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

Workflow Efficiency

Visualization

Accountability

Fair & Equitable Valuation

Automated Appraisals

Legal Notification

Change Monitoring

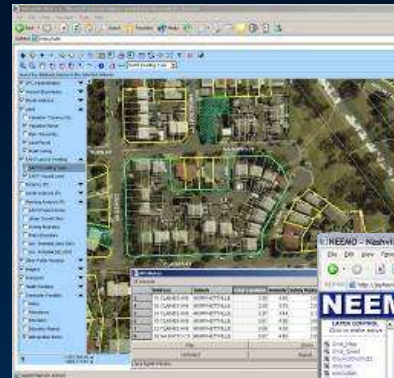**Complex modeling**

Integration is Becoming Understood and Easier
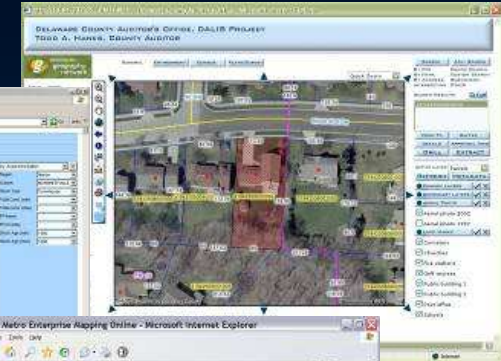
Land Information Systems

Public Access

Comprehensive Land Registry

Cadastral Records

Lithuania

Adelaide

Ohio

Government Lease Management

Nashville, TN

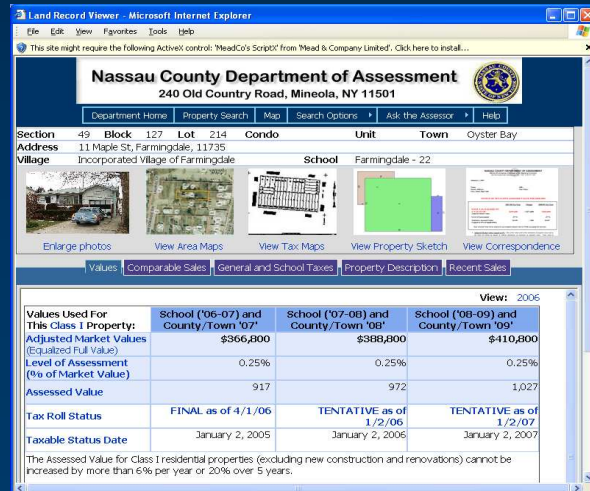**USA**
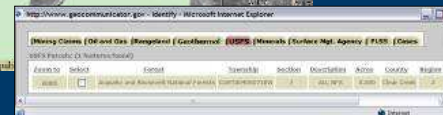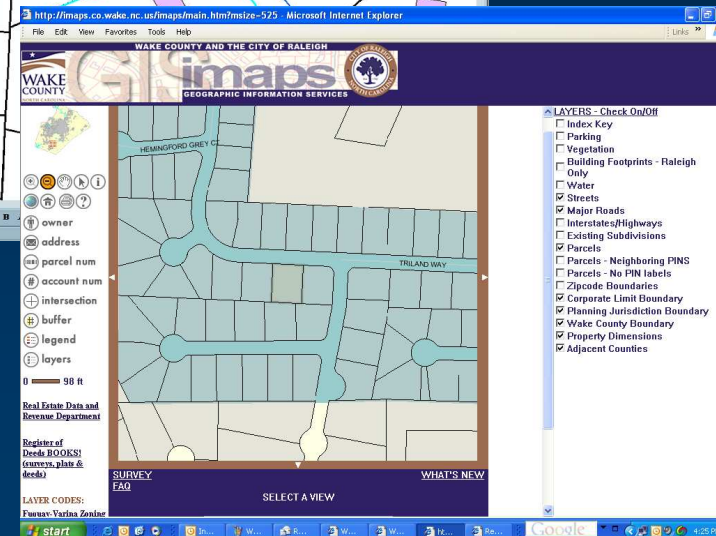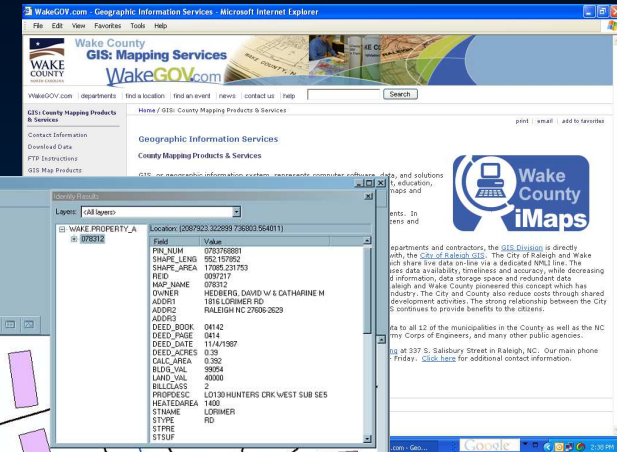
Citizen Access – Via Web
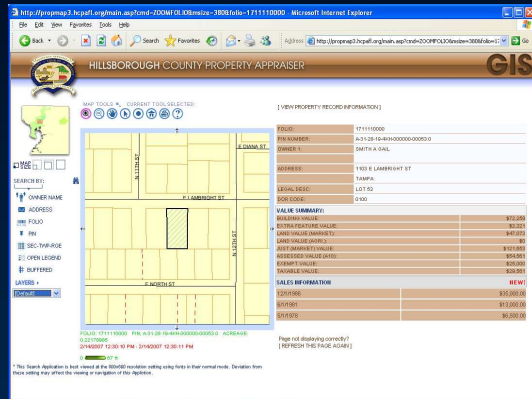
Hillsborough County

Nassau County

Wake County

Online Search, Reporting and Map Generation

Integration with Aerial Photos

Oblique Imagery

Integration With Document Management

Updating Using Mobile GIS

Automated Notice of Valuation

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

GeoWeb

Emerging

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

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 . . .

