

# The New Face of GIS

*New Developments at ESRI*



**Kevin Daugherty**  
**FIG Commission 7**  
**Annual Meeting**  
**Seoul, Korea 2007**

# Applications Provide The Evidence

*.... Of The Increasing Value of GIS*

Map Books

Damage Assessment

Data Management

(Transactions Editing)

Ad Hoc Mapping

Spatial Analysis

Consistency

Integration  
With CAMA

Citizen Inquiry

Visualization

Workflow Efficiency

Accountability

Automated Appraisals

Fair & Equitable Valuation

Legal Notification

Change Monitoring

Complex modeling



*Integration is Becoming Understood and Easier*

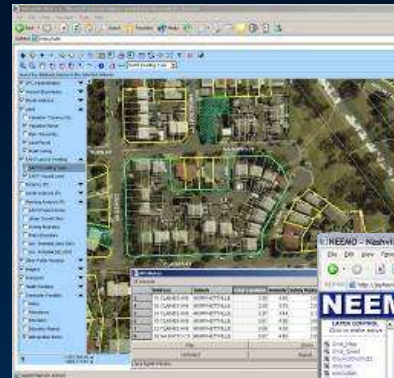
# Land Information Systems

## Comprehensive Land Registry



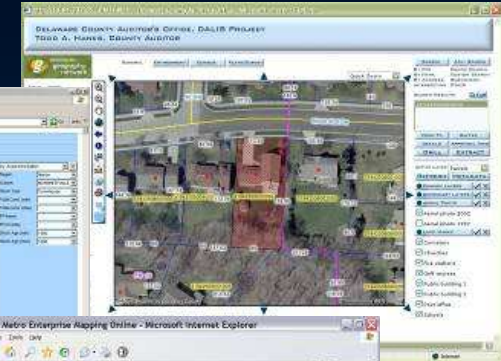
Lithuania

## Cadastral Records



Adelaide

## Public Access



Ohio

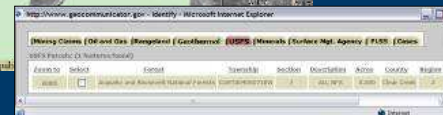


Nashville, TN

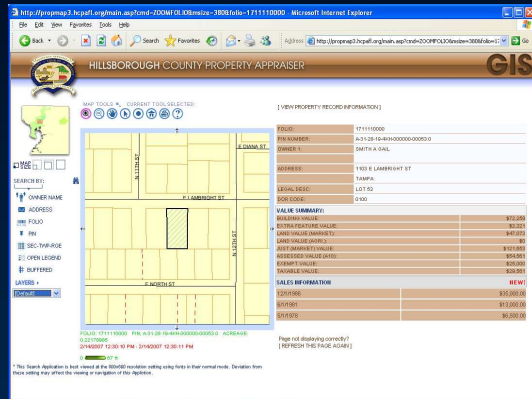
## Government Lease Management



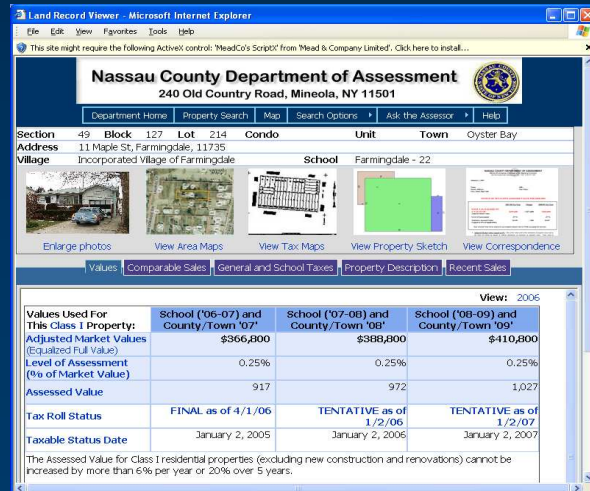
USA



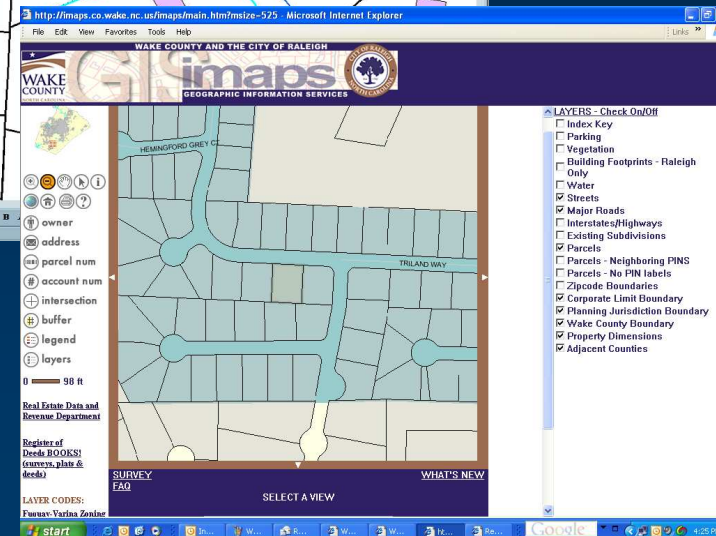
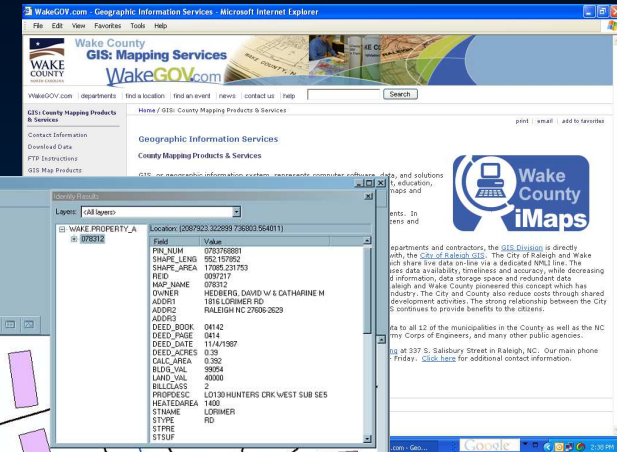
# Citizen Access – Via Web



## Hillsborough County



## Nassau County



## Wake County

# Online Search, Reporting and Map Generation

The image displays four overlapping screenshots of the Richland County GIS website, illustrating its various features:

- Top-left screenshot:** Shows the main homepage with a green header and a navigation menu. The header includes the Richland County logo and the text "Richland County Geographic Information Systems". The navigation menu lists various services such as Home, Mapping, Projects, Data, Standards, Training, Contact Us, In The Know, Policies, Property Info, and FAQ.
- Middle-left screenshot:** Shows the "Assessed Property Inquiry" page, which includes a search bar and a list of results.
- Middle-right screenshot:** Shows the "Richland County Internet Mapping Service" interface, featuring a map and a "LAYERS" panel on the right. The "LAYERS" panel lists various data layers such as Places, Recreation, Sheriff, Infrastructure, Transportation, Property, Elevation, Hydrography/Flooding, Census Data, Boundaries/Districts, Landcover/Soils, 2004 Color Photos, 2004 Infrared Photos, 2000 Color Photos, 2000 B-W Photos, 1996 B-W Photos, USGS Shaded DRG, and Satellite Imagery.
- Bottom-right screenshot:** Shows a detailed view of the mapping service interface, including a map and a "LAYERS" panel. The "LAYERS" panel includes a "Help" section with instructions on how to use the layers. Below the map, there are input fields for "Locate Address" and "Locate Parcel", each with a "Click to Locate" button. A "Refresh" button is also present.

