Keeping Current with ICT
The Latest Technology from ESRI

FIG Commission 7 Annual Meeting
Bled, Slovenia – May 2006
Kevin Daugherty
ESRI

The Growing Business of GIS

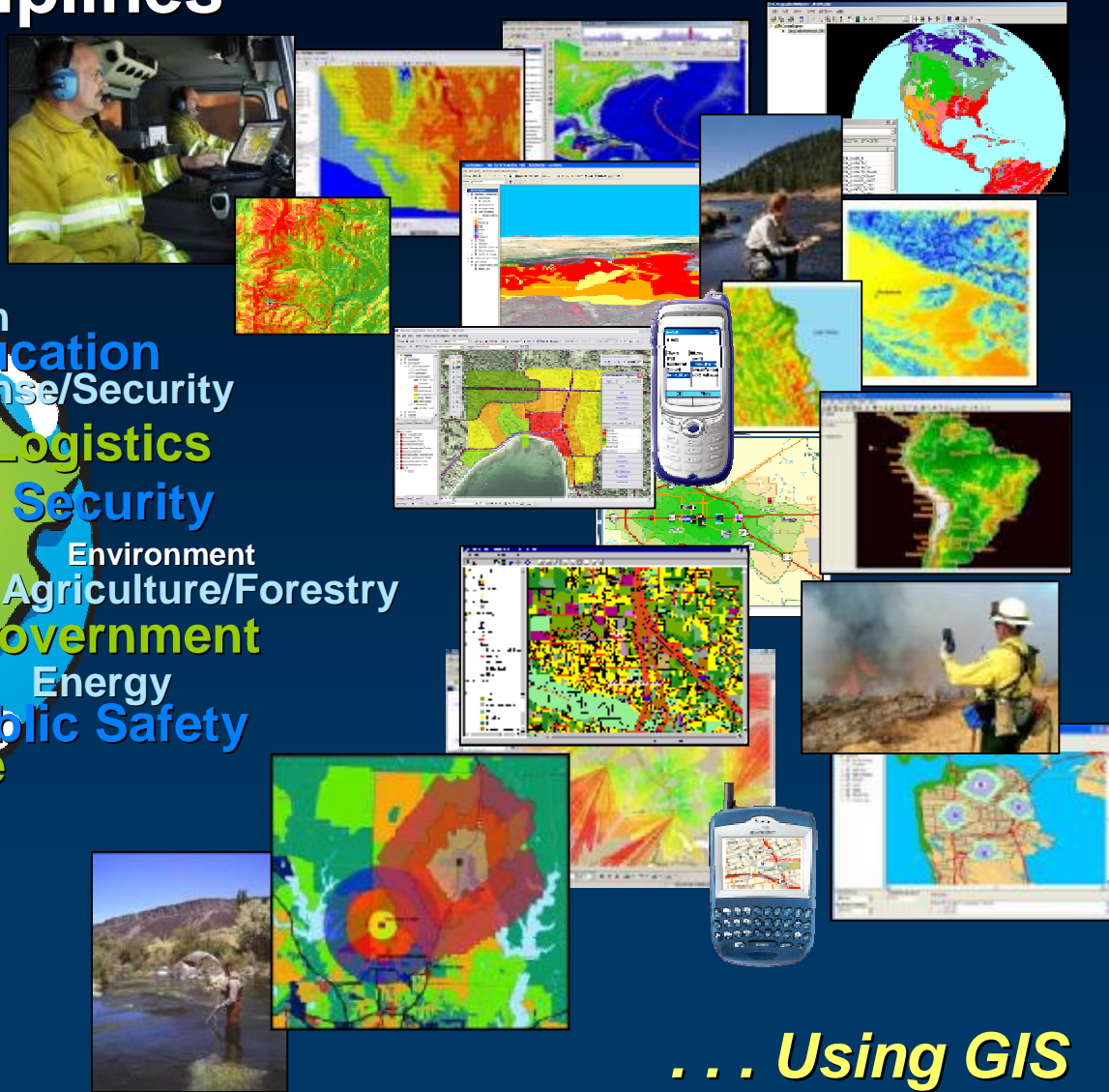

. . . Has many facets

A Growing Number of Professionals
Around the World - Many Disciplines & Interests

Information Communication Technology Serves Many Disciplines

Utilities
Health
Biodiversity
Education
Modeling
Defense/Security
Urbanization
Logistics
Pollution
Security
Congestion
Environment
Conservation
Agriculture/Forestry
Land Use
Government
Oceans
Energy
Business Efficiency
Public Safety
Development
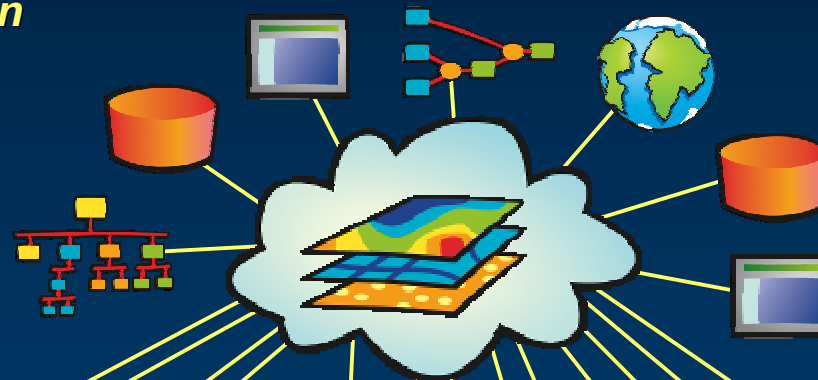Crime
Water

. . . Using GIS

Individual Systems Will Be Connected into a System of Systems

Facilitated by . . .
- Standardized Data Models
- GIS Portals
- Networks of Providers
- Collaboration Agreements
- Leadership and Organization
- Technology

    . . . And Cooperation

GeoWeb

. . . Providing New Capabilities For Integration, Collaboration And Improvement

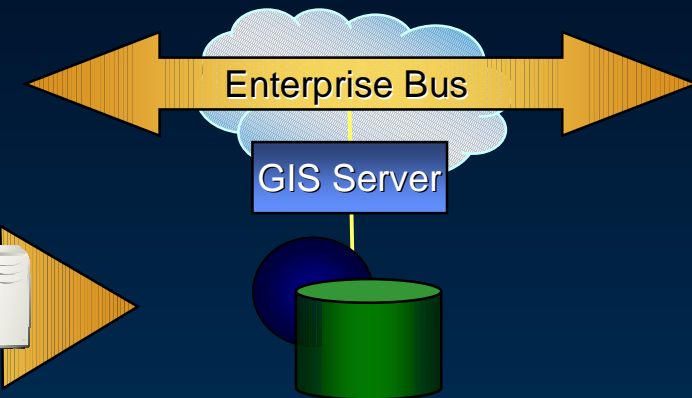*…Helping Better Manage Our World*

Enabling Technology

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

**Scalable
Networked
Hardware**

**Services-Oriented
Architecture**

Enterprise Bus

GIS Server

Servers

Desktop

Web
Services

Laptop

PDA

Cell
Phone

Open, Flexible, and Standards Based

ESRI's Software Strategies

- Enhance ArcGIS Desktop
- Strengthen / Simplify Geodata Management
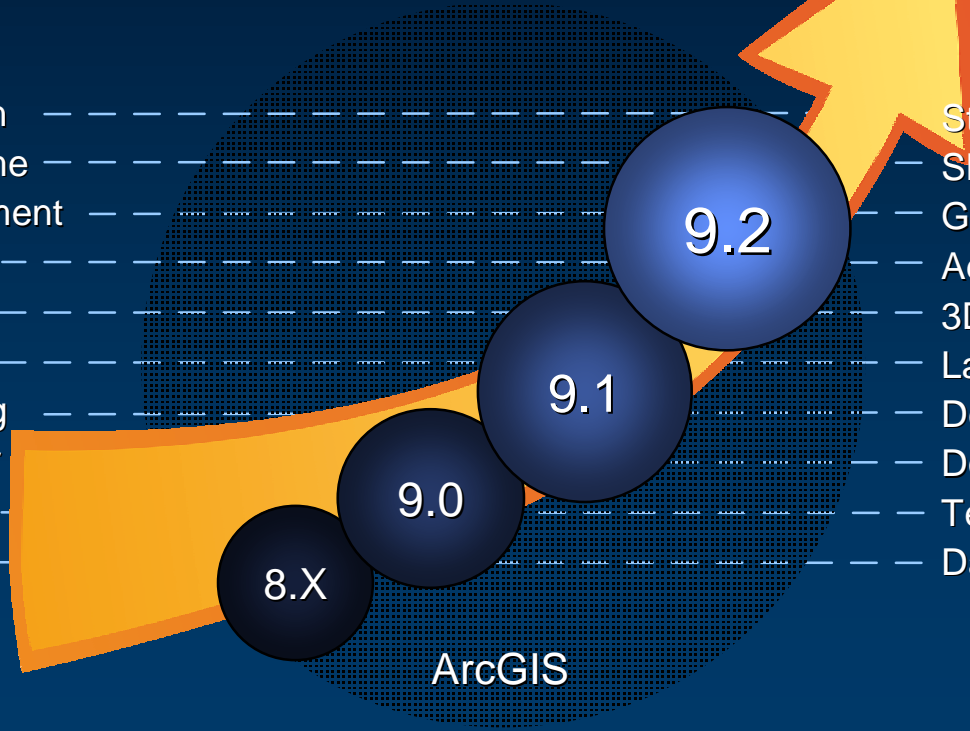- Extend ArcGIS Server
- More Mobile GIS