GeoWeb

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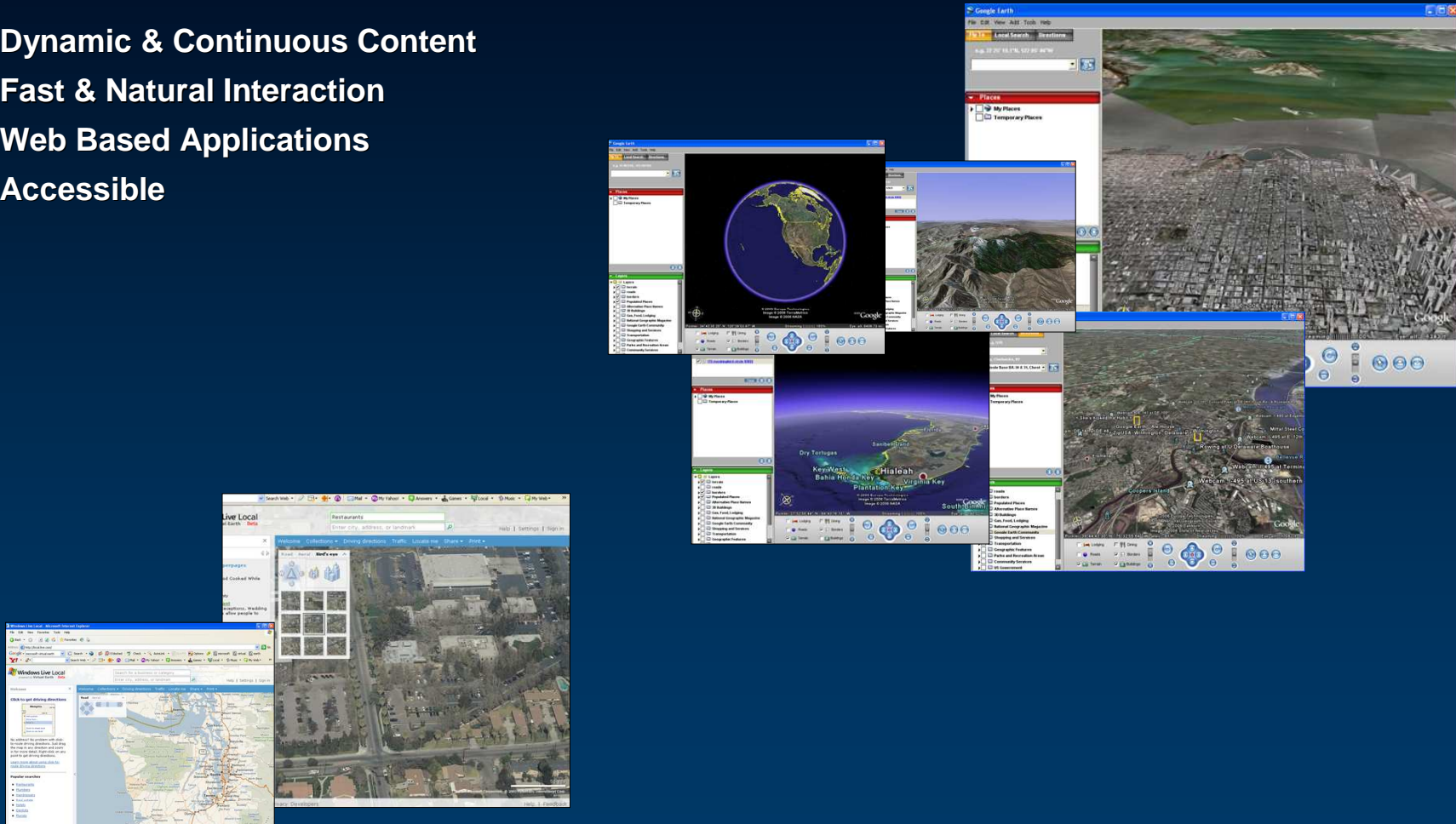
. . . Opening the World's Eyes To a Whole New Way of Seeing

GIS on The Web Provides Many Additional Possibilities

For Sharing, Integrating and Analyzing Geographic Knowledge

Connecting Professionals And Users

GeoWeb

Use

Serve

Author

Data
Maps
Models
Globes
Metadata
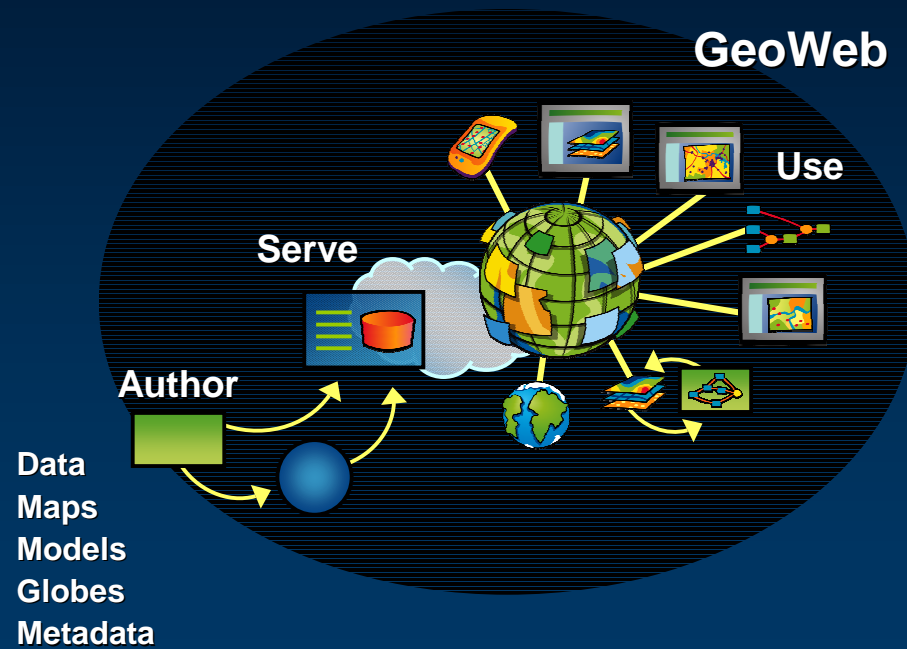
Enabling Technology