# Integration with Aerial Photos

http://tax.canyonco.org - Parcel Viewer - Microsoft Internet Explorer

Canyon County Taxation and Assessment  
Web-Mapping Viewer

ACCOUNT # ADDRESS SUBDIVISION

1 Parcels Found:

Record 1

Account Number	R3439901200
Parcel Number	D4N02W353320
Section	35
Township	4N
Range	2W
Subdivision	
Site Number	7981
Street Name	TIMBERLINE
City	NA
Acreage	2.19
Legal	35-4N-2W NW TX 05111 NWNW
Tax Code	1500000
Total Value	299000

Map: 536159.83 , 4832796.84 -- Image: 369 , 249 -- ScaleFactor: 0.52

http://www.acimap.us - Currently logged in as: Guest Access level: Public - Microsoft Internet Explorer

ALLEN COUNTY, INDIANA

Turn Over/View On/Off Close Data Viewer Active Tool

Search Help Adv Search  
Metadata Legend Layers  
Clear Map Refresh

Processing query...  
Displaying Results...

New Search - Print Results  
Found 1 Matching your search  
Displaying Records 1 - 1

GIS Parcel #	Address
02-08-21-279-001.000-072	1101 FANGER TR

New Search - Print Results

Map: 41.129599, 85.491999 -- State Plane: 491199.97, 2142472.44

## Oblique Imagery

Untitled - ArcMap - ArcView

File Edit View Insert Selection Tools Window Help

Editor Create New Feature

Layers  
Display Source Selection

Filter: Neighborhood Community  
 North  South  East  West  Other  North  South  East

Location: Lat: 38.8798109410825 Lon: -77.1003408288406  
 D:\Map034029\Neg\0b69N\_030412.pii

77°39'42"W 38°57'10.56"N

# Integration With Document Management

The screenshot displays the OnBase | GeoDocX web application interface. The browser address bar shows a URL with various parameters. The main content area is divided into several panels:

- Document Results:** A table listing document types and their associated parcel IDs.
- House Photo:** A photograph of a two-story brick house with a snow-covered roof.
- Parcel Map:** A map showing a grid of parcels, with one parcel highlighted in red.
- General Warranty Deed:** A scanned document titled "General Warranty Deed" with legal text.

Document Name	Parcel
CR - General Warranty Deed CR - General Warranty Deed - Case A - 02-05000000	PARCELS [R] [X]
CR - Lien CR - Lien - Case # - CR - 0501000000 - Lien - 0501000000	PARCELS [R] [X]
CR - Mortgage CR - Mortgage - Case # - CR - 0501000000	PARCELS [R] [X]
LN - House Photos House Photo: WILLIAMSBURY - Lien # 0501000000	PARCELS [R] [X]

At the bottom of the interface, there is a "Parcel Results" section with a table of parcel information:

Parcel ID	Parcel Name	Parcel Type
000 000 000 PARCELS LANDS_LAND	000 000 PARCELS LANDS_LAND	000 000 PARCELS LANDS_LAND
000 000 000 PARCELS LANDS_LAND	000 000 PARCELS LANDS_LAND	000 000 PARCELS LANDS_LAND

# Updating Using Mobile GIS

The image displays a GIS application interface with a 'Residential Inspection Complete' form and a map. A mobile PDA device is overlaid on the map, displaying a street map with a red location marker.

**Residential Inspection Complete Form Data:**

Inspection No.	000111	Story Height	2	Total Rooms	7	Inspection	
Use	001	Basement	000	NO. OF Apts	0	Inspection Date	000000
Inspection Code	00	Upper Floor Area	1000	Basement	One Bedroom		
BOC Code	0	Upper Floor AD	00	Tenant	Long term	InsComplete	000
Year Built	1987	Appraisal	1	Agent	Easy Services		
Est Year Built	1988	Total Ad. Area	100	Comments	Residence Lot 100		
Year Remodeled	1999	Tax Map	0000000000000000				

**Form Controls:** Flag, Flag Comments, Print, Add, View, Delete, Save, Calc

**Map Data:** 40° 19' 56.17239-B



# Automated Notice of Valuation

**Cindy Domenico**  
Boulder County Assessor  
Mailing Address  
P.O. Box 471  
Boulder, CO 80306-0471  
[www.boulderassessor.org](http://www.boulderassessor.org)

**2005 NOTICE OF VALUATION**  
Residential Property

Office Location  
1325 Paul Street, 2nd Floor  
Boulder, CO 80302  
Phone: 303-441-4830  
Fax: 303-441-4996  
Office Hours: 8:00 - 5:00, Mon-Fri

May 1, 2005

\*\*\*\*\*AUTO\*\*5-DIGIT 80303

OWNER NAME  
MAILING ADDRESS  
CITY STATE ZIP

Location & Legal Description  
STREET ADDRESS  
LOT 54 BLOCK XX KEEWAYDIN MEADOWS

STR: 04 1S 70 Tax Area: 0010 Nhd: 148

**PROPERTY DESCRIPTION**  
Land: 1 Lot(s)  
1972 1 STORY - RANCH  
Bathrooms: 1-Full 2-Three Quarter 0-Half  
Main living area: 1648 SF  
Upper living area: 0 SF  
Basement area: 1430 SF of which 1264 SF are finished

Account Number \_\_\_\_\_ Access PIN \_\_\_\_\_

PROPERTY VALUE			
	Current Actual Value as of: 6/30/2004	Prior Actual Value as of: 6/30/2002	+ or - Change
Residential	\$416,200	\$391,100	\$25,100

**PROPERTY TAX ESTIMATE**  
- The Assessor estimates the value of property. The property value is multiplied by the assessment percentage (set by law) to arrive at your assessed value. Your taxes are set when that assessed value is multiplied by a mill levy set this fall by school boards, county commissioners, city councils, and special district directors.

If no special levies or bonds are added and no exemptions are in place, we estimate your total taxes for this year (2005 payable 2006) will be approximately

Your tax bill last year (2004 payable 2005) was \$2,186.36

\$2,302.80

Go to [www.boulderassessor.org](http://www.boulderassessor.org) for a more detailed description of your property and a complete listing of all the sales in your area. Use your Account Number and Access PIN to obtain information on your property. Refer to the attached Appeal Form for definitions of property characteristics.

Copyrighted photos courtesy of TRES®

**MARKET COMPARISON GRID**  
- Your property has been valued using mass appraisal techniques. These three comparable properties support your 2005 actual value.  
- Listed below are the most significant attributes that contribute to the value of your property.

Your Property	Comparable 1	Comparable 2	Comparable 3
Property Address _____ PUEBLO PL	_____ OMAHA PL	_____ OMAHA PL	_____ BLACK HAWK RD
Account Number R _____	R _____	R _____	R _____
Sale Date	25-Sep-2003	08-Aug-2003	11-Apr-2003
Sale Price	\$387,000	\$410,000	\$426,900
Time-Adjusted Sale Price	\$391,567	\$415,412	\$434,798
Total Above Grade Living Area	1,648 SQ FT	1,412 SQ FT	1,479 SQ FT
Year Built	1972	1972	1973
Quality	AVERAGE	AVERAGE	AVERAGE
Bathrooms	1-F 2-T	1-F 2-T	1-F 2-T
Finished Basement Area	1264 SQ FT	736 SQ FT	882 SQ FT

**MARKET COMPARISON MAP**  
- The map at right shows the location of your property and the comparable sold properties listed above.  
- Residential property, by law, must be valued solely by the *market approach*. Market value is based on sales prices of homes with similar location, size, age, and other amenities. Your property has been compared to similar single-family homes that sold during an 18-month period from January 1, 2003 through June 30, 2004. By law, if there were not enough sales during that time period, a 5-year period may be used.  
- Sales prices within this study period were *time adjusted* to the end of the period, June 30, 2004, as if they were sold on that date. The *time adjusted sales price* reflects market conditions on that date.