Desktop

Mobile GIS

Geodatabase

Server

. . . With Increased Focus on Quality, Usability and Performance

ESRI Is Focused On A New Generation of Products

Hundreds of Enhancements

Documentation
Temporal / Time
Data Management
Smart Clients
Tracking
Cartography
Geoprocessing
Image / Raster
Mobile
Server

Standards / Interoperability
Sketching / Design
Geospatial Viewers
Address Geocoding
3D Visualization
Land Records
Developer
Documentation
Terrain Surface Modeling
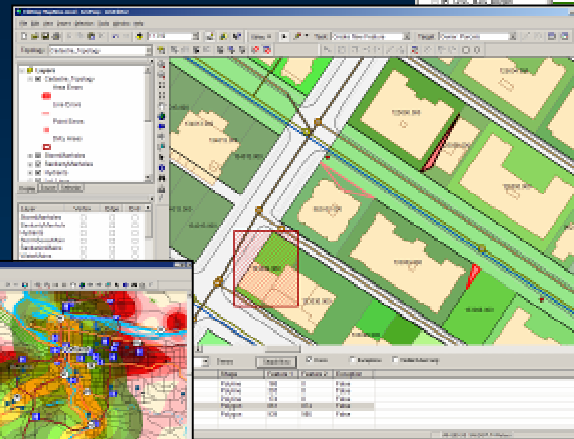Data Compilation and Editing

9.2
9.1
9.0
8.X

ArcGIS

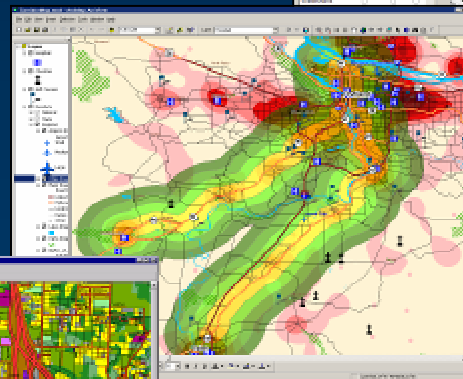*. . . Improving Productivity and Usability*

ArcGIS Desktop
Many Improvements

- Usability
- Cartography
- Charting
- Animation
- Data Compilation
- Geoprocessing
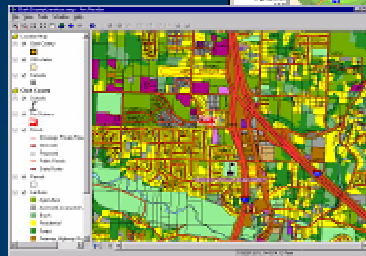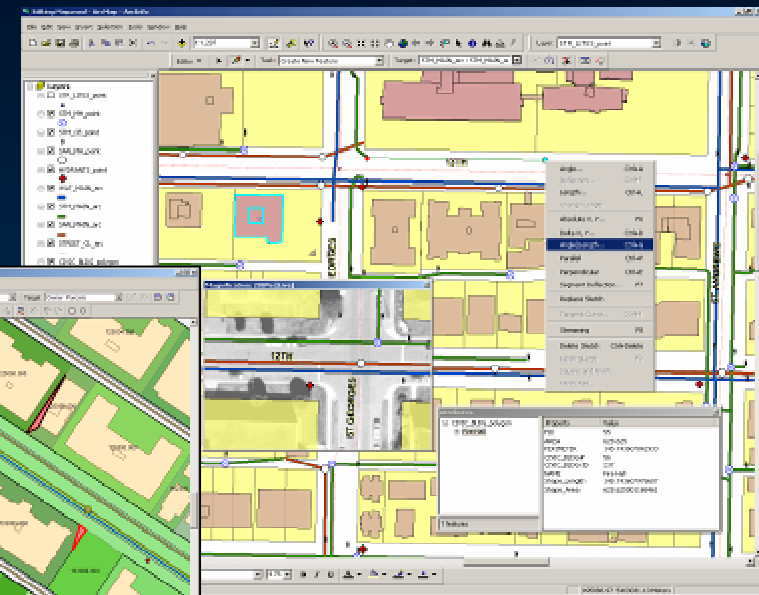- Data Management
- Interoperability

ArcInfo
(Geoprocessing / Analysis)

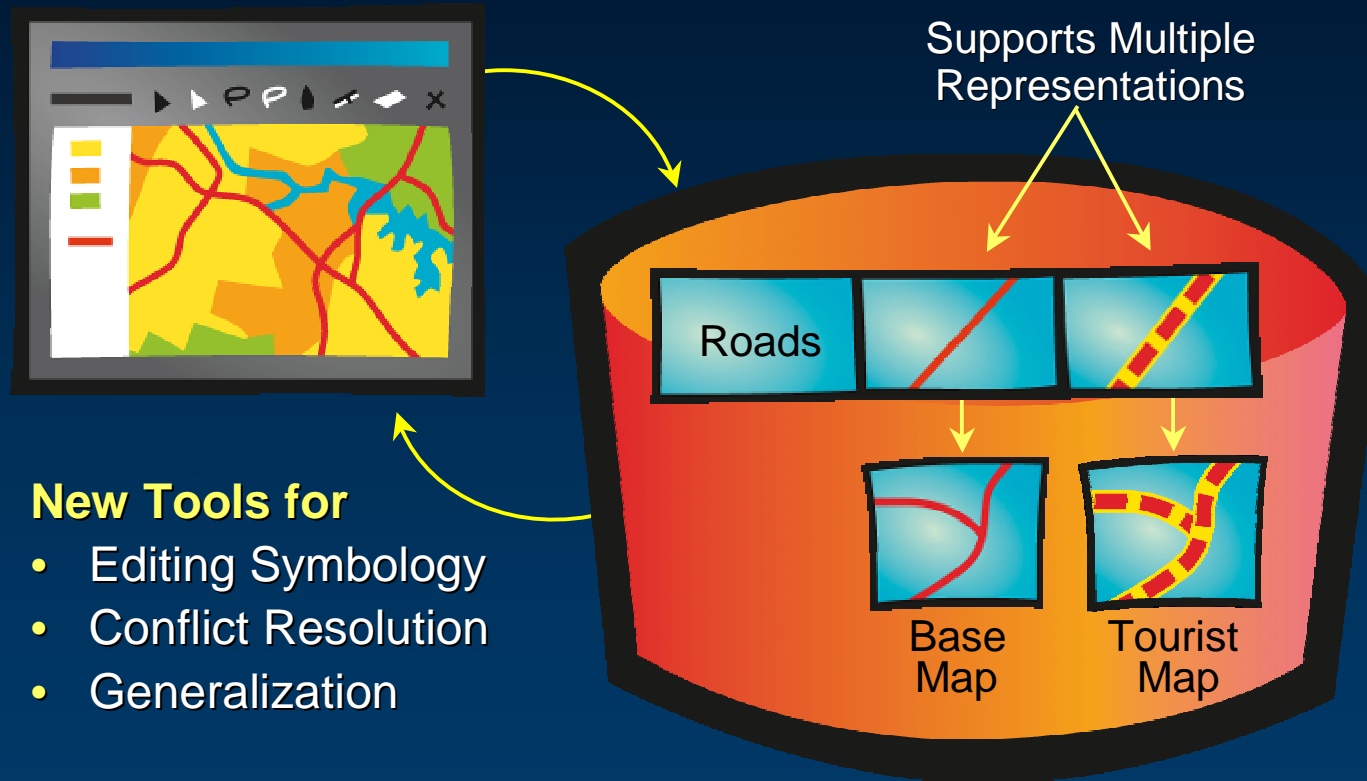ArcEditor
(Create / Manage)

ArcView
(Use)

ArcReader
(View)

Common, Scalable Family of Products

Advancing Cartography
## *Adding Cartographic Finishing Tools to ArcGIS*

Extends ArcMap to Create & Edit Intelligent Representations

Supports Multiple Representations

Roads

Base Map

Tourist Map

New Tools for

- Editing Symbology
- Conflict Resolution
- Generalization

Extends the Geodatabase to Support Cartographic Representations

Advancing Cartography
## *Integrating Human Artistry*
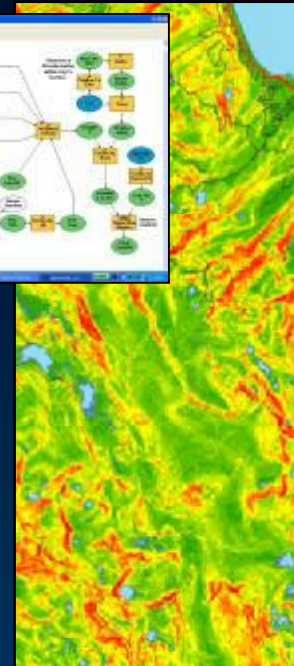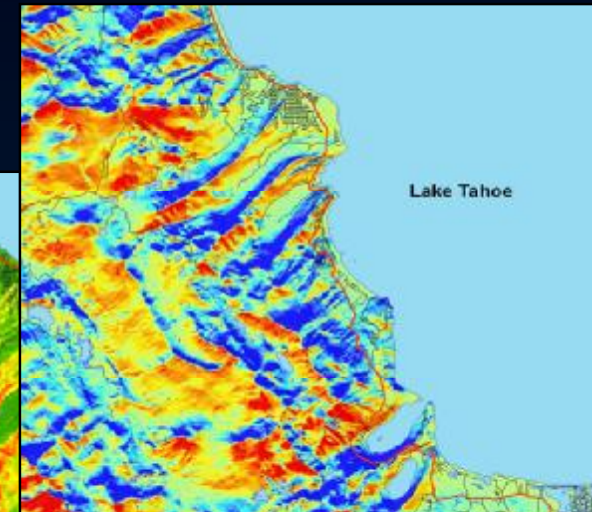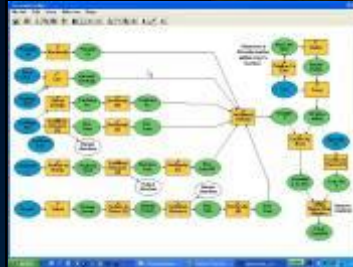