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

Servers

Desktop

Web Services

Laptop

Scalable Networked Hardware

PDA

Phone

GIS Servers
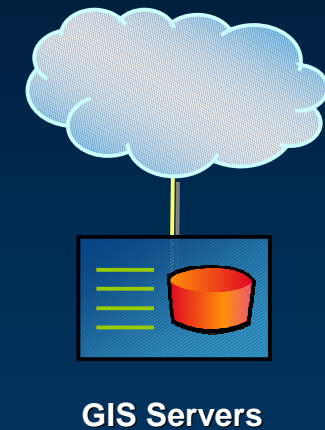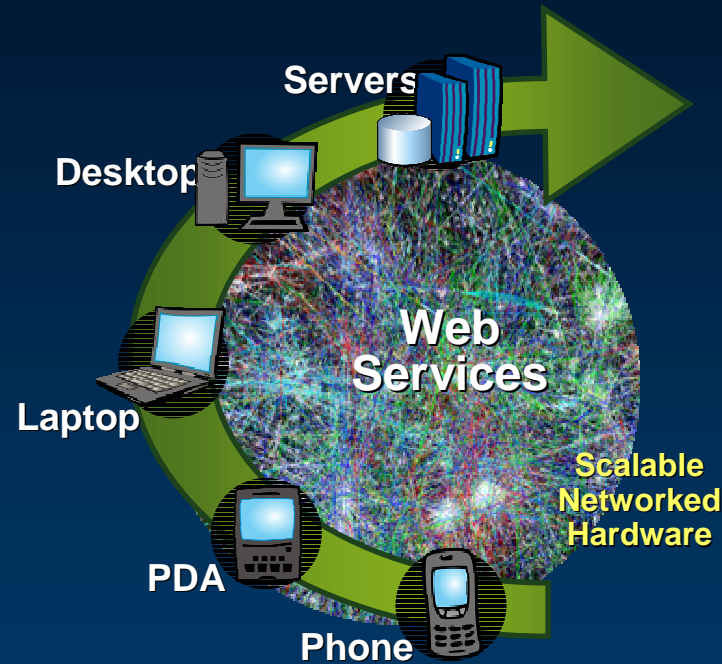
. . . Improving Our Ability To Share and Distribute

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
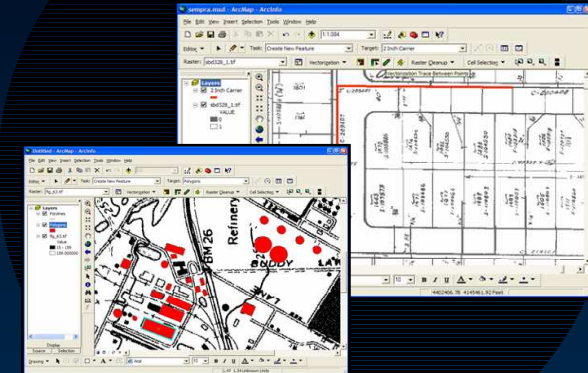
CAD Integration
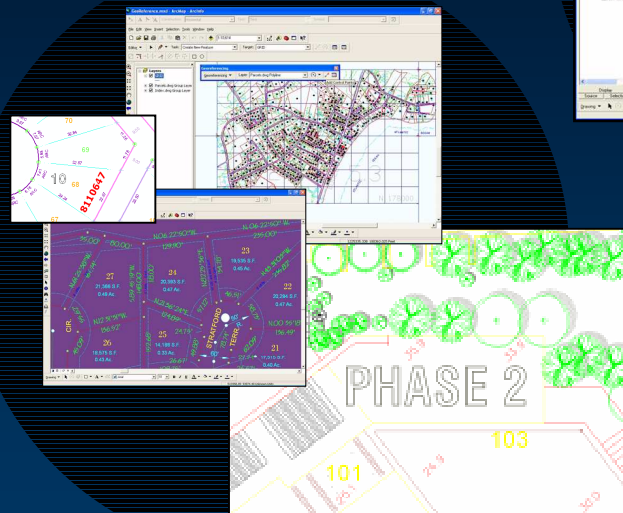
Integrating Survey Measurements
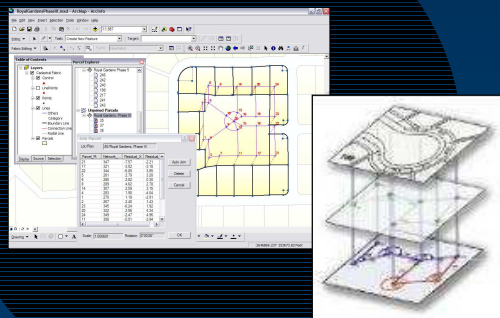
Enhanced Interoperability

PHASE 2

Extended Data Modeling
Abstracting Various Sciences, Technology and Methods for Spatial Measurement

Geodatabase

Networks · Surveys · Addresses · Vectors · Annotation · 3D Objects · Attribute · Topology · Dimensions · Terrain · Cadastral · Cartography · CAD · Images
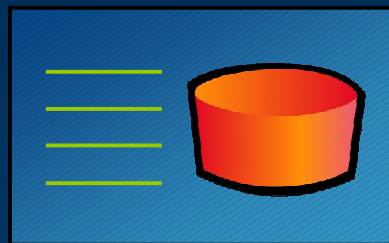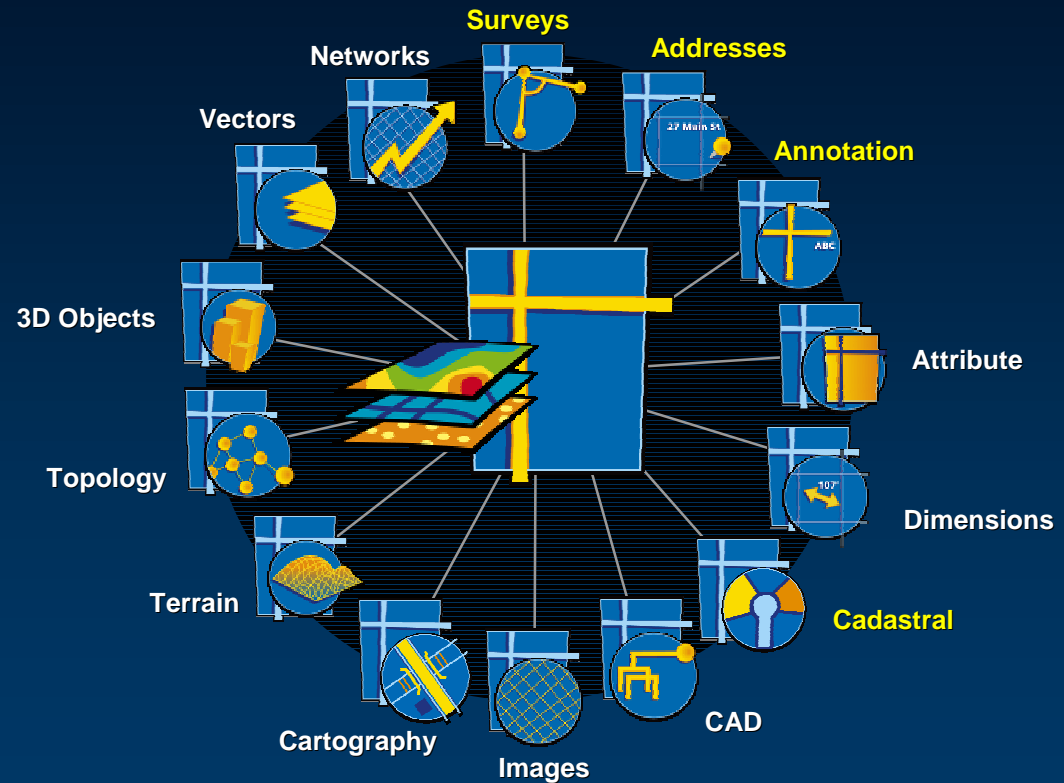
Managing all Types of Geospatial Data