# GIS Provides A Systematic Framework

*Modeling The Property Records Environment  
Supporting Complex Workflows*

## Providing

- An Integrative (Geospatial) Framework
- Analytic Methods
- Intuitive Visualization



*... Providing Many Tools and Methods  
... And Comprehensive Information Management*

# GIS Is Evolving

*Web Services is Becoming A New Platform*

- Many Authors & Publishers
- Lots of Communities
  - Interconnected
  - Interoperable
  - Integrative
  - Dynamic

## GeoWeb

### Emerging

Distributed  
Collaboration

GIS Services

### Today

Mapping &  
Visualization  
Services

### Legacy

Client / Server

Supporting

- Distributed Data Management
- Collaborative Computing
- Application Integration

*... Creating New Opportunities for Collaboration And Integration Of Systems*

# *Web Services Enables Shared Data With Other Organizations*

**Making Cadastral Mapping Usable as a Service . . .**



## **Requires**

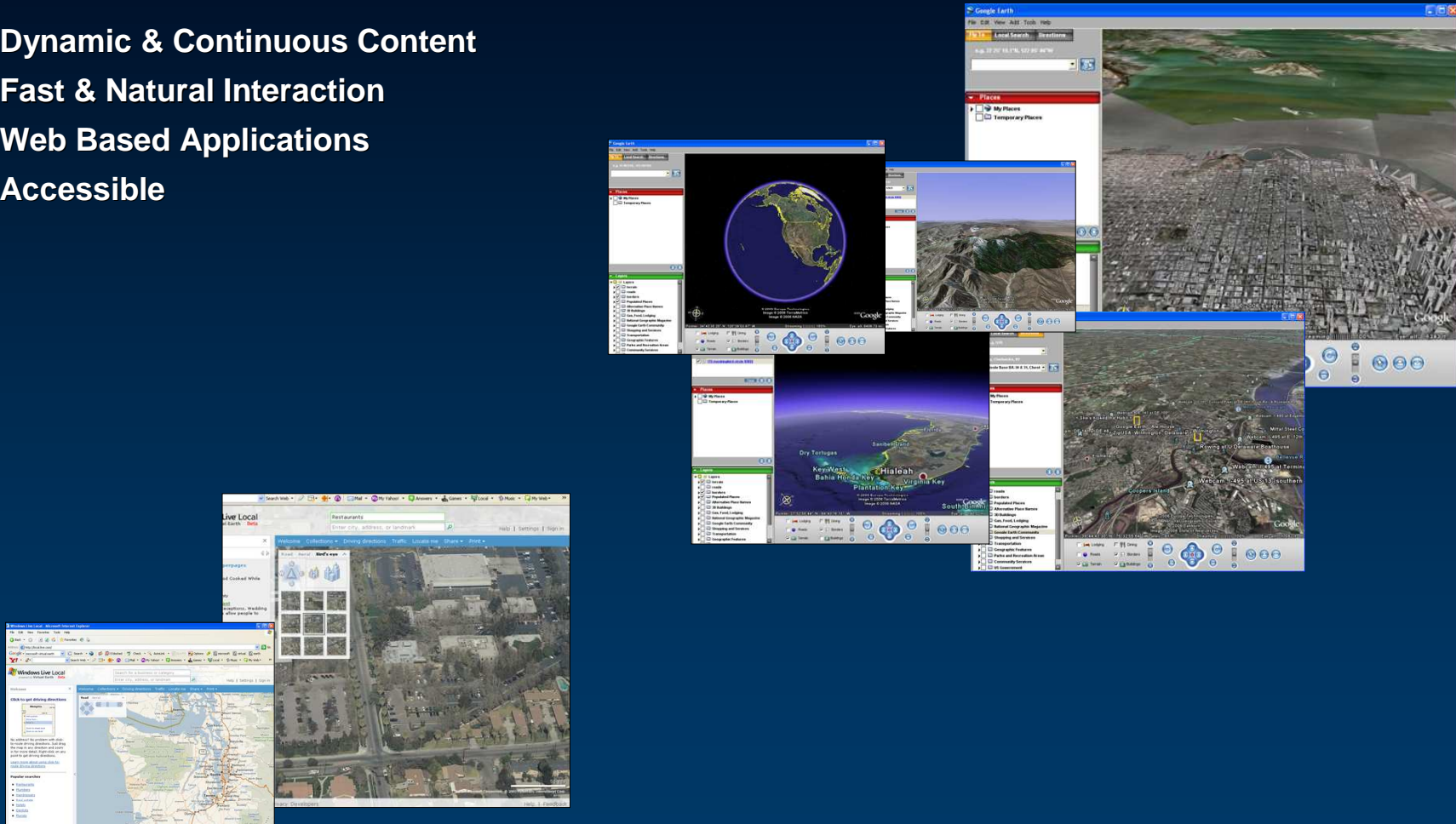
- Geographic Framework
- Collaboration
- Sharing Content
- **Interoperability**
- **Enabling Technology**

*. . . Dynamically Integrating  
Property Data with Other Information*

# Google and Microsoft Are Already Changing Things

## *Introducing a New Way of Interacting with Geographic Information on the Web*

- Dynamic & Continuous Content
- Fast & Natural Interaction
- Web Based Applications
- Accessible

