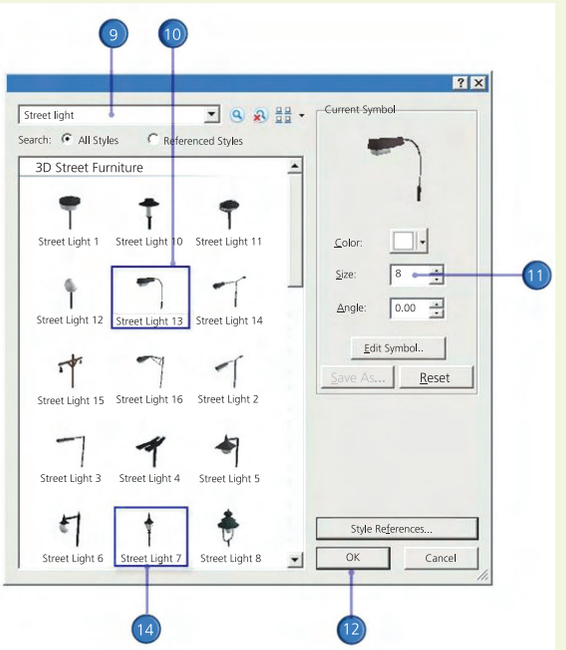
Extruding buildings

Features in a two-dimensional data source can be projected into a three-dimensional representation through a process known as extrusion. A 2D building footprint, for example, c be extruded into a 3D block representation of that building. Here, you will extrude building polygons according to a height value governed by the number of floors and average height per floor to create realistic 3D building shapes.

Steps:

1. In the table of contents, right-click Building_Footprints layer and click Properties.
2. Click the Globe Extrusion tab.
3. Check Extrude features in layer.
4. Click the Calculate Extrusion Expression button to open the Expression Builder dialog box.
5. Click the attribute NUM_FLOORS to add it to the Expression text box.
6. Assuming that each floor has a height of 4 meters, you can calculate the height of each building by multiplying the number of floors in each building by 4.

Set the expression to [NUM_FLOORS] * 4 to reflect the following graphic.



7. Click OK.
8. Click OK to close the Layer Properties dialog box.

The 2D building footprint features are now extruded into 3D blocks.

Optionally, to increase performance, you can choose not to draw the bottom faces of extruded polygons.

Navigate around the display to view your results.

Symbolizing features

Steps:

1. In the table of contents, right-click the Street_Lights layer and click Properties.

You can also open the Layer Properties dialog box by double-clicking the layer.

2. Click the Symbology tab.
3. Click Categories.

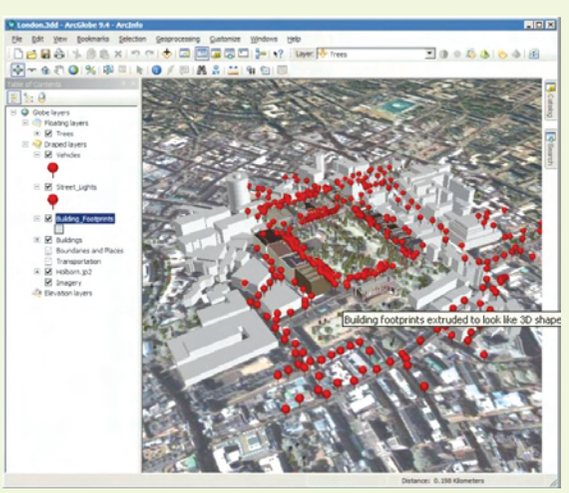
ArcGlobe automatically selects the Unique values option.

4. Click the Value Field drop-down arrow and click MODEL.
5. Click Add All Values.

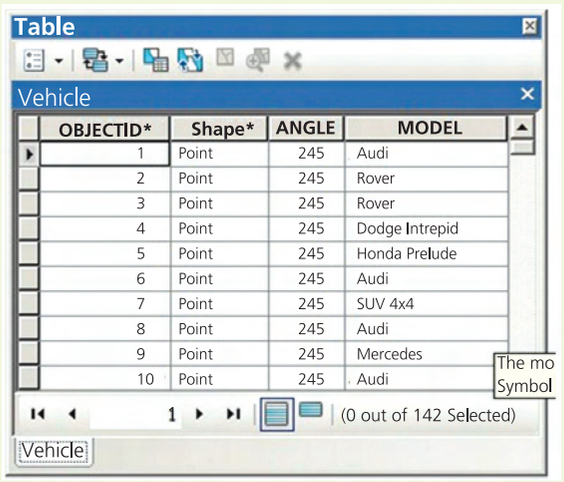
This adds all unique values to the list. You could also have clicked the Add Values button to choose specific Model values to display.