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**
  - **. . .**

GIS

CAD

Supports Any Client

Browser

Image Server

Creates Multiple Products Dynamically

Raster Files
(Any Type or Format)
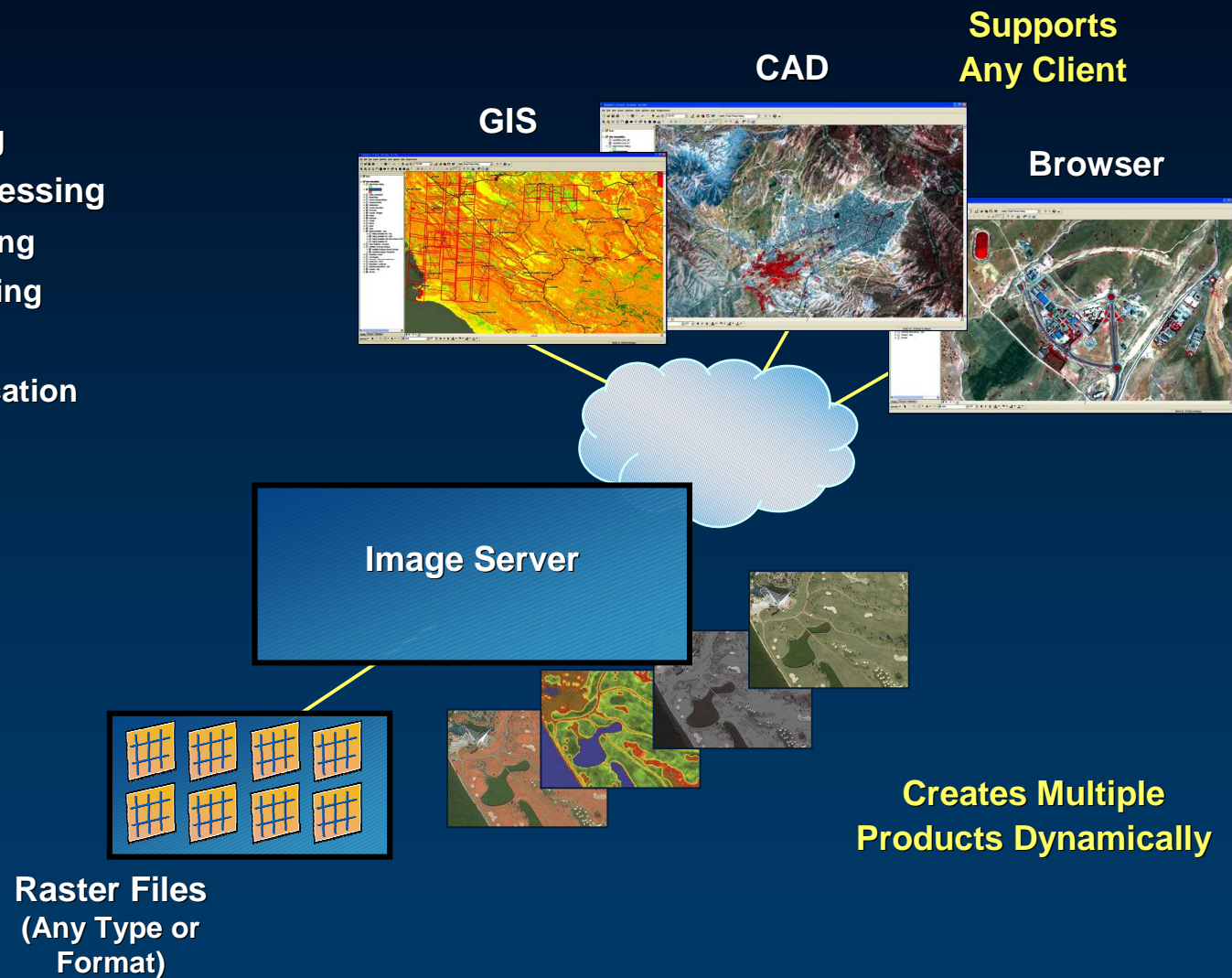
. . . Reducing Time Between Acquisition and Use