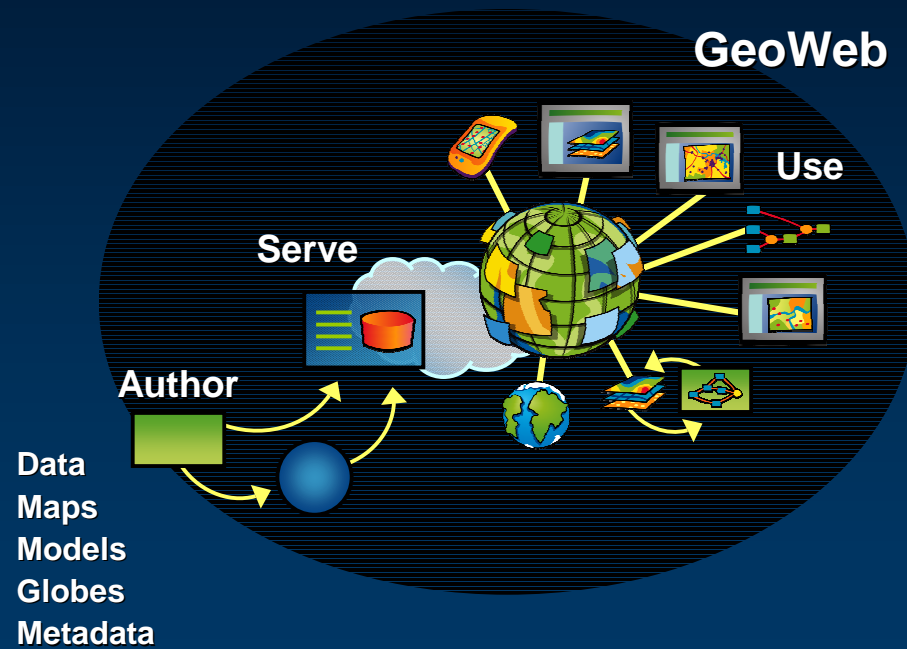


*... Opening the World's Eyes To a Whole New Way of Seeing*

# GIS on The Web Provides Many Additional Possibilities

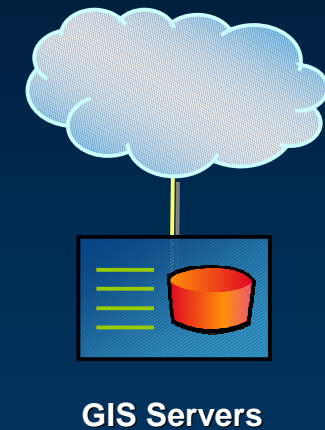
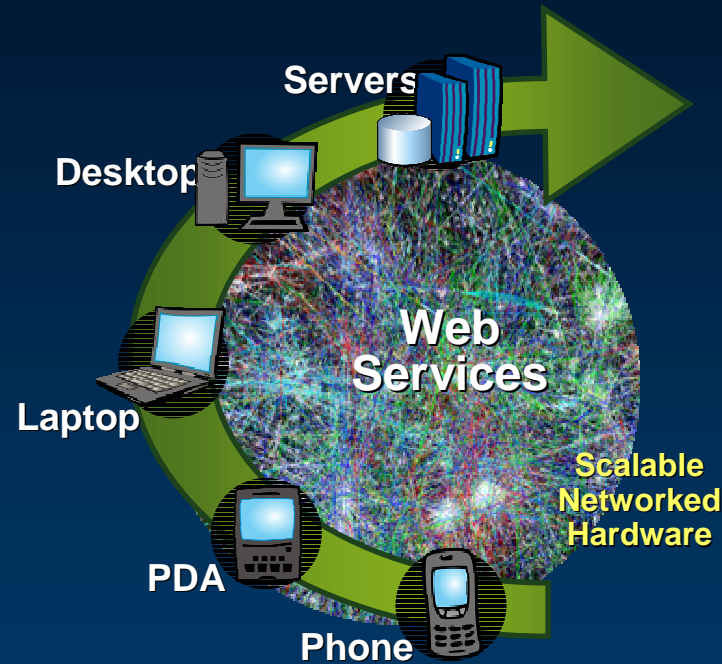
*For Sharing, Integrating and Analyzing Geographic Knowledge*

*Connecting Professionals And Users*



# Enabling Technology

- **Faster Processing**
  - Multi-core
  - Blades
- **Increased Bandwidth**
- **Larger Storage**
- **Web Services Standards**
- **Mobile Technologies**
- **Real Time Networks**
- **GIS Software**



*... Improving Our Ability To Share and Distribute*

# GIS Technology Is Advancing -

## Many New Capabilities & Innovations

- Mapping
- Visualization
- Modeling
- Query & Reporting
- Spatial Analysis
- Data Management



Deployed On Desktop, Server, Mobile . . .