6. Double-click the symbol for stlght13.
7. In the Symbol Selector dialog box, click the Style References.
8. In the Style References dialog box, check 3D Buildings, 3D Street Furniture, and 3D Vehicles then click OK.

Styles are a collection of symbols, colors, map elements, and other graphical elements stored in a library to use inside ArcGIS.



9. In the Symbol Selector dialog box, click inside the Search combo box and type street light, then press Enter.
10. Click the Street Light 13 symbol.
11. Type 8 in Size text box.



12. Click OK.
13. Double-click the symbol for stlght7.
14. Repeat steps 9 through 12, except type 5 for the size, and assign Street Light 7, or another street light symbol you prefer.
15. In the Layer Properties dialog box, click the Advanced button and click Rotation.
16. Click the Rotate Points by Angle in this field drop-down list and click Angle.
17. Click OK.
18. Click OK on the Layer Properties dialog box.
19. In the table of contents, double-click the Trees layer.

Make sure the Symbology tab is selected.

20. In the Layer Properties dialog box, click the Advanced button and click Rotation.
21. Click the Rotate Points by Angle in this field drop-down list and click random.
22. Click OK.
23. In the Layer Properties dialog box, click the Advanced button and click Size.
24. Click the Size Points by Value in this field drop-down list and click random.
25. Type 6 in the Minimum box and 15 in the Maximum box.
26. Click OK.
27. Click OK on the Layer Properties dialog box when you have finished.

The random values of rotation and size will be generated between the minimum and maximum random values specified for the trees.

Matching symbols in a style

The symbols in a style have names. If your features have values that match these names, you can automatically associate a particular symbol with each matching feature. If your features use a different set of names, you can edit the names in the style to match them.

Steps:

1. In the table of contents, right-click the Vehicles layer and click Open Attribute Table.

In the Table window, notice the Model column. Each vehicle type listed corresponds to a symbol with the same name.

2. Close the Table window.
3. Double-click the Vehicles layer to open the Layer Properties dialog box.
4. Click the Symbology tab.
5. Under Categories, click Match to symbols in a style.
6. Click the Value Field drop-down arrow and choose MODEL.
7. Click the Match to symbols in Style drop-down list and choose 3D Vehicles.style.
8. Click Match Symbols.

This adds all unique values that have a matching symbol in the style.

Alternatively, by clicking Add Values, you can manually specify which unique values to display. You can also manually edit a label if you would like more descriptive labels to appear in the legend and the table of contents. This does not change the name in the attribute table.

9. Click the Advanced button and click Rotation.
10. Click the Rotate Points by Angle in this field drop-down list and click Angle.
11. Click OK.
12. Click OK again to close the Layer Properties dialog box.

Navigate around the neighborhood to view the results.

This function is used to apply the symbology to the feature layer based on the Feature type.

```
Public Function RenderMxd(ByVal
featureLayer As IFeatureLayer, ByVal
featType As esriGeometryType) As Boolean
Dim readString As String = ""
Dim layerName As String = ""
Try
layerName =
featureLayer.FeatureClass.AliasName.Split("
.")(1)
readString = CheckDataReader(featType,
layerName)
If featType =
esriGeometryType.esriGeometryPoint Then
PointRender(featureLayer, readString)
End If
Catch ex As Exception
'Write Error to Log file
WriteErrorLog(ex, "RenderMxd")
Return Nothing
End Try
End Function
```