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

Desktop   Web   Mobile   Open APIs

OGC
KML
SOAP
SQL

Applications →

Mapping
3-D Visualization
Geoprocessing
Data Management

← Services
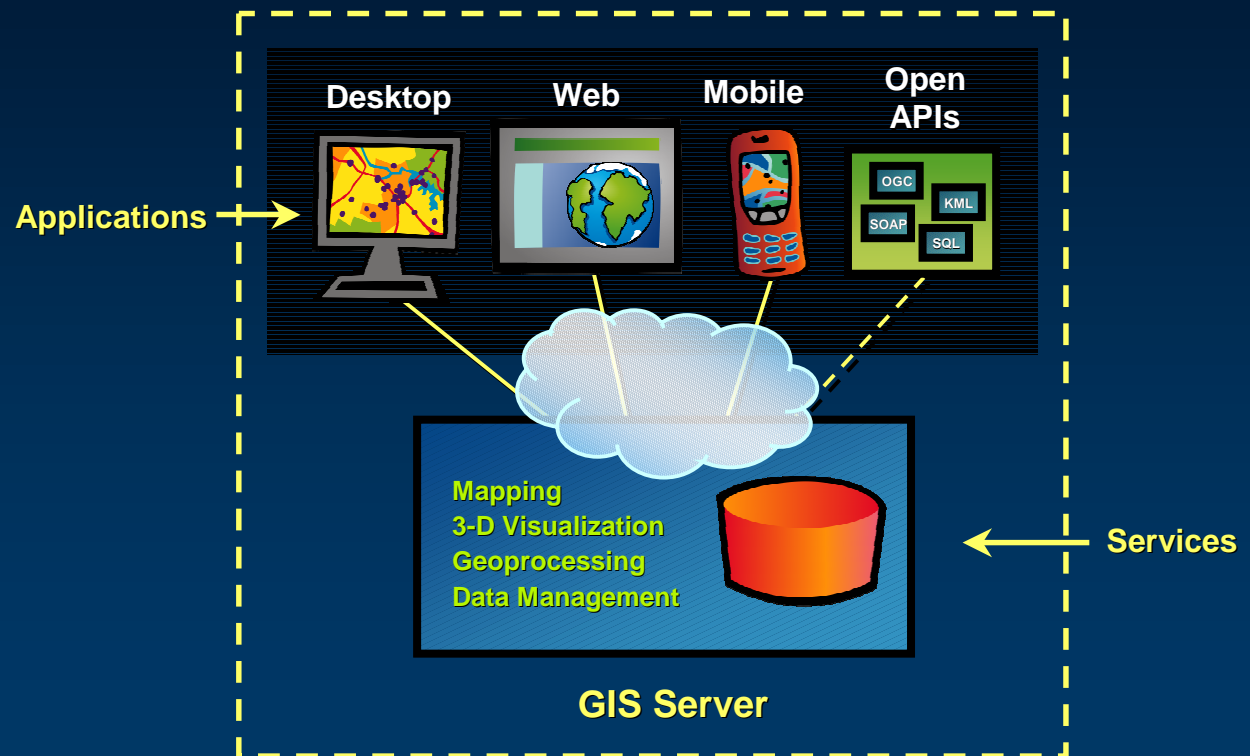
GIS Server

. . . Enabling Enterprise GIS

Web Clients
Browser Based GIS Application

Supporting
- **Mapping**
- **Editing**
- **Geoprocessing**
- **Geocoding**
- **Data Management**

Web Map

AJAX

**Integrates
Multiple Service**
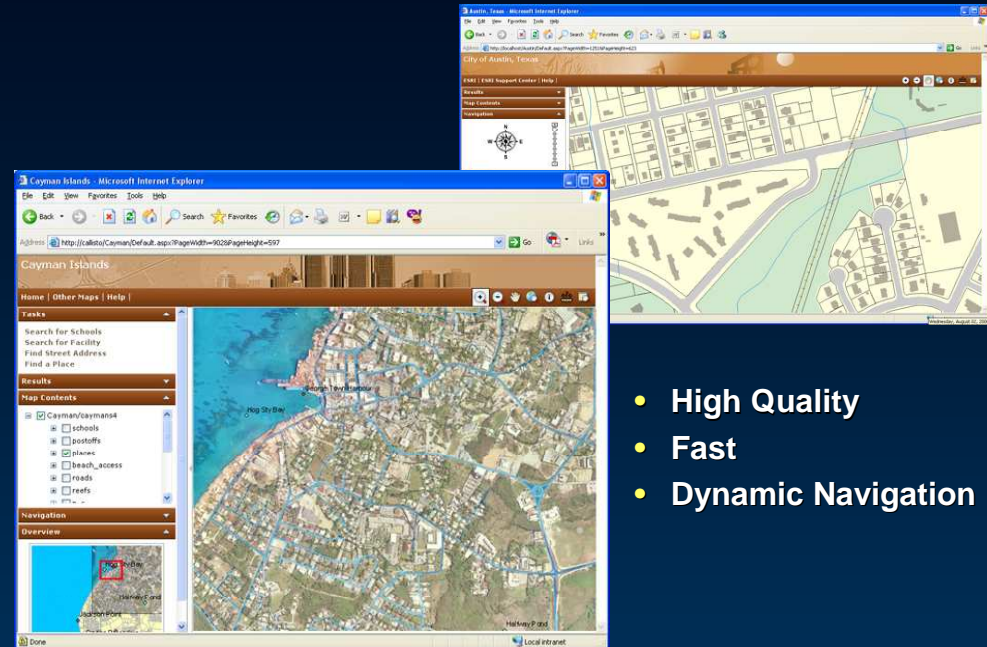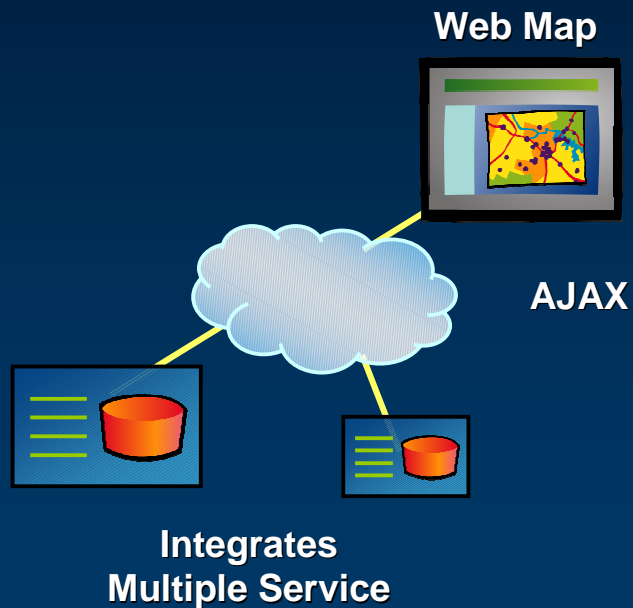
- **High Quality**
- **Fast**
- **Dynamic Navigation**