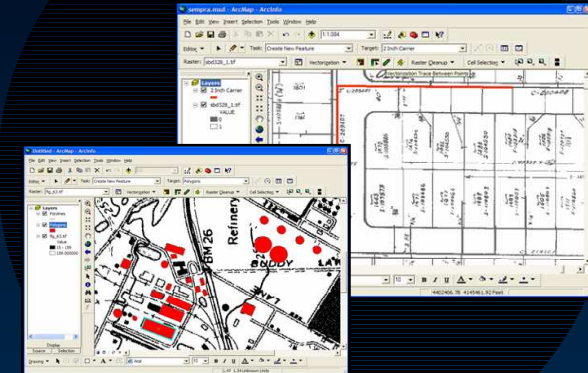
. . . Increasingly On The Web



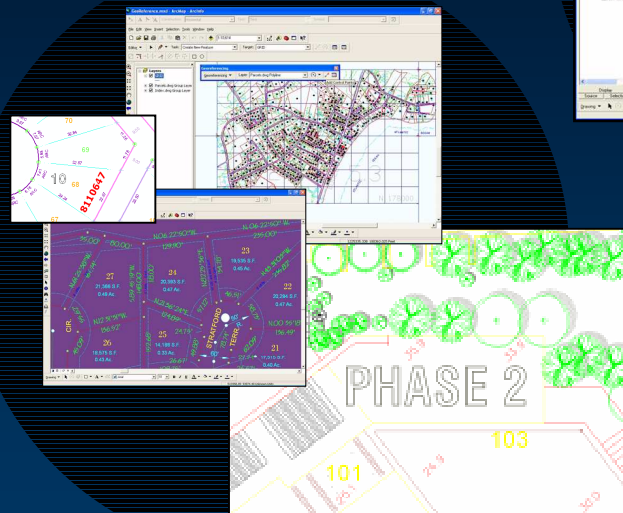
# Improved Data Compilation and Editing

*Adding New Techniques and Methods*

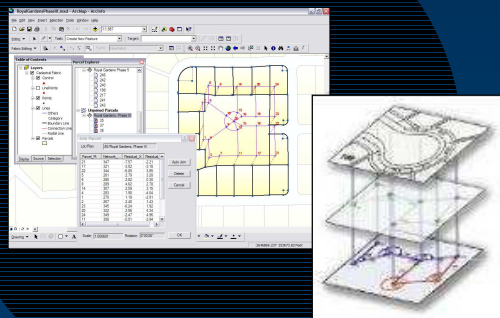
**Automated Scanning**



**CAD Integration**



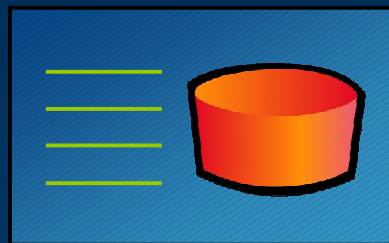
**Integrating Survey Measurements**



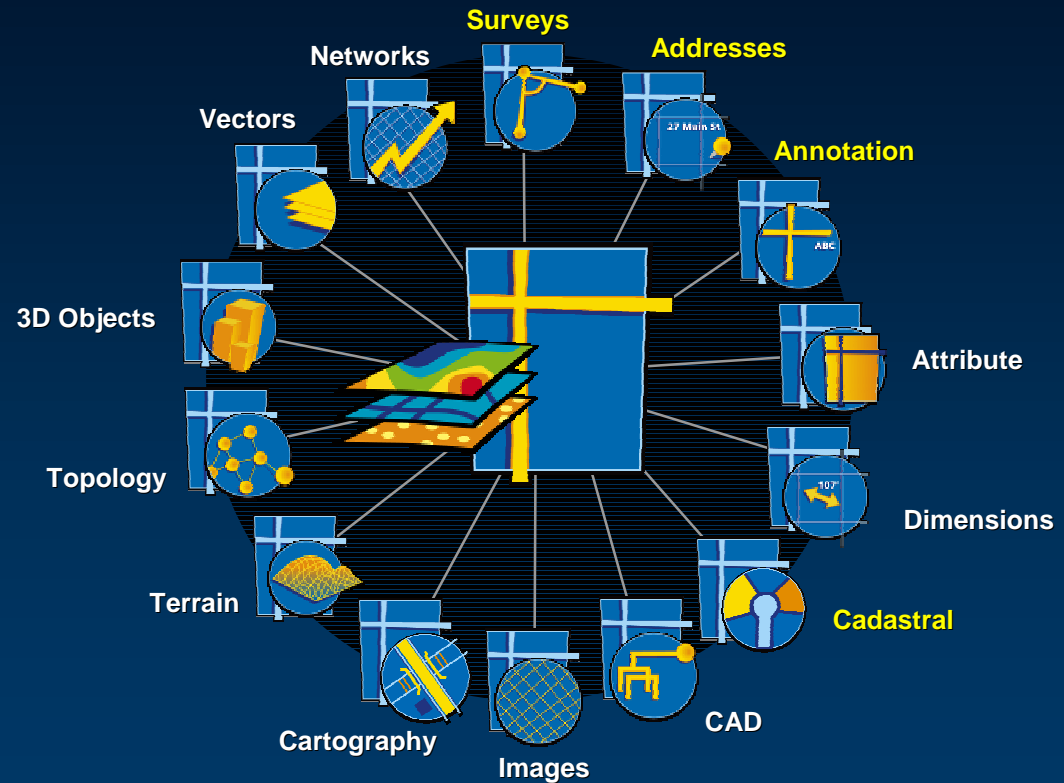
**Enhanced Interoperability**

# Extended Data Modeling

*Abstracting Various Sciences, Technology and Methods for Spatial Measurement*



Geodatabase

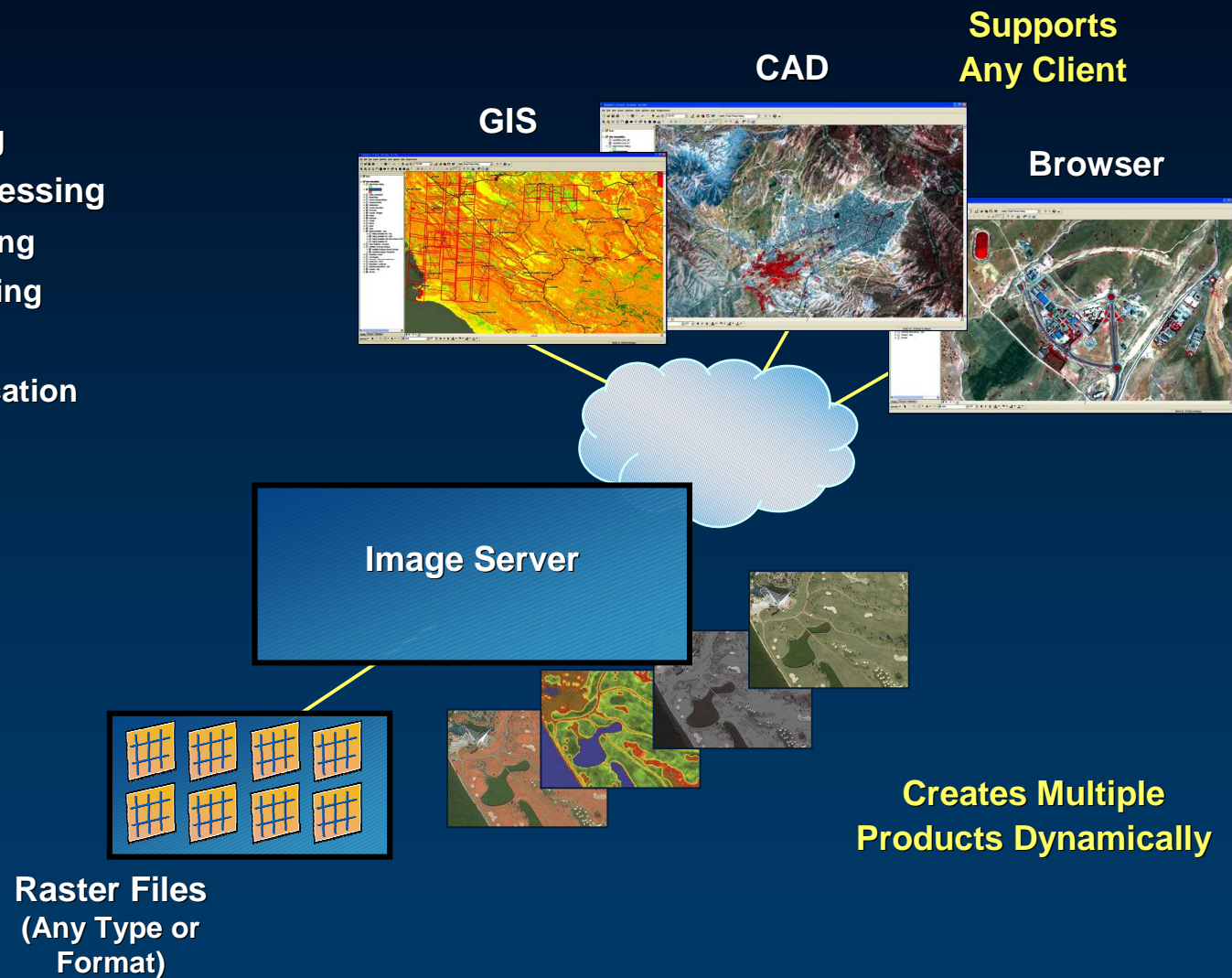


*Managing all Types of Geospatial Data*

# Image Serving

*A New Way to Rapidly Access to Large Imagery Collections*

- Fast
- Easy Publishing
- On-the-Fly Processing
  - Georeferencing
  - Pan Sharpening
  - Mosaicing
  - Ortho-rectification
  - . . .

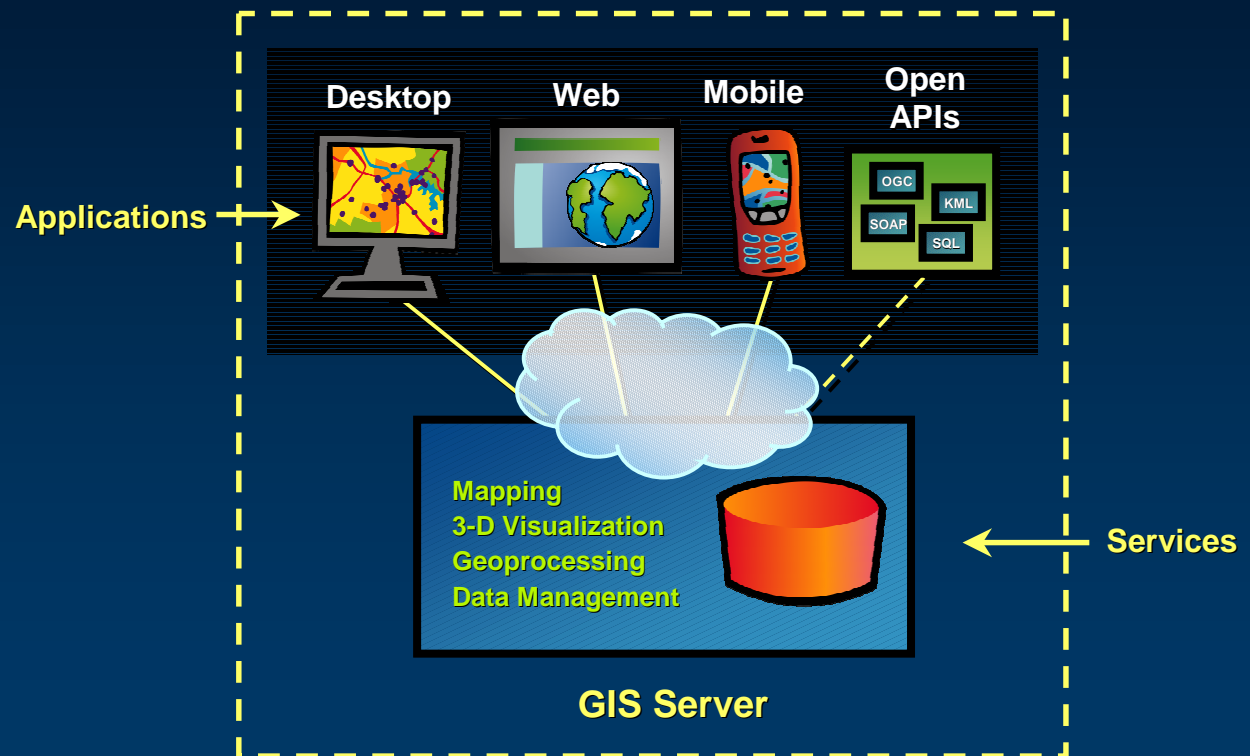


*. . . Reducing Time Between Acquisition and Use*

# GIS Server Architecture Provides a **New Platform** *Comprehensive Functionality*

- Centrally Managed
- Many Clients
- Easy to Install & Manage
- Scalable
- High Performance
- Interoperable
- Affordable