Digital
Landscape

Digital
Cartographic
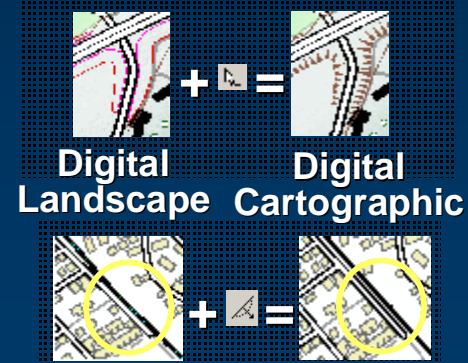
. . . with Computer-Generated Mapping

Improving Geoprocessing
## *Many New Capabilities*

- Very Large Data Sets
- Spatial Analysis Tools
  - Solar Radiation
  - Random Sampling
  - Statistics / Geostatistics
  - Vector-Raster Improvements
- Fast Geocoding (5-10x)
- Time Based Modeling / Simulation
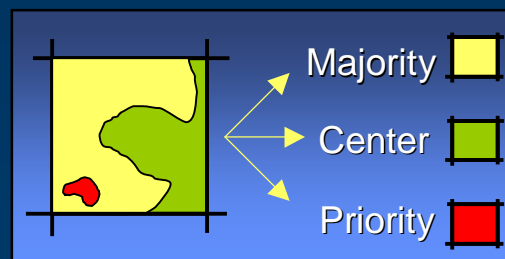- Batch Geoprocessing
- Server Based
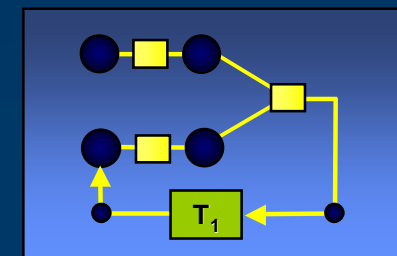
Lake Tahoe
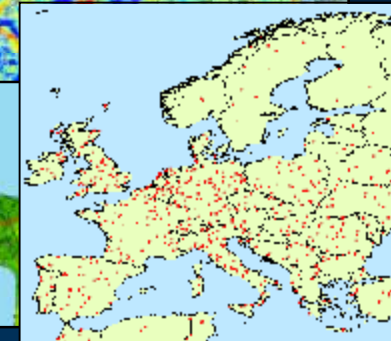
Solar Radiation
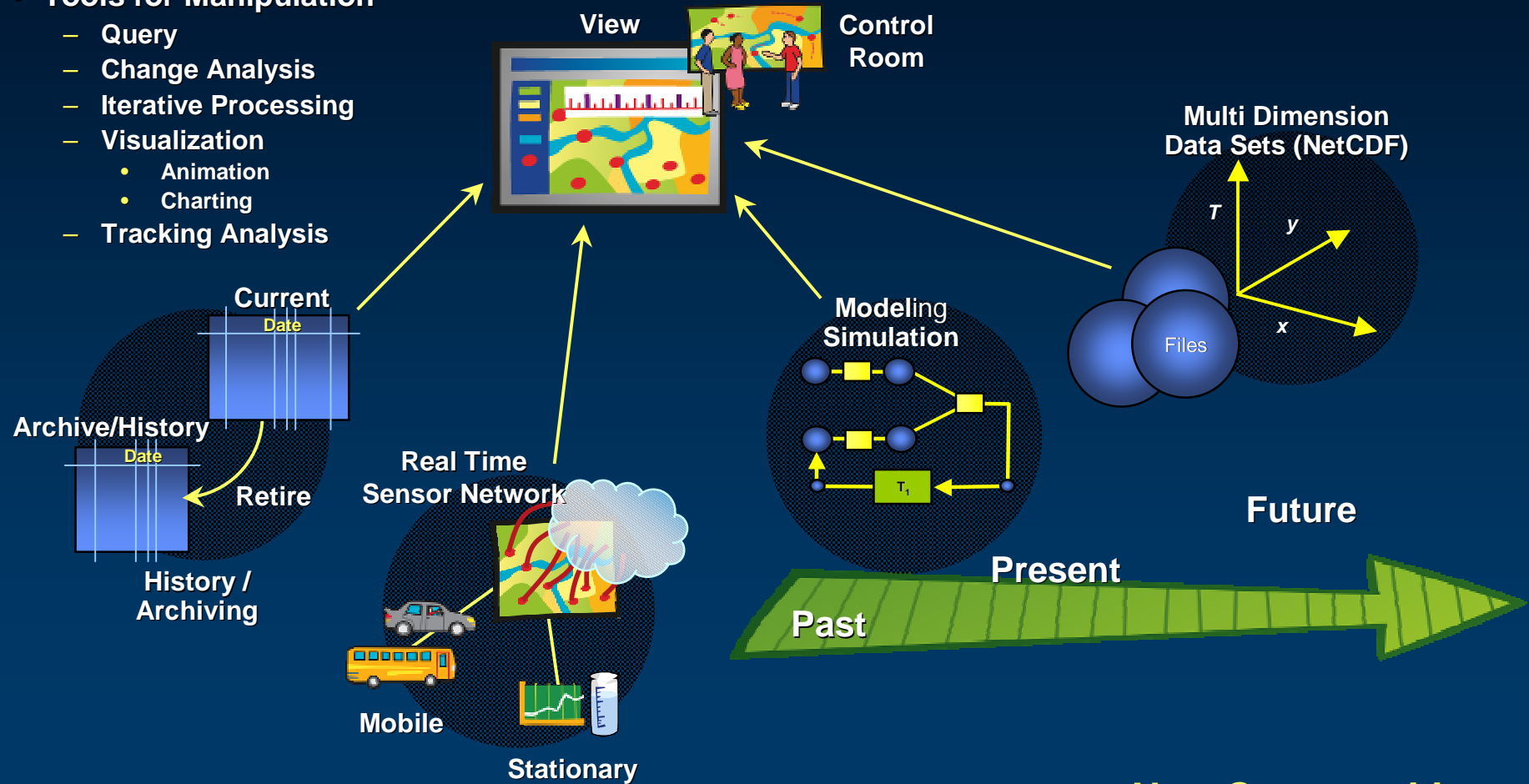
Random Sampling

GIS Server

Raster Conversion

Majority
Center
Priority

Model Looping

T_1
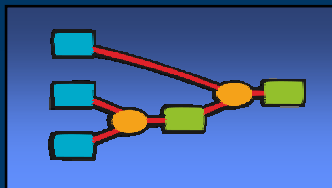
Integration of Time
New Ways to Manage, Analyze & Visualize Geography

- **Extended Data Model**

- **Tools for Manipulation**
  - **Query**
  - **Change Analysis**
  - **Iterative Processing**
  - **Visualization**
    - **Animation**
    - **Charting**
  - **Tracking Analysis**

View

Control Room

Multi Dimension Data Sets (NetCDF)

T y

x

Files

Current

Date

Modeling Simulation

T_1

Archive/History

Date

Retire

Real Time Sensor Network

History / Archiving

Future

Present

Past

Mobile

Stationary

. . . New Opportunities

Integration of Time

- **Extended Data Model**

- **Tools for Manipulation**
  - **Query**
  - **Change Analysis**
  - **Iterative Processing**
  - **Visualization**
    - **Animation**
    - **Charting**
  - **Tracking Analysis**

Monthly Global Temperature 2050-2055
CCSM Scenario A1B-Run 5

. . . New Ways to Manage, Analyze & Visualize Geography

Animation in All Applications
Visualizing Change Over Space & Time

- ArcMap
- Charts
- ArcScene
- Globe

. . . Communicating Patterns, Relationships & Processes
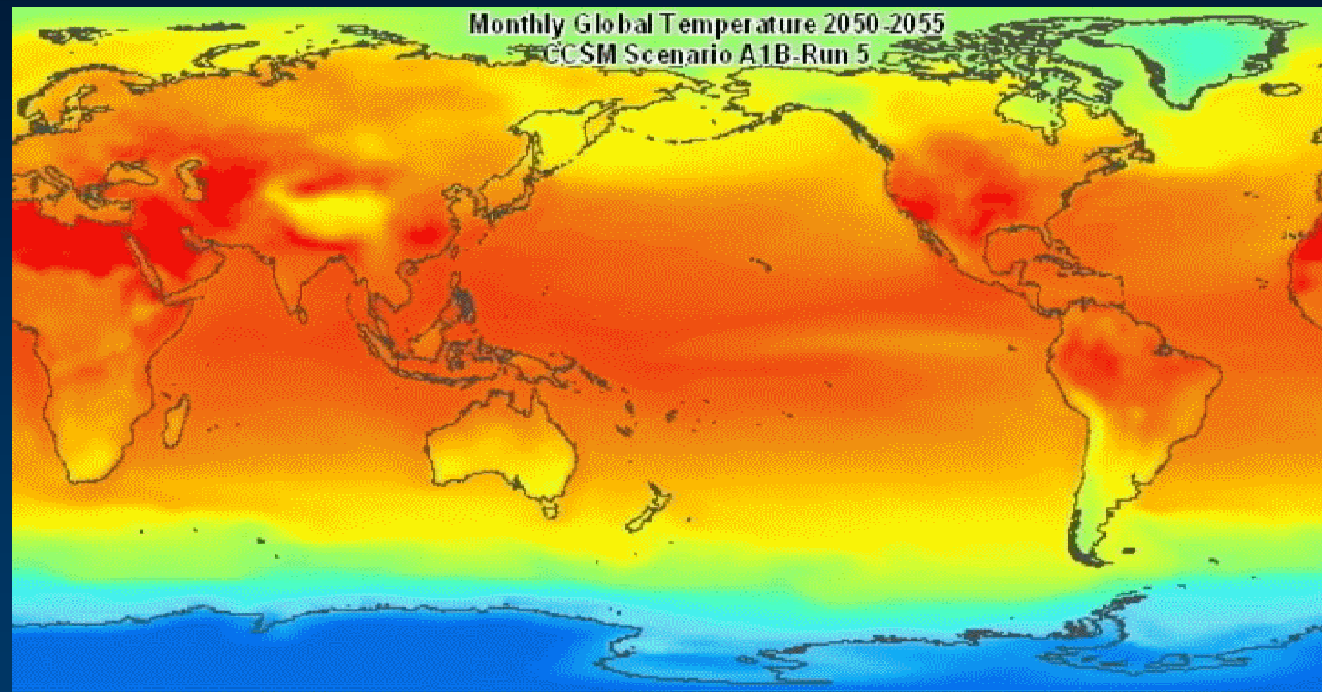
Interoperability Support
Ensuring an Open Platform