. . . 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

LEICA

BAE

Google Earth

Ionic

Image Integration

KML

SAP

AutoCAD

Metadata ISO 19139

Any Client

SOAP, XML, SQL

Open API's

CAD

GIS Services

MapInfo

GeoMedia

Any DBMS

OGC Standards WMS, WFS, GML, . . .
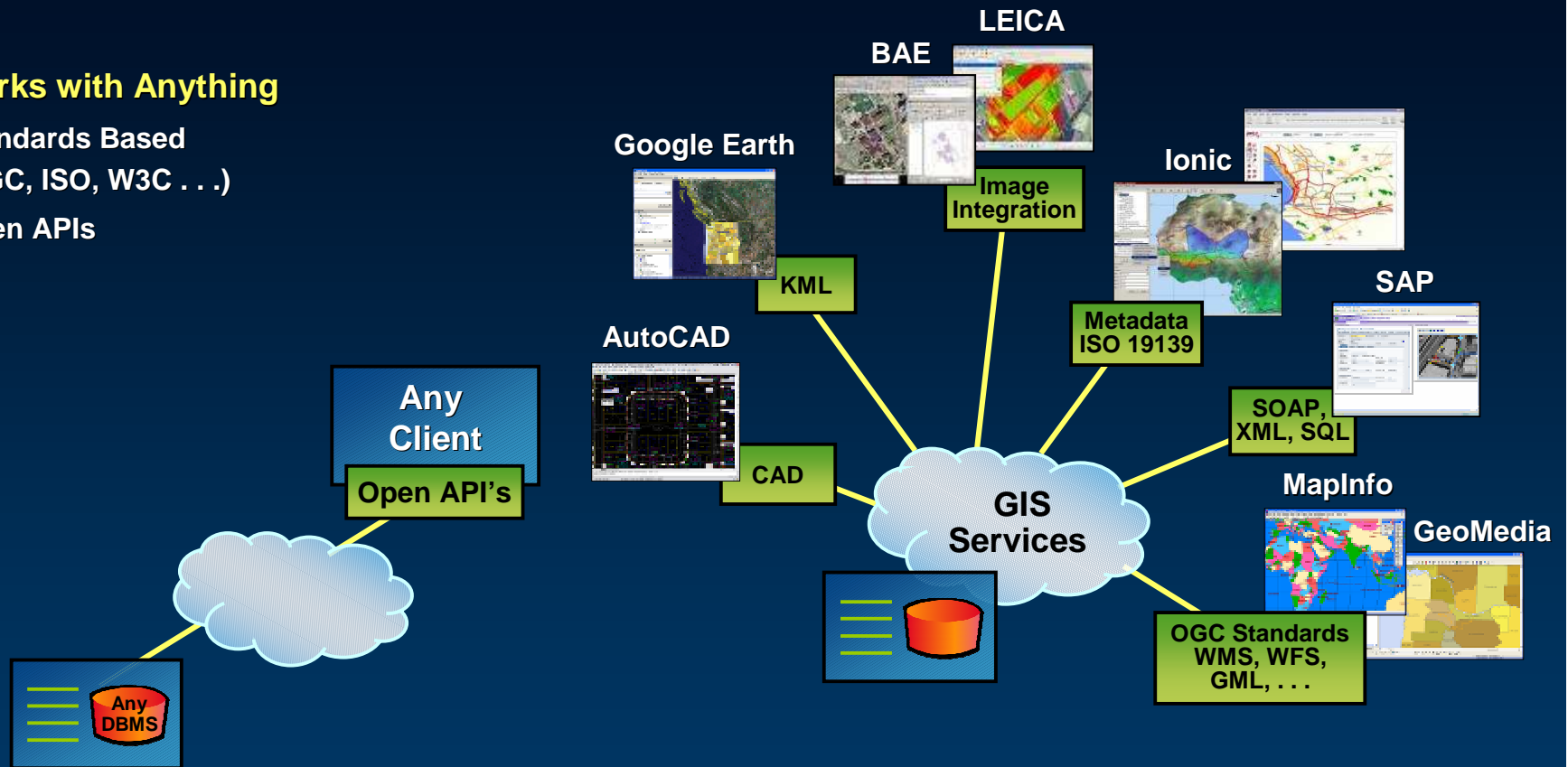
. . . Ensuring That Cadastral Data Investments Can Be Leveraged
. . . Providing a New Platform for Geospatial Integration