The function cares the Point simple rendering and unique-value rendering.

```
Public Function PointRender(ByVal
featurelayer As IFeatureLayer, ByVal
readString As String) As Boolean
Dim symbol As ISimpleMarkerSymbol= Nothing
Dim i As Integer
Dim rgbColor As IRgbColor = Nothing
Dim color As System.Drawing.Color = Nothing
Dim symbString() As String = Nothing
Dim renderString() As String = Nothing
Dim pictureMarkerSymbol As
IPictureMarkerSymbol = Nothing
Dim simpleRenderer As ISimpleRenderer =
Nothing
Dim splitRenderString() As String = Nothing
Dim uniqueValueRender As
IUniqueValueRenderer = Nothing
Dim geoFeatureLayer As IGeoFeatureLayer =
Nothing
Dim pathImage As String = ""
Dim bitMap As System.Drawing.Image =
Nothing
Try
pathImage =
dbInteraction.GetStringFomXML("PathImage")
geoFeatureLayer = featurelayer
symbString = readString.Split("^")
rgbColor =
serverContext.CreateObject("esriDisplay.Rgb
Color")
If Not symbString Is Nothing Then
'Logic for Simple Rendering of Point
If symbString(0) = "Simple" Then
renderString = symbString(1).Split("|")
simpleRenderer =
serverContext.CreateObject("esriCarto.Simpl
eRenderer")
If renderString(1).Contains("#")Then
color =
System.Drawing.ColorTranslator.FromHtml(ren
derString(1))
rgbColor.Red = color.R
rgbColor.Green = color.G
rgbColor.Blue = color.B
symbol =
serverContext.CreateObject("esriDisplay.Sim
pleMarkerSymbol")
symbol.Color = rgbColor
If
LCase(renderString(2)).Contains("circle")
Then
symbol.Style =
esriSimpleMarkerStyle.esriSMSCircle
ElseIf
LCase(renderString(2)).Contains("square")
Then
symbol.Style =
esriSimpleMarkerStyle.esriSMSSquare
ElseIf
LCase(renderString(2)).Contains("diamond")
Then
symbol.Style =
esriSimpleMarkerStyle.esriSMSDiamond
ElseIf
LCase(renderString(2)).Contains("cross")
Then
symbol.Style =
esriSimpleMarkerStyle.esriSMSCross
ElseIf LCase(renderString(2)).Contains("x")
Then
symbol.Style =
esriSimpleMarkerStyle.esriSMSX
End If
simpleRenderer.Symbol = symbol
ElseIf renderString(1).Contains(".") Then
pictureMarkerSymbol=
CType(serverContext.CreateObject("esriDispl
ay.PictureMarkerSymbol"),
IPictureMarkerSymbol)
With rgbColor
.Red = 255
.Blue = 255
.Green = 255
End With
bitMap =
System.Drawing.Image.FromFile(pathImage)
```