Support for OGC Standards

ArcGIS Desktop

9.0   9.2

| WMS | WFS | WCS |

GML – Level 0

9.0   9.2

| WMS | WFS | WCS | Catalog |

ArcIMS / ArcGIS Server

Simple Feature
Standard
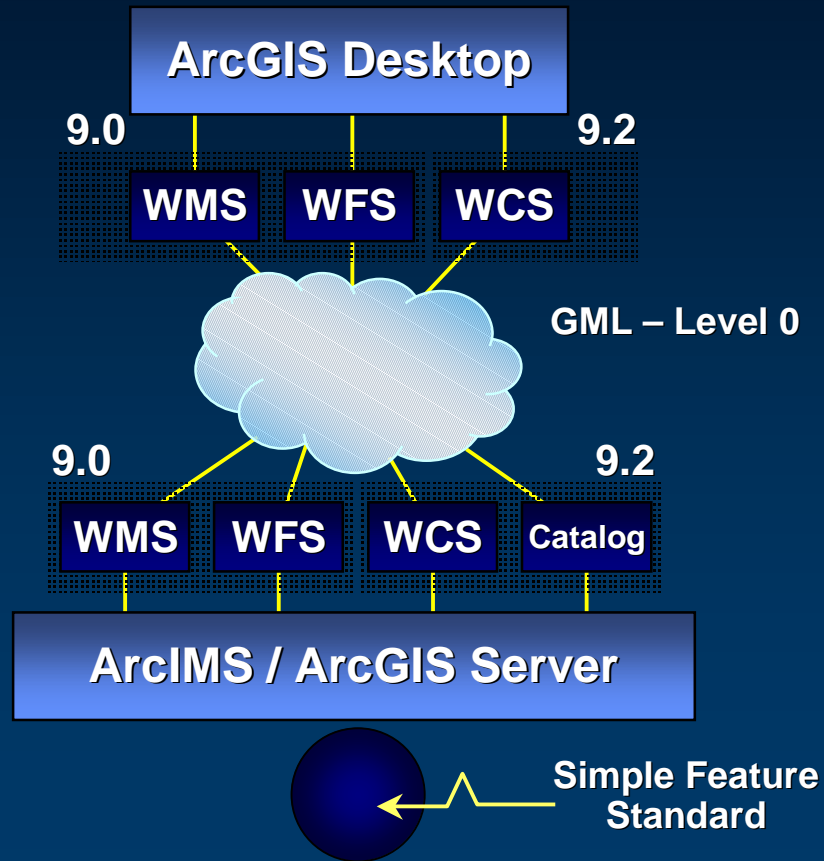
Data Interoperability Extension
New Data Sources & Converters

Direct Read & Use

Supports Complex Data Transformation

Integrated with ModelBuilder

- Formats
- Data Models
- Schema
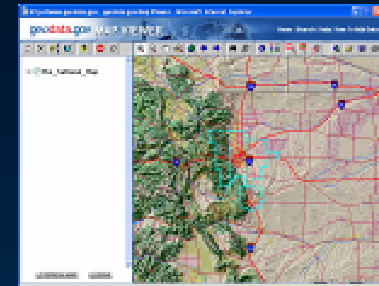- Projections / Datum

Support for OGC Standards
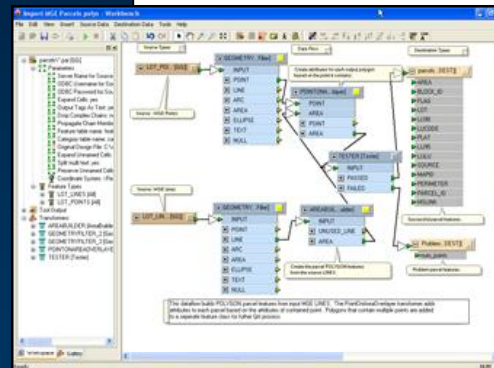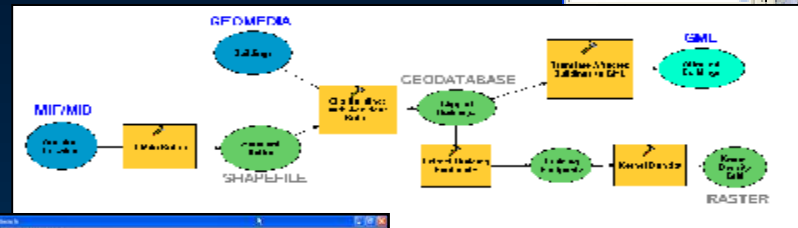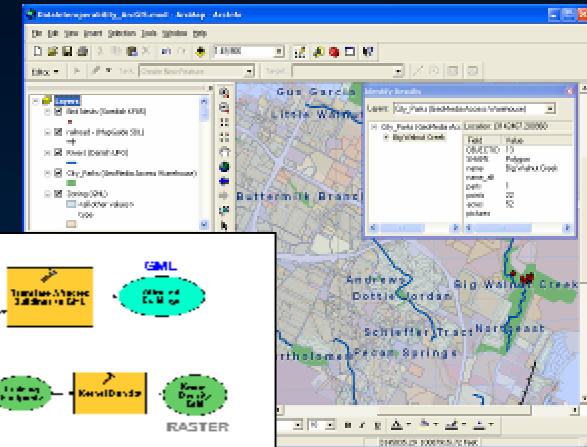
Creating Custom Format Converters

In Katrina the ETL Process was Employed
to Create an Integrated Database

Integrating Existing Local, State And Federal Data
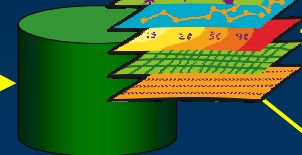

National
Data Model

Data Sets
- Local Gov
- State Gov
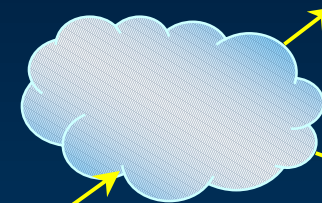- Federal Gov
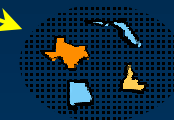- Commercial

Spatial ETL
- Transformation
- Conversion
- Integration

Database
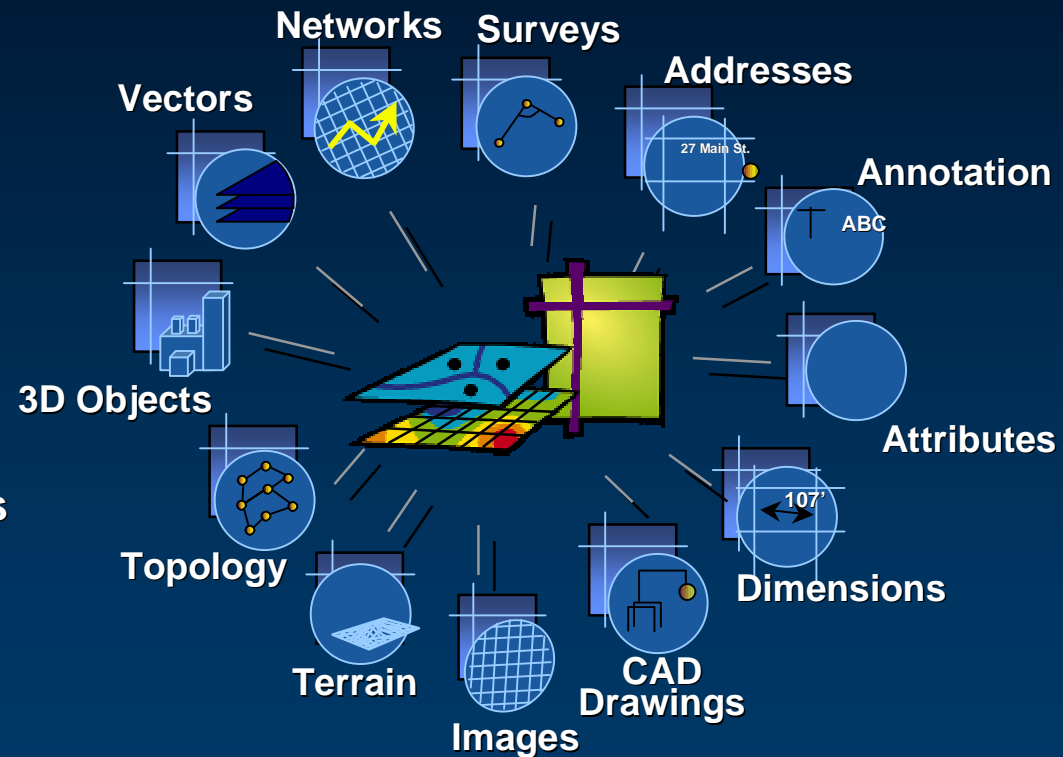& Server

Data & Services

Data Bricks

DVD Data Sets

. . . A Possible Model for National GIS
. . . Bringing Many Benefits

Improving Geo Data Management
Extending and Simplifying the Geodatabase

- **Data Modeling**
- **File and Work Group Geodatabase**
- **Simplified Administration**
- **Distributed Data Management**
- **Spatial SQL**
- **History / Archiving**
- **Non Version Editing**
- **High Precision Coordinates**