## *Empowering the Non-GIS Professional*



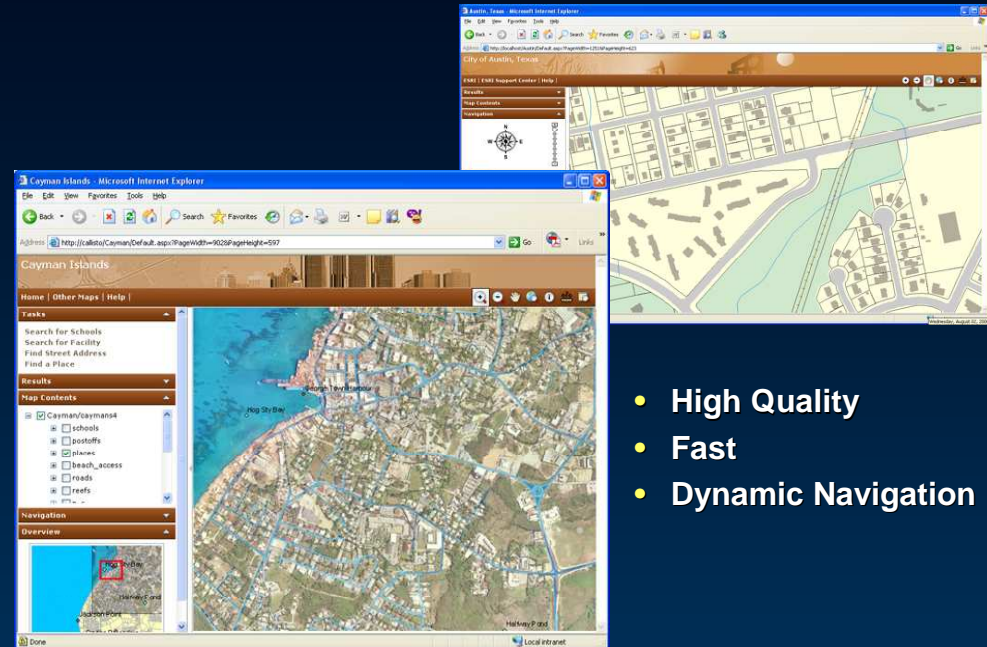
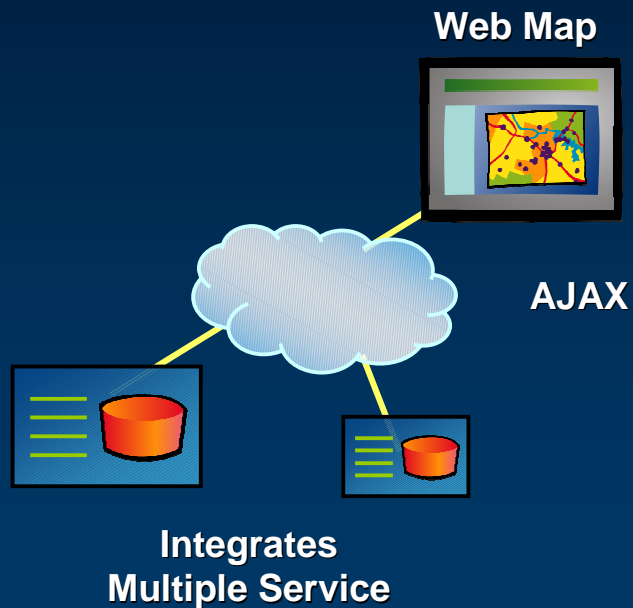
*... Enabling Enterprise GIS*

# Web Clients

## Browser Based GIS Application

### Supporting

- Mapping
- Editing
- Geoprocessing
- Geocoding
- Data Management



- High Quality
- Fast
- Dynamic Navigation

*... Easy Access to GIS Services*

# Browser-based Editing

- Add, modify, and remove features
- Update attribute data
- Useful for focused applications



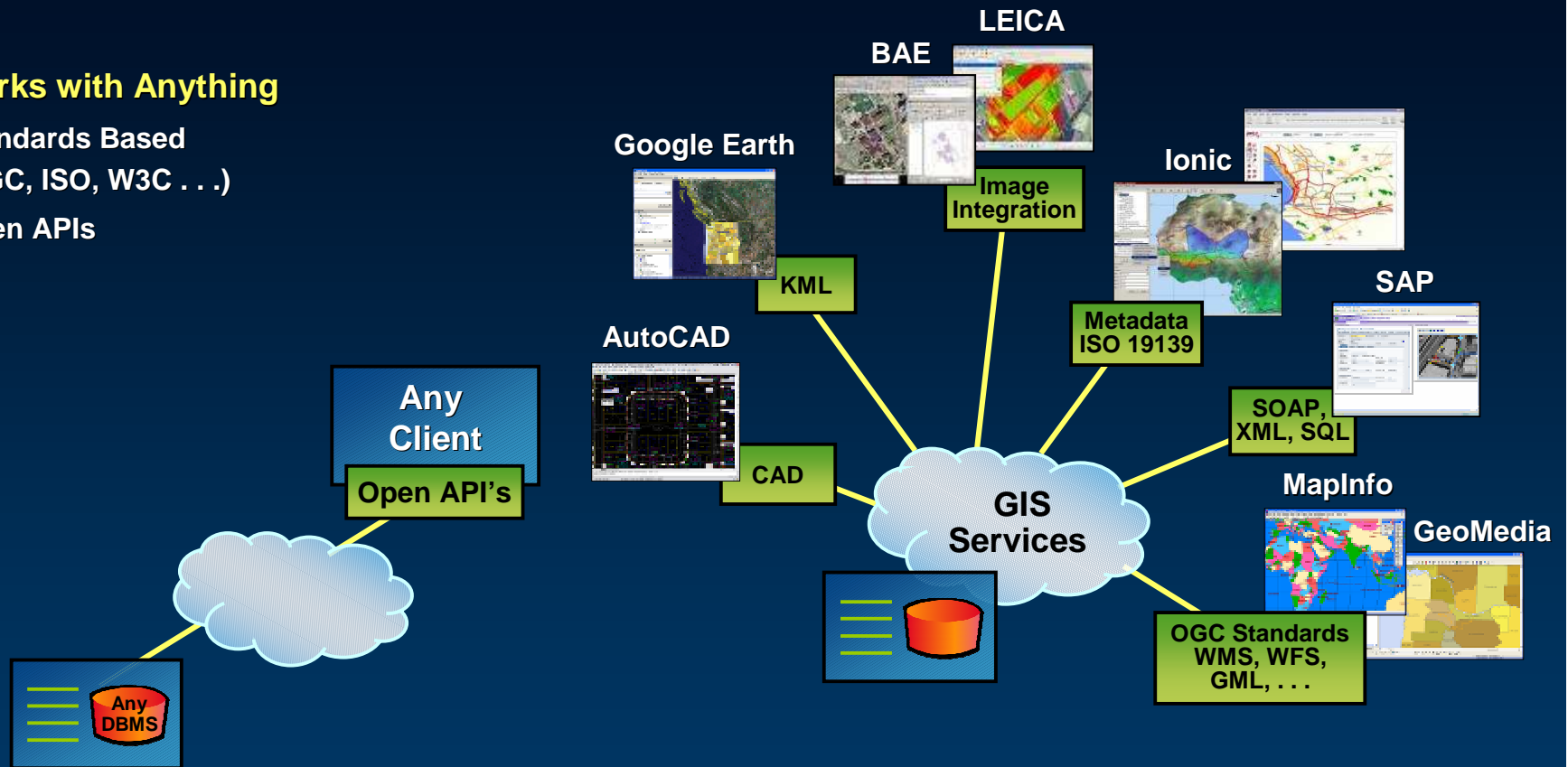
*... Server Based Rules Insuring Integrity*