ArcScripts

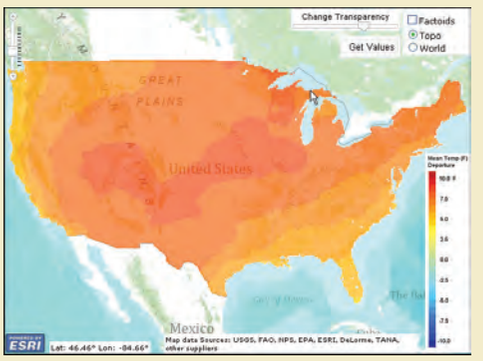
```
bitMap.Save(pathImage1 & "\" &
featurelayer.Name ".bmp",
System.Drawing.Imaging.ImageFormat.Bmp)
With pictureMarkerSymbol
.CreateMarkerSymbolFromFile(esriIPictureT
ype.esriIPictureBitmap, pathImage1 & "\"
& featurelayer.Name & ".bmp")
.BitmapTransparencyColor = rgbColor
.Angle = 0
.Size = 12
.XOffset = 0
.YOffset = 0
End With
simpleRenderer.Symbol =
pictureMarkerSymbol
End If
geoFeatureLayer.Renderer = simpleRenderer
'Logic for Unique Value Rendering
ElseIf symbString(0) = "Unique" Then
splitRenderString = readString.Split("^")
uniqueValueRender =
serverContext.CreateObject("esriCarto.Uni
queValueRenderer")
uniqueValueRender.FieldCount = 1
If splitRenderString.Length > 2 Then
uniqueValueRender.Field(0) =
splitRenderString(1).Split("|")(1)
For i = 1 To splitRenderString.Length - 2
renderString =
splitRenderString(i).Split("|")
'<Fieldname>|<FieldValue>|<Color>|<Shape>
|<Icon>
If renderString(3).Contains("#") Then
color =
System.Drawing.ColorTranslator.FromHtml(r
enderString(3))
rgbColor.Red = color.R
rgbColor.Green = color.G
rgbColor.Blue = color.B
symbol =
serverContext.CreateObject("esriDisplay.S
impleMarkerSymbol")
symbol.Color = rgbColor
If
LCase(renderString(4)).Contains("circle")
Then
symbol.Style =
esriSimpleMarkerStyle.esriSMSCircle
ElseIf
LCase(renderString(4)).Contains("square")
Then
symbol.Style =
esriSimpleMarkerStyle.esriSMSSquare
ElseIf
LCase(renderString(4)).Contains("diamond")
Then
symbol.Style =
esriSimpleMarkerStyle.esriSMSDiamond
ElseIf
LCase(renderString(4)).Contains("cross")
Then
symbol.Style =
esriSimpleMarkerStyle.esriSMSCross
ElseIf
LCase(renderString(4)).Contains("x") Then
symbol.Style =
esriSimpleMarkerStyle.esriSMSX
End If
uniqueValueRender.AddValue(renderString(2
), "", symbol)
symbol = Nothing
ElseIf renderString(3).Contains(".") Then
pictureMarkerSymbol=
serverContext.CreateObject("esriDisplay.P
ictureMarkerSymbol")
With rgbColor
.Red = 255
.Blue = 255
.Green = 255
End With
bitMap =
System.Drawing.Image.FromFile(pathImage &
"\" & renderString(3))
bitMap.Save(pathImage1 & "\" &
featurelayer.Name & ".bmp",
System.Drawing.Imaging.ImageFormat.Bmp)
With pictureMarkerSymbol
.CreateMarkerSymbolFromFile(esriIPictureT
ype.esriIPictureBitmap, pathImage1 & "\"
& featurelayer.Name & ".bmp")
.BitmapTransparencyColor = rgbColor
.Angle = 0
.Size = 12
.XOffset = 0
.YOffset = 0
End With
uniqueValueRender.AddValue(renderString(2
), "", pictureMarkerSymbol)
pictureMarkerSymbol = Nothing
End If
Next
geoFeatureLayer.Renderer =
uniqueValueRender
End If
End If
End If
Catch ex As Exception
WriteErrorLog(ex, "Common-PointRender")
Return Nothing
Finally
rgbColor = Nothing
symbol = Nothing
color = Nothing
pictureMarkerSymbol = Nothing
simpleRenderer = Nothing
uniqueValueRender = Nothing
geoFeatureLayer = Nothing
bitMap = Nothing
End Try
End Function
```

ESRI

Global Page

The Nature Conservancy Deploys ESRI Technology for Climate Trend Analysis

Climate Wizard Delivers Climate Change Data and Models



The Nature Conservancy Climate Wizard, powered by ESRI, displays free maps of historic climate change and future projected change. Climate Wizard offers scientists, planners, environmentalists, and public users an intuitive means to understand and compare climate change models useful to decision making.

ESRI has had a longtime commitment to environmental sciences and is working with many organizations dedicated to meeting the challenges of climate change For many years, ESRI has supported Nature Conservancy efforts to protect our planet by providing environmental expertise and geographic information system (GIS) technology.

The new ESRI-powered version of Climate Wizard was first demonstrated at the 2009 United Nations Climate Change Conference (COP-15) in Denmark. It allows anyone to click a map location and get up-to-date data of climate change trends. A user can also choose between different climate change models to predict impacts on that location.

Climate Wizard uses 16 models from the Coupled Model Intercomparison Program (CMIP 3) published for the United Nations Environment Programme and the World Meteorological Organization Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report. The user selects a model or ensemble of models from a menu and displays them on a GIS map interface.

These new displays replace previous static climate map images with live Web mapping services. An important new capability available due to this improvement enables users to query the 16 different climate change projections for three carbon emissions scenarios at specific locations. They can see the range of future climate projections in graph and tabular formats and view and analyze dynamic data using GIS functionality to see highly specific details relevant to their unique projects. They can also download the climate change data in GIS format.