Geodatabases Model and Manages All Geographic Data Types

Networks   Surveys
Vectors   Addresses
27 Main St.
Annotation
ABC
Attributes
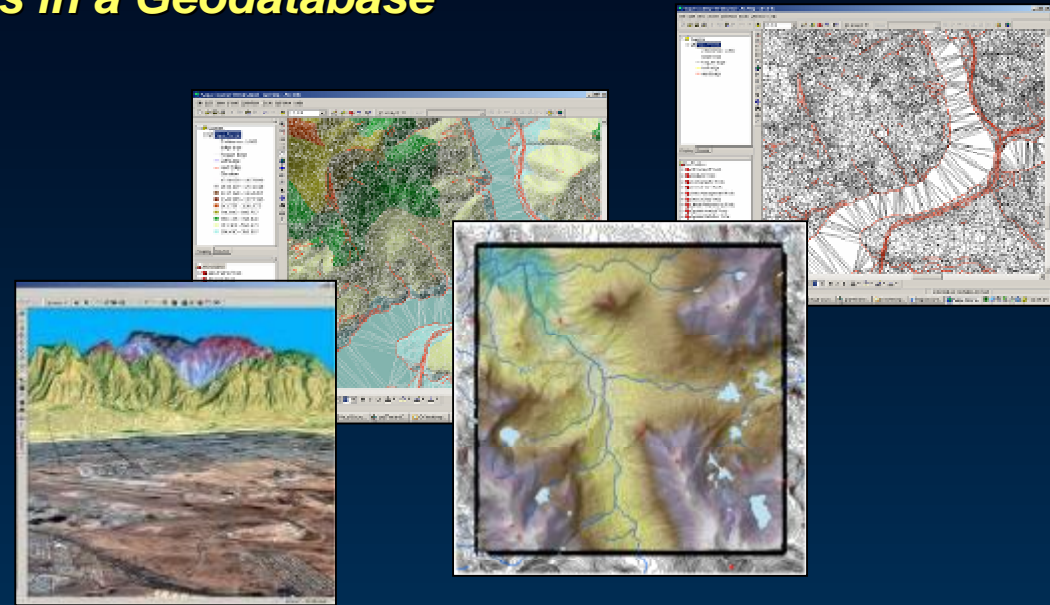3D Objects
107'
Dimensions
Topology
CAD Drawings
Terrain
Images

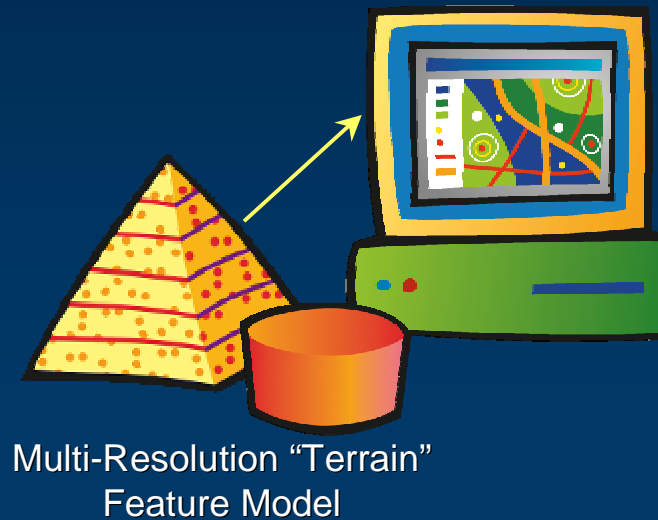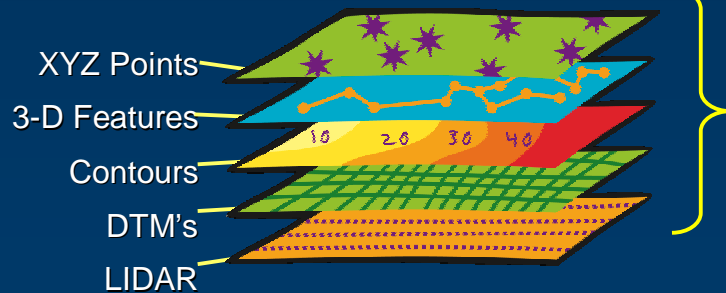*Reflecting Various Sciences, Technology, and Methods For Spatial Measurement*

Managing Terrain Surfaces
Multi-resolution Terrain Surfaces in a Geodatabase

- Very Large Data Sets (Billions of Points)
- Fast

Integrates All 3-D Data

- XYZ Points
- 3-D Features
- Contours
- DTM's
- LIDAR

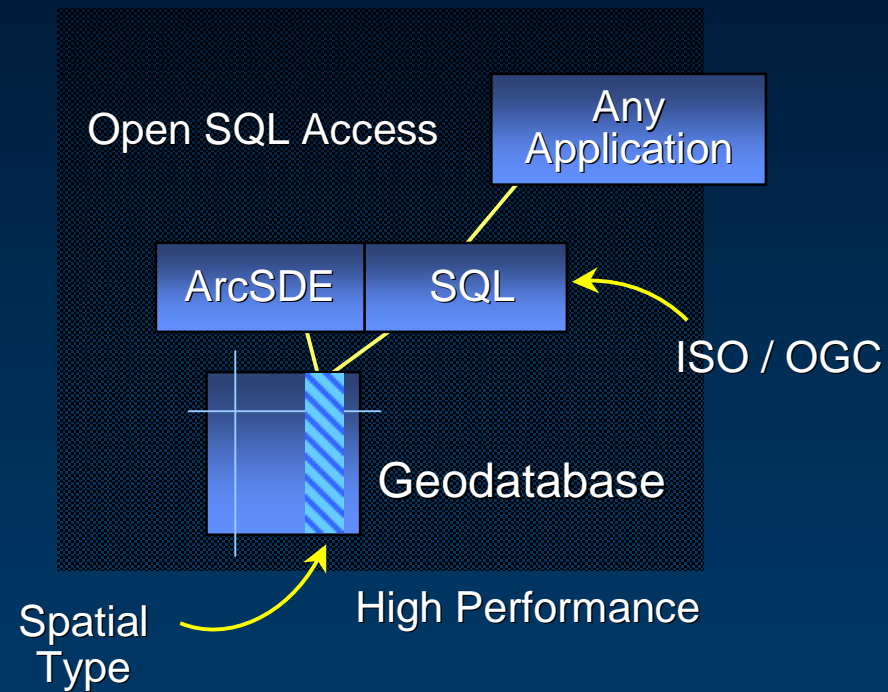Multi-Resolution "Terrain" Feature Model

Supports
- Contouring
- Hillshade
- Field of View
- Line of Sight
  - Slope
  - Solar

Extended Geodatabase Management
Support for Simple Database Access

Open SQL Access

Any Application

ArcSDE | SQL

ISO / OGC

Geodatabase
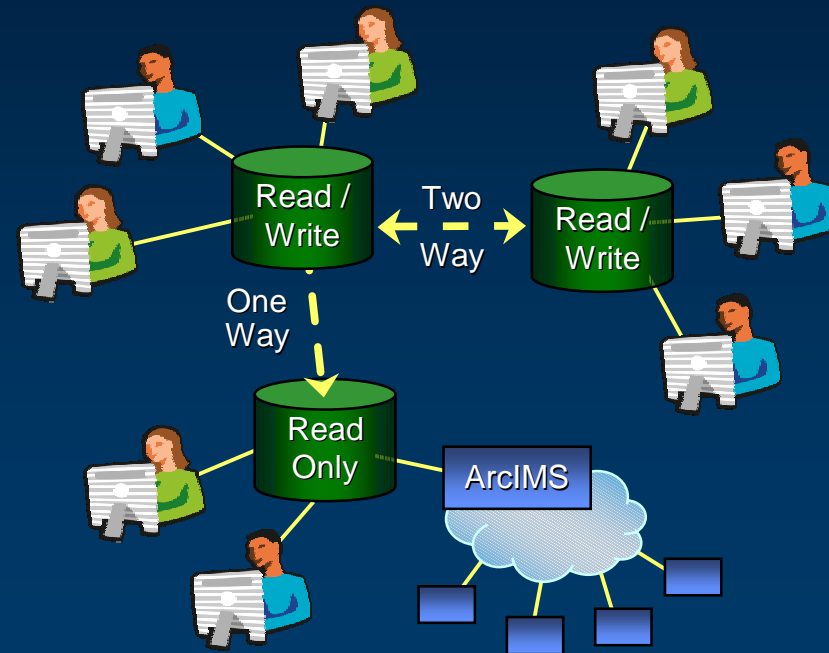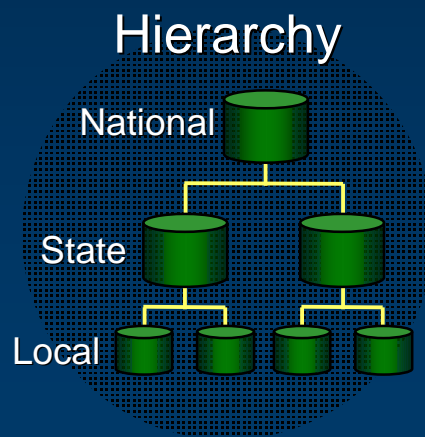
Spatial Type