# GIS Servers Support Open And Interoperable Access

Supporting Many Clients and DBMS's

## It Works with Anything

- Standards Based (OGC, ISO, W3C . . .)
- Open APIs

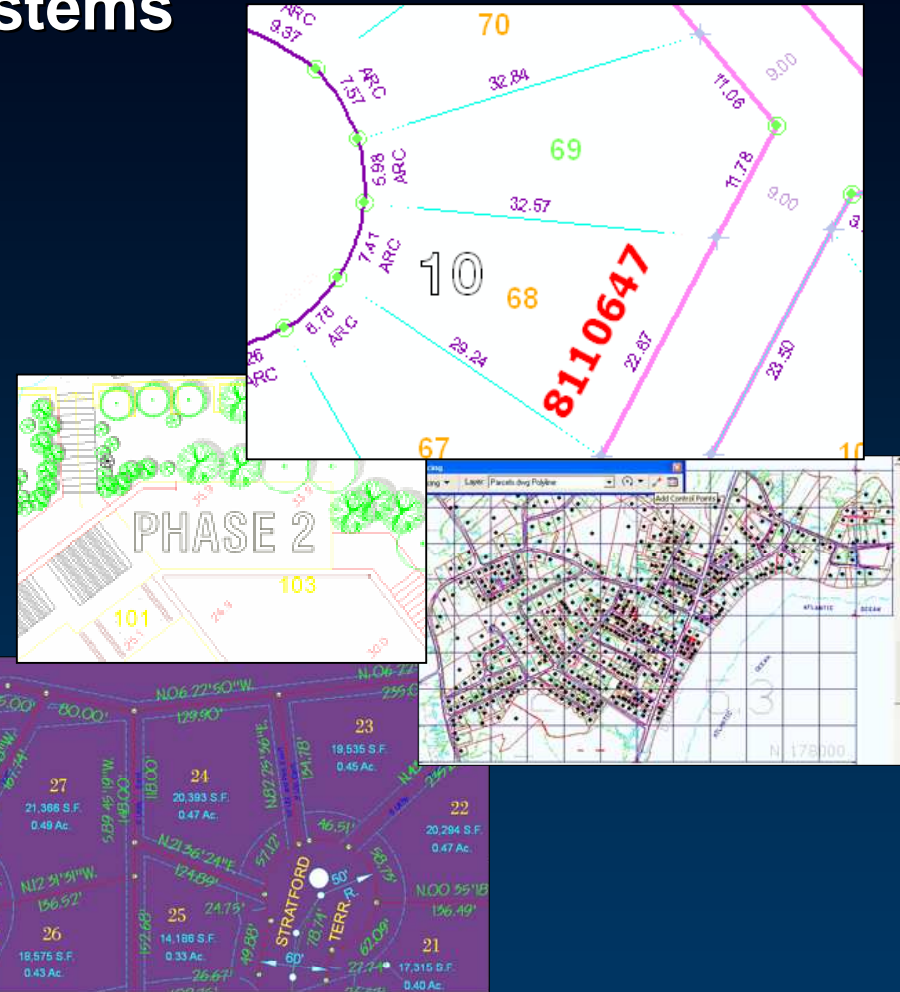
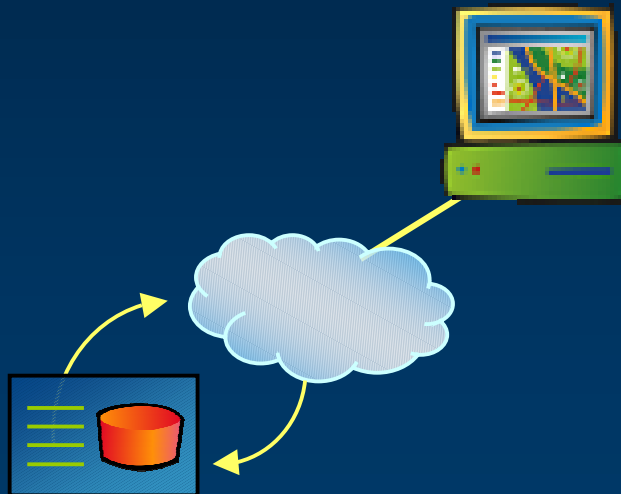


*. . . Ensuring That Cadastral Data Investments Can Be Leveraged  
. . . Providing a New Platform for Geospatial Integration*

# GIS as a Service for CAD Systems

## *Complete CAD/GIS Integration*

- Supporting
  - Data Management
  - Mapping
  - Editing
  - Spatial Analysis



*Enhancing Interoperability*



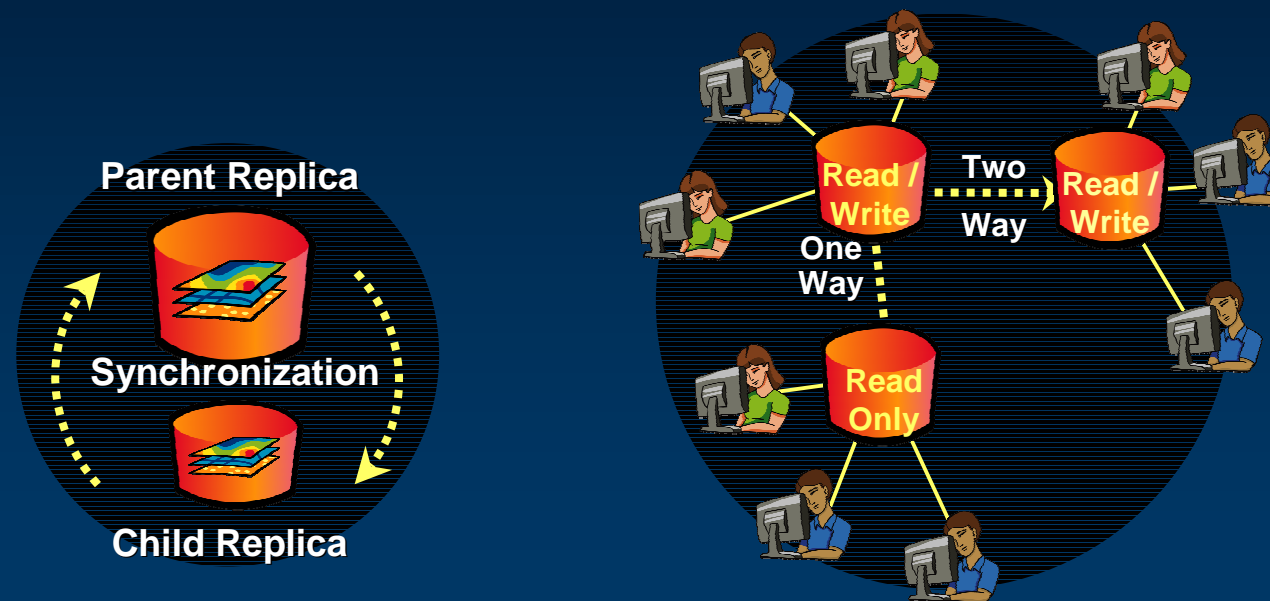
# GIS Servers Can Manage Distributed Geospatial Data

## *Using Replication Services*

- Change Only Updates
- Periodically Synchronized
- Updates Over the Web or Courier