GIS as a Service for CAD Systems
Complete CAD/GIS Integration

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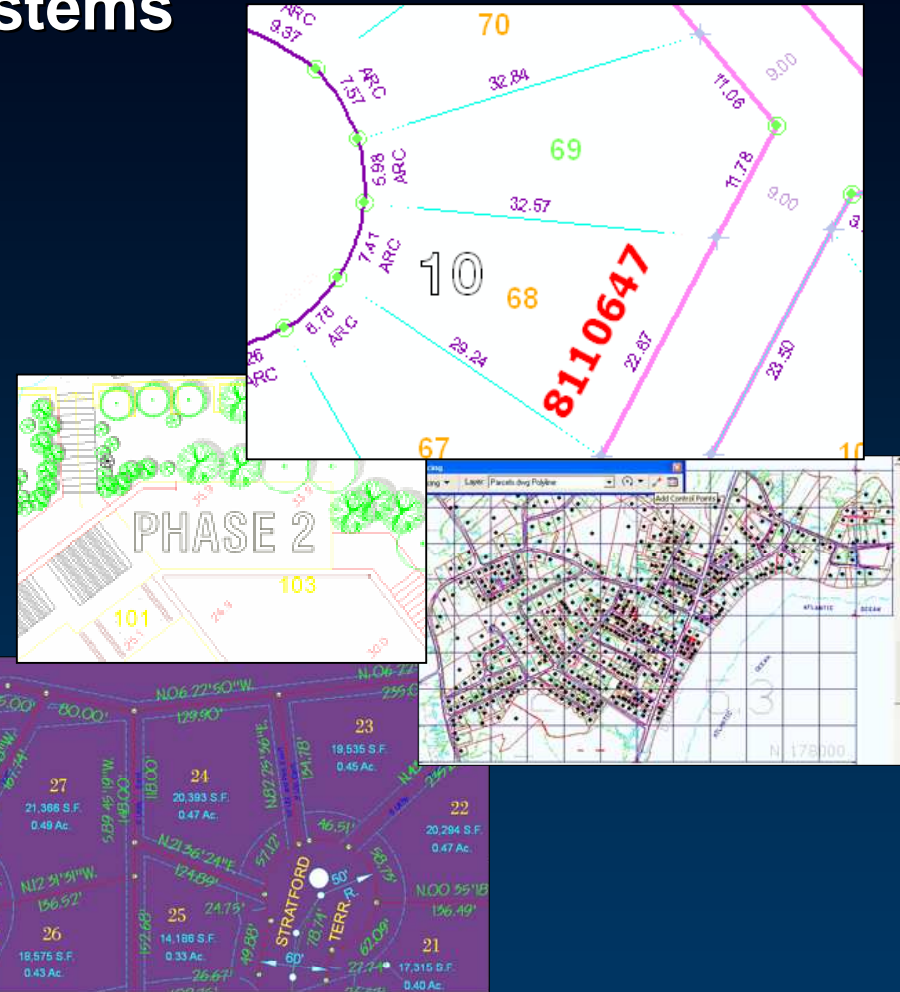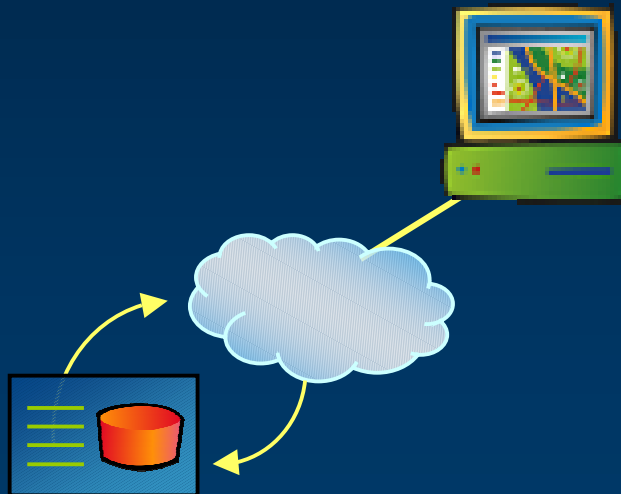
Enhancing Interoperability

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**

Parent Replica

Synchronization

Child Replica

Read / Write — Two Way — Read / Write

One Way

Read Only

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**
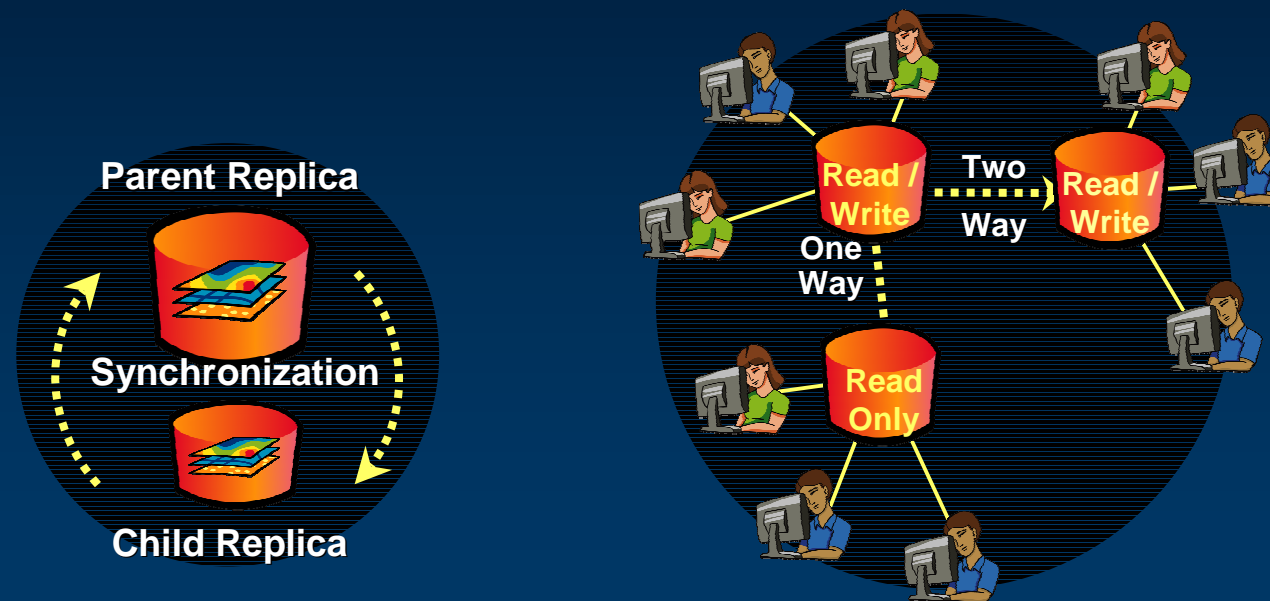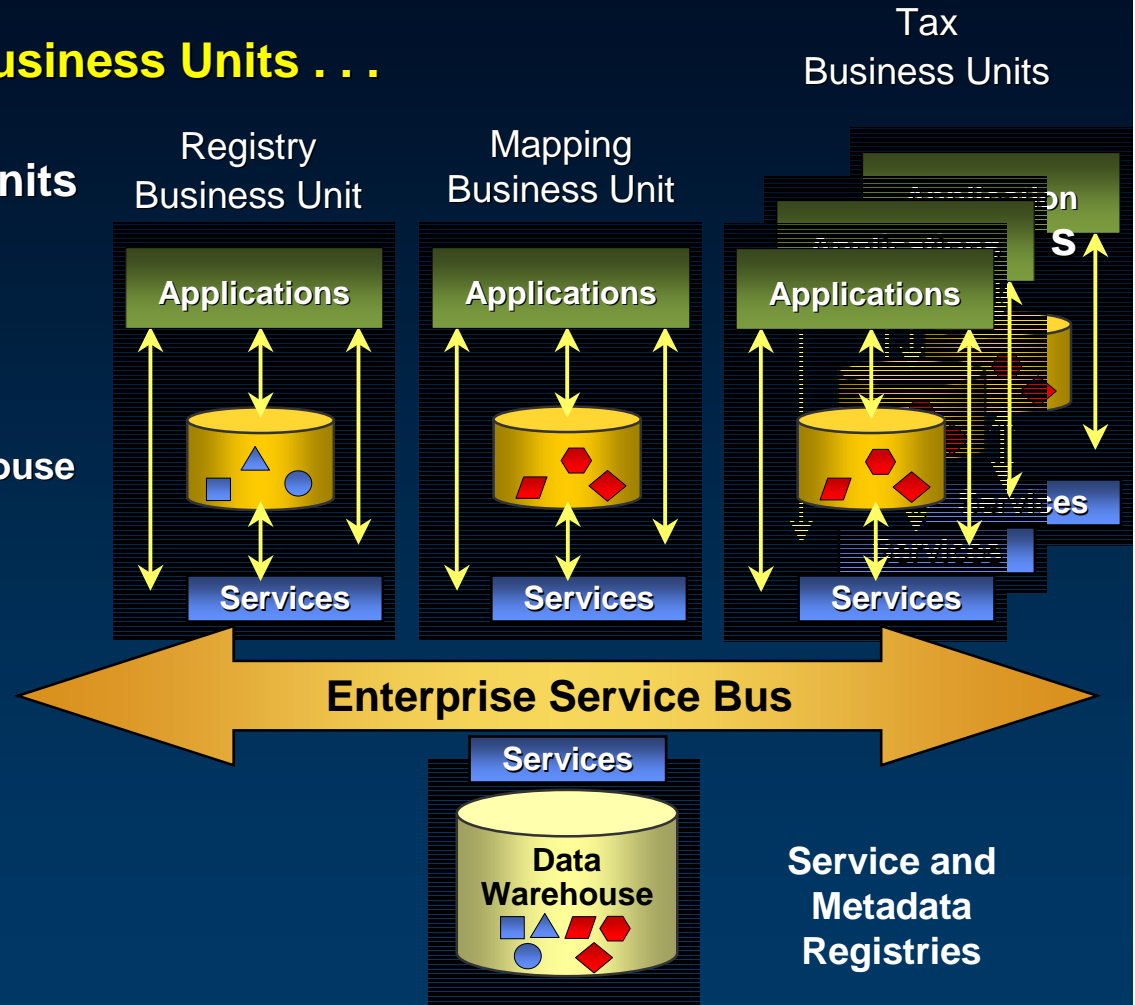- **Business Units Are Service Providers and Consumers**