High Performance

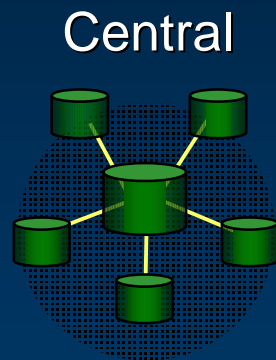# Managing Distributed Data
Replication of Geographic Information

- – Change Only Updates
- – Synchronized Periodically
- – Works on the Web or Courier

Supports
- Collaborating Agencies
- Co-Data Producers
- Central & Regional Offices
- Mobile Units

Central

Hierarchy

National

State

Local

Read / Write

Two Way
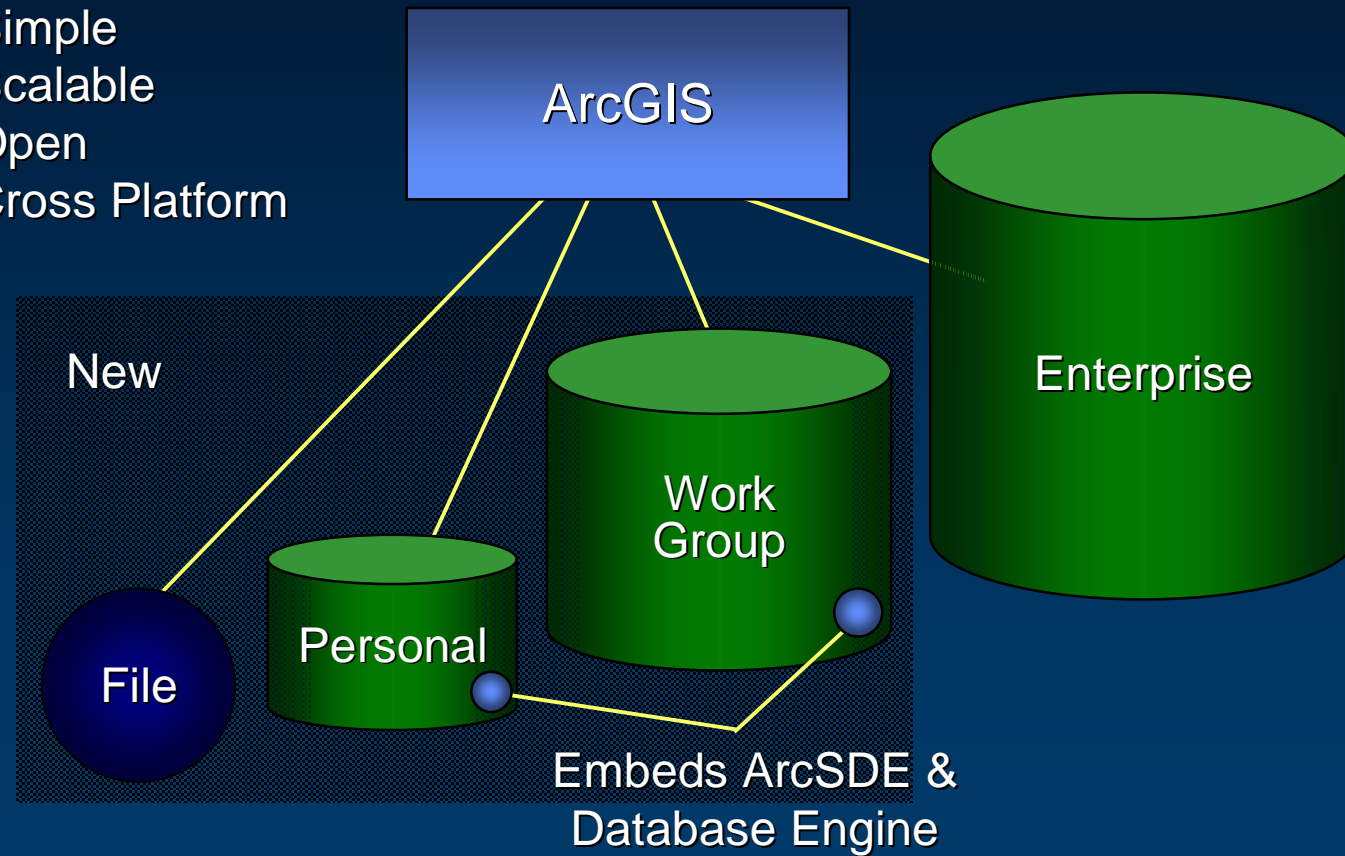
Read / Write

One Way

Read Only

ArcIMS

. . . Key Technology For GeoWeb

Simplifying Geodatabases
New Support for File, Personal and Work Group Geodatabase

- Fast
- Simple
- Scalable
- Open
- Cross Platform

ArcGIS

New

File

Personal

Work Group

Enterprise

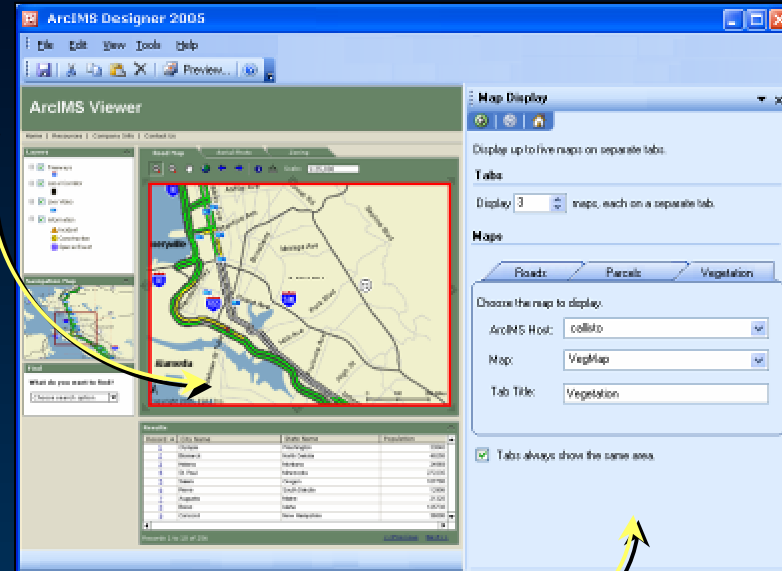Embeds ArcSDE & Database Engine

ArcIMS 9.2 — A Major Release
Mapping, Data Sharing & Catalog Services

Many Improvements
- Install / Administration
- Performance
- New Viewer / Designer
- Modernized .NET and Java Integration
- Quality
- OGC Support
- Extensions