## Supporting

- Collaboration
- Co-Data Production
- Mobile Users

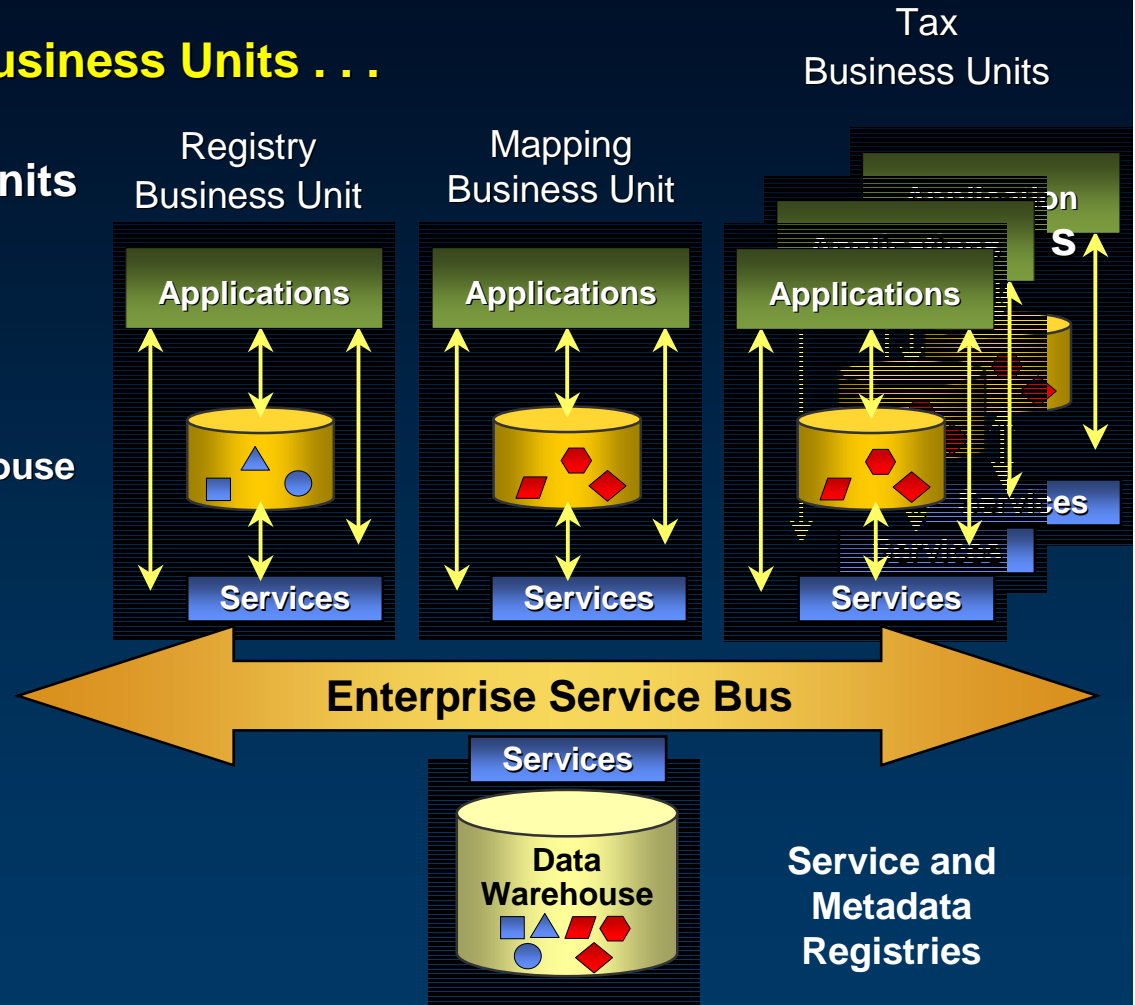


*Supporting Collaborative Data Management*

# GIS Can Be Implemented Across the Enterprise Using A Service Oriented Architecture

## Modernizing and Integrating Business Units . . .

- **Organized Around Business Units**
  - Tailor Applications and Data to Mission Needs
  - Manage Operational Database
  - Share Data
    - Publishing to the Data Warehouse
    - Directly as Services
- **Business Units Are Service Providers and Consumers**



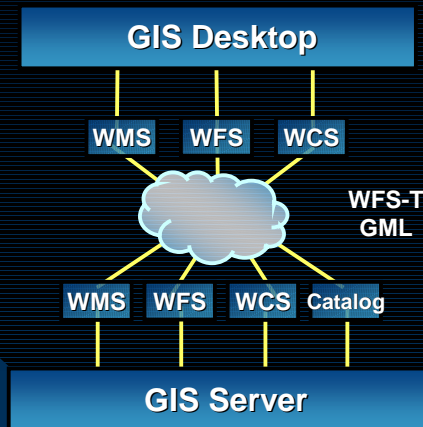
*. . . A Framework For Incrementally Growing an Enterprise Services Architecture*

# Standards Based Interoperability Is Important

## Multiple Approaches

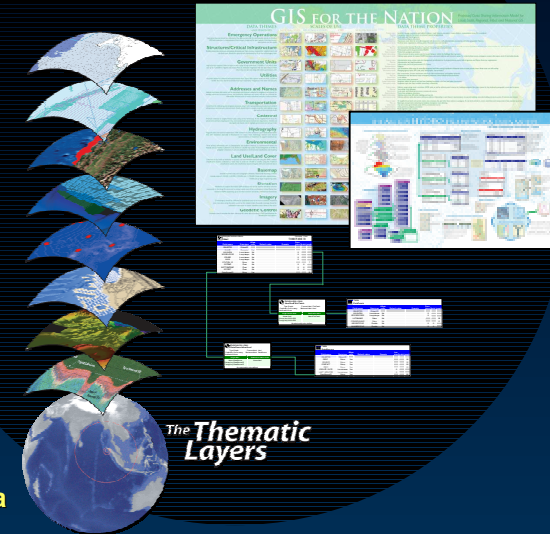
### Technology Standards

- Web Services
- OGC/ISO
- DXF, KML . . .



### Content Standards

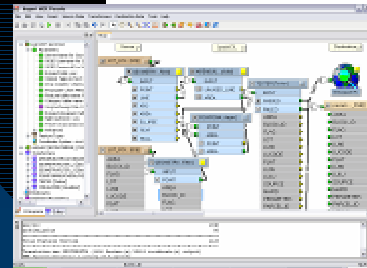
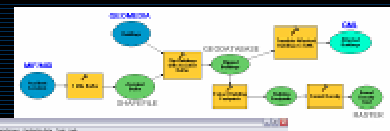
- Data Models
- Metadata (19139)



### Transformation Procedures (ETL)

- Formats
- Schema
- Semantic

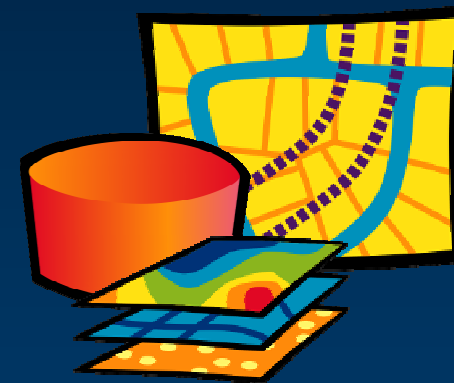
ETL = Extract,  
Transform & Load Data



... Providing An Open & Standards-based Environment  
... And Enabling Successful Collaborative Systems

# Implementing Enterprise GIS Requires More Than Technology

- Vision and Leadership
- Management Support
- Understanding of Business Processes
- Planning
  - Technical Architecture
  - Data Models
  - Organization
  - Implementation Work
- Good People



*... And a Spirit Of Collaboration*

**Thank you for your attention!**