Tax
Business Units

Registry
Business Unit

Mapping
Business Unit

Applications

Applications

Applications

Services

Services

Services

Enterprise Service Bus

Services

Data Warehouse
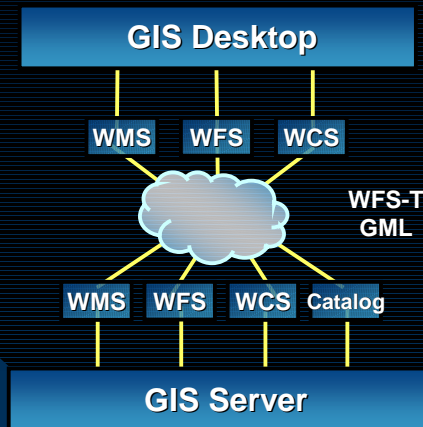
Service and Metadata Registries

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

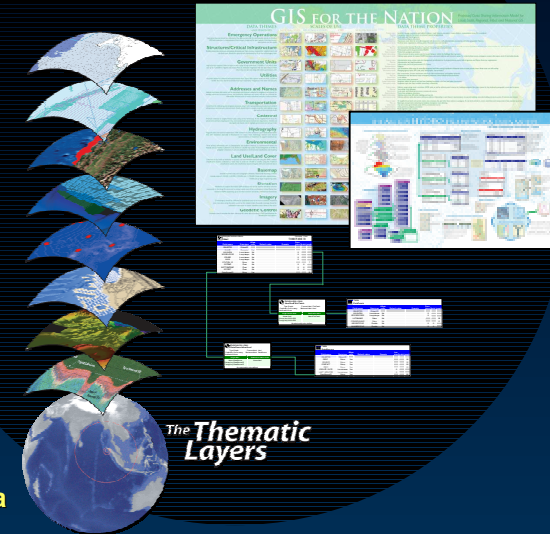# Standards Based Interoperability Is Important

Multiple Approaches

Content Standards

- **Data Models**
- **Metadata (19139)**

Technology Standards

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

GIS Desktop

WMS WFS WCS

WFS-T
GML

WMS WFS WCS Catalog

GIS Server

Transformation Procedures (ETL)

- **Formats**
- **Schema**
- **Semantic**

**ETL = Extract,
Transform & Load Data**

The **Thematic
Layers**
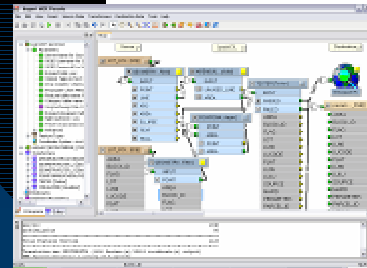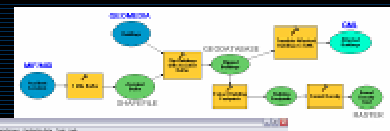
. . . Providing An Open & Standards-based Environment
. . . And Enabling Successful Collaborative Systems

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**
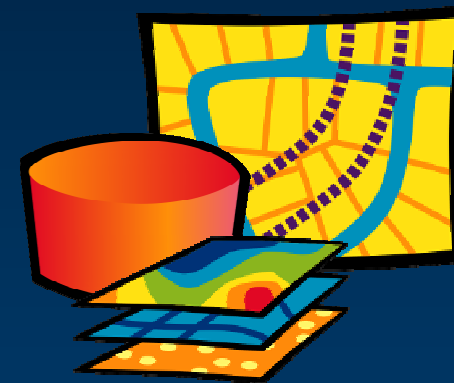
. . . And a Spirit Of Collaboration

Thank you for your attention!