Viewer

Designer

Geoportal Tool Kit

ArcIMS

Mapping

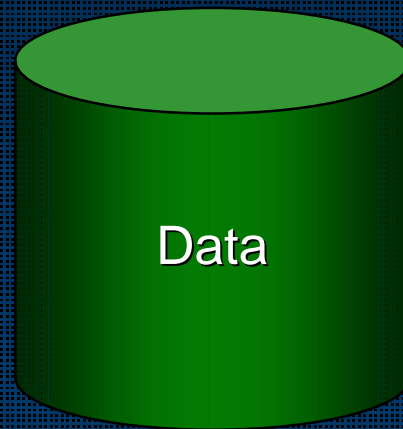Data

Metadata

Routing

Data Delivery

ArcMap
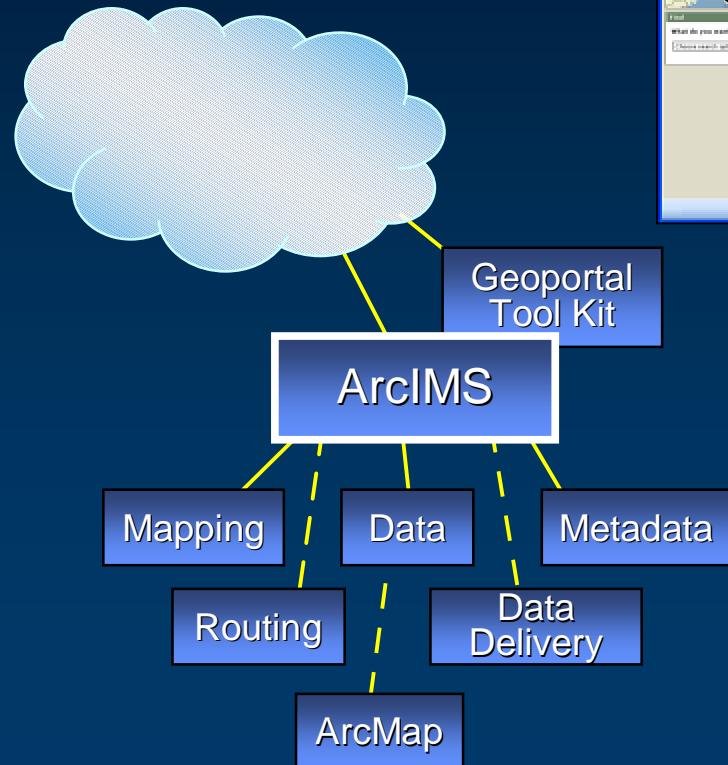
Integration with ArcGIS

ArcGIS Server
Server Based GIS

New Approach for Deploying GIS

Data and Analysis
On the Server

Data

Map

Globe

Geoprocessing

Routing

Tracking

Database
Management

Write your own
Service

ArcGIS Server
Server Based GIS

Enterprise Application

Supports

Smart Clients

Web Services

GIS Server

Web Clients

Mobile Clients

Supports

- Web Browser
- Mobile Devices
- Smart Clients
- Open Web Service
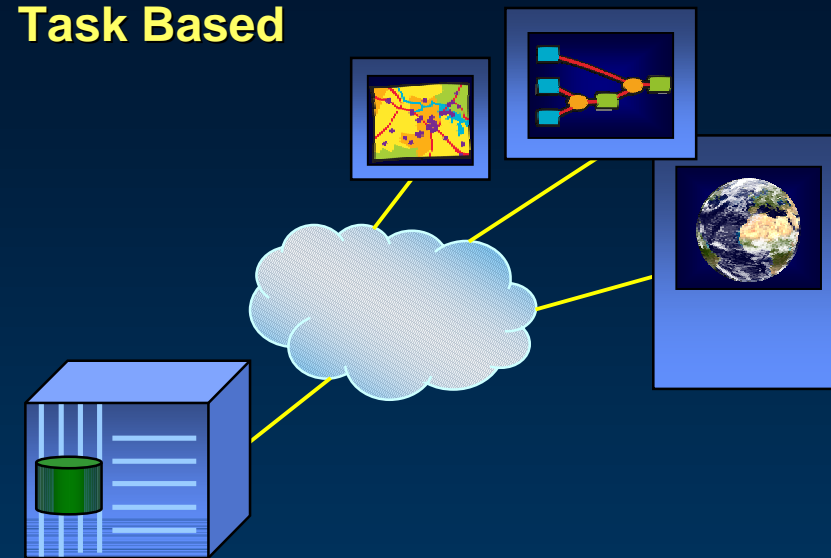- Enterprise Application Integration
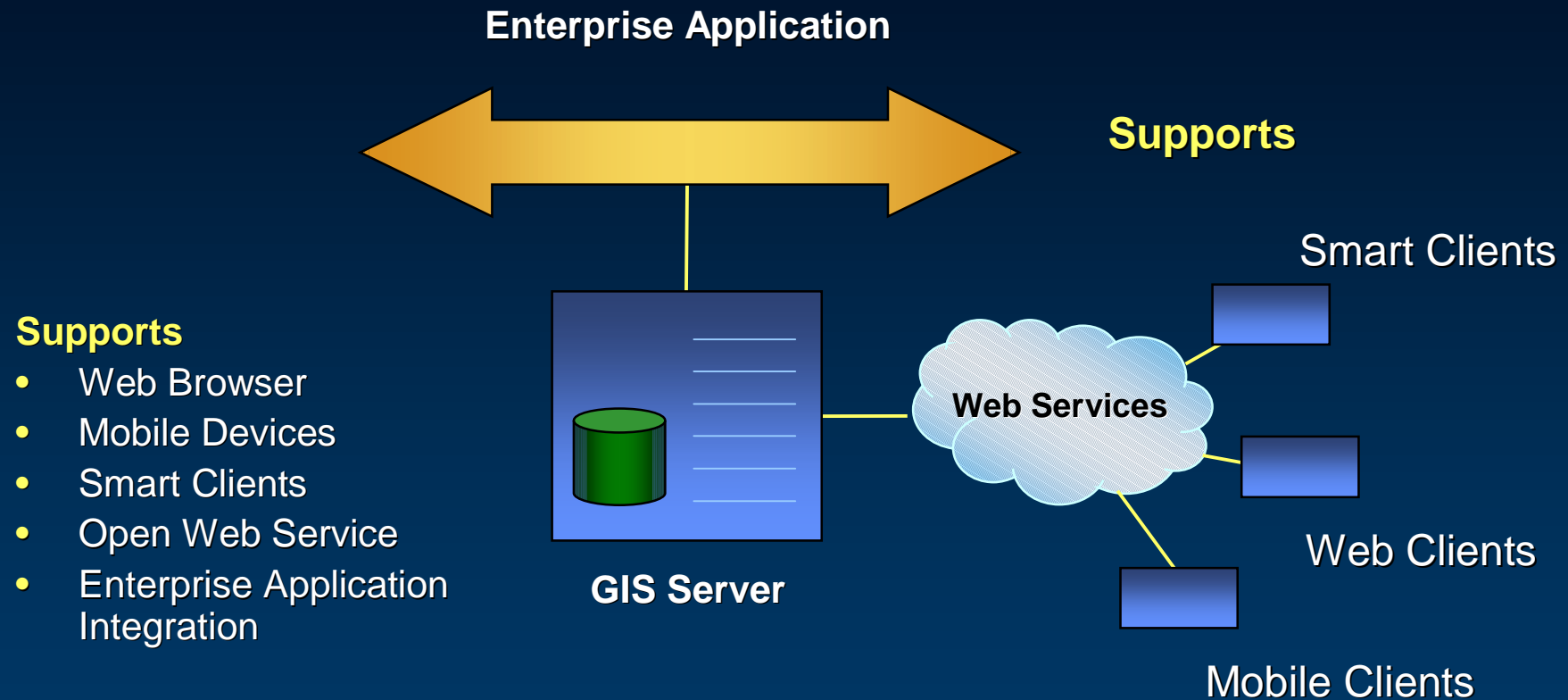
. . . Centralized GIS Development and Processing

GIS Server Supports ArcGIS Explorer
Simple, Fast and Free 3D Viewer

Task Based

GIS Server

Services
- Maps / Globes
- Analysis Functions
- Data Fusion (Mash ups)

. . . Making it Easy to Access, Fuse, Analyze and Visualize Geospatial Data
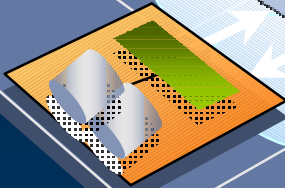
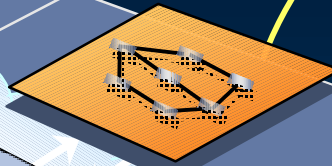# ArcGIS Server Can Be Integrated with Other Enterprise Systems

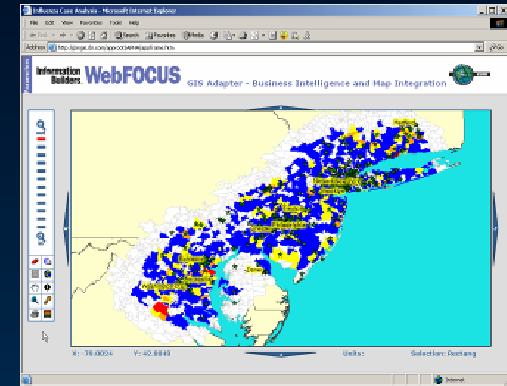*Public Health Information Disease Surveillance*

Web Services & Messaging

Application

Enterprise Service Bus

GIS Server

Other Enterprise Systems

. . . Open, Flexible and Standards Based

ArcGIS Server Provides A Framework For Integration

3-D Viewers

Mobile

COP

2-D Viewers

Presentation Tier (Any viewer)

Enterprise Service Bus

Metadata Catalog Services	Globe Services	Map & Chart Services	Geo-Processing Services	Image-Processing Services	Open Web Services	Tracking & RSS Services

Serving/ Publishing Tier

3 Tiers

Authoring Tier
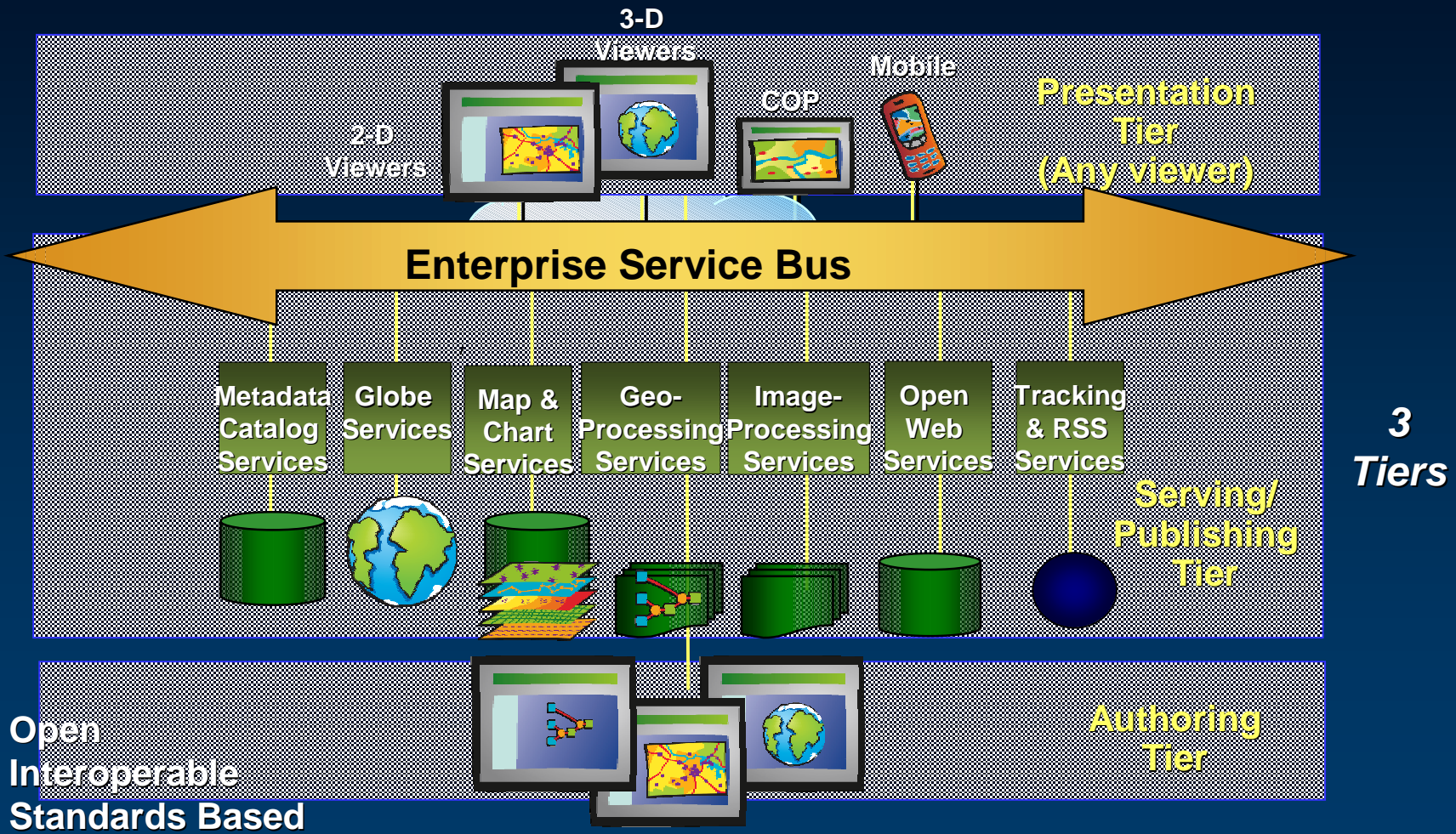
- Open
- Interoperable
- Standards Based
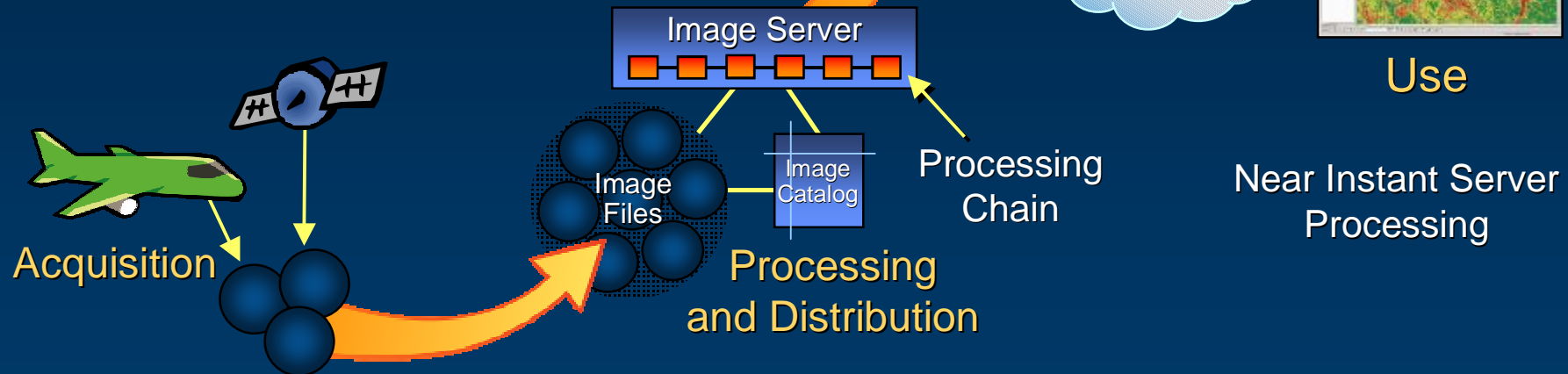
. . . And Integrates With Standard IT Infrastructure