The Nature Conservancy launched Climate Wizard in January 2009, with the intent of making climate change a place-based issue so that people would consider how changes in the earth's climate affect them. The original objective was to build a state-of-the-art framework that could easily accept new data as it is coming from modeling agencies and put this information into the hands of researchers quickly and easily. The addition of ArcGIS Server technology to the tool in December 2009 has made a big step toward achieving this objective by providing live Web mapping services and maps that can be queried on the fly, as well as improved Web application mashup capabilities. The Climate Wizard project is a collaborative effort of the University of Washington, The Nature Conservancy, the University of Southern Mississippi, and ESRI.

For More information please visit: www.esri.com/climate

United Nations University and ESRI to Collaborate on GIS Research and Training

GIS Technology Expanded to All 15 UNU Campuses

UNU's Konrad Osterwalder (left) and ESRI's Michael Gould sign an MOU between their organizations.

ESRI and United Nations University (UNU) recently approved a memorandum of understanding (MOU) at the university's headquarters in Tokyo, Japan. They will collaborate on research, create Centers of Excellence, promote the exchange of graduate students, and provide geographic information system (GIS) training opportunities within and by UNU.

"This agreement will promote enhanced spatial information use in UNU's research and education initiatives," said UNU rector and under-secretary-general of the United Nations professor Konrad Osterwalder. "It will also support the increased presence of young researchers at UNU campuses and complement existing and planned research and education programs."

Adds Michael Gould, ESRI director of education solutions, "The MOU will help connect promising graduate students to real-world problems, such as climate change, water resource management, food security, natural hazards, and sustainable development, and critical issues being researched at UNU institutes using GIS. ESRI is pleased to be able to support their efforts."

UNU has used ArcGIS software since 2006. Projects include the Wildlife Enforcement Monitoring System, which documents and analyzes transboundary wildlife trade for monitoring purposes and compliance with the Convention on International Trade in Endangered Species of Wild Fauna and Flora. The university has also used GIS to assess flood risk and analyze climate and land-use change impacts on water resources in the Asia Pacific region.

For more information about ESRI's higher education program, visit www.esri.com/university.

Careers at ESRI India

1. Role: Business Executive

Experience: Should have 2+ years experience in sales

Skill Set:

- Good understanding of IT Products & Services
- Understand customer's requirement and translate it into business.
- Exposure to GIS industry would be an added advantage.
- Good experience in selling software products.
- Proven track record to meet and exceed targets.
- Should have good exposure to government sales

Soft Skill:

- Ability to work independently as well as team-oriented.
- Excellent Communication, Presentation & interpersonal skill.

2. Role: Application Sr. Developer

Experience: Should have 3+ years experience in GIS Application Development.

Skill Set:

- Knowledge of .Net/Java/ J2EE/Flex/ Desktop customization using .Net technology database as backend.
- Proficient in designing/developing multi-tiered secured business applications for high availability, scalability and of high performance
- Should have experience EJB, Servlet, JPA, JNDI, JMS, JMX, web services, XML.
- Should have knowledge in GIS domain with specifically ESRI Technologies i.e. Arc GIS Object/Arc Engine/Arc GIS Server/ArcFM.

Soft Skill:

- Very good oral and written communication skills
- Strong team player with team management skill, flexible yet results-driven.
- Ability to Multitask and be able to balance multiple priorities and alert clients & team to project scope changes

3. Role: Team Lead

Experience: Should have 5+ years experience

Skill Set:

- Plan, organize, delegate, track and coordinate team activities.
- Provide technical direction for the team.
- Ability to work under pressure and aggressive deadlines.
- Knowledge of .Net/Java and J2EE.
- Should have knowledge in GIS domain with specifically ESRI Technologies i.e. Arc GIS Server/Arc FM

Soft Skill:

- Very good oral and written communication skills.
- Ability to Multitask and be able to balance multiple priorities and do time management.
- Excellent team management skills.

e-mail your resume to gistalent@esriindia.com or send it through post to:

Head, Human Resource, ESRI India
B-1/H-9 Colosseum, MCIA, Mathura Road, New Delhi - 110044, INDIA.

Kindly mention the position applied for and your current location in the subject line.