Image Server Expands GIS Server Strategy
New Paradigm for Processing and Serving Geoimagery

On-the-Fly

- Georeferencing
- Ortho Rectification
- Pan Sharpening
- Mosaicing
- . . .

Any Desktop Client
(GIS / CAD / Imaging Processing / Web)

Use

Image Server

Image Files

Image Catalog

Processing Chain

Near Instant Server Processing

Acquisition
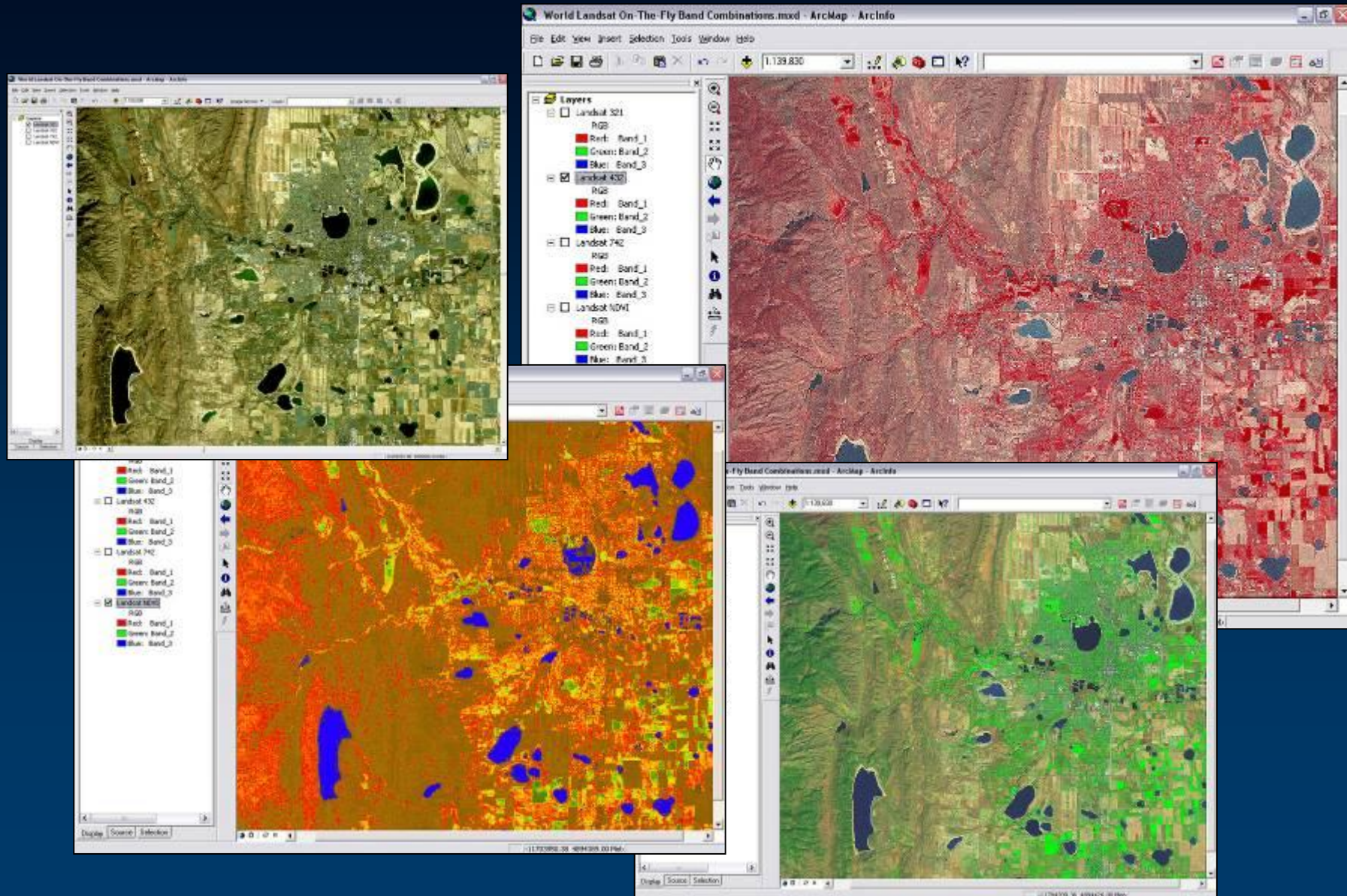
Processing and Distribution

. . . Reduces Time Between Acquisition and Use
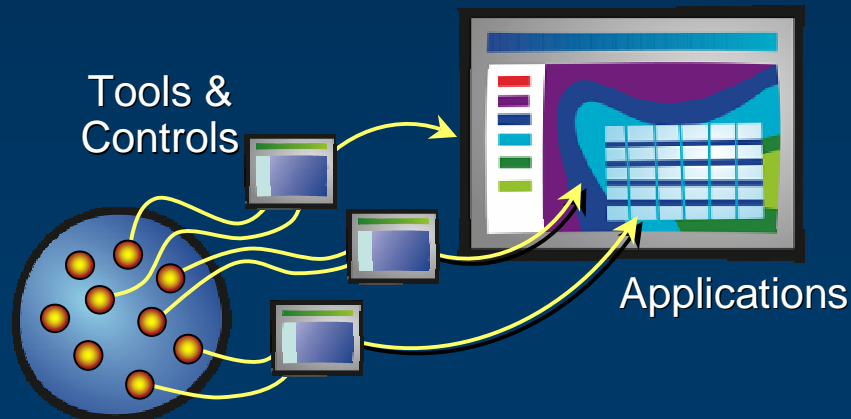
Image Server Visualization

Multiple Representations

ArcGIS Engine 9.2
GIS Components for Desktop Developers

- Hundreds of Tools
- All Desktop Extensions
- Many New Controls

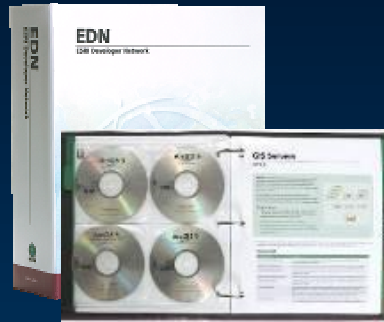Tools & Controls

Applications

. . . Embed GIS in Your Application
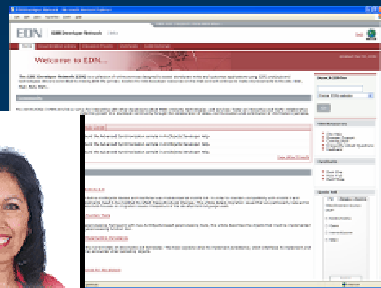
ESRI Developer Network (EDN)

Provides all ESRI Developer Technologies in a Simple Product

Web Support

- Developer Forums
- Technical Support
- SDK Updates
- Help
- Samples

Annual Developer Subscription

Software Library

- ArcSDE
- ArcIMS
- ArcGIS Server
- ArcGIS Engine
- ArcWeb Services

For Development, Testing and Demonstration

Mobile GIS Strategies

- ArcPad……………………………Complete Solution
- Mobile ADF……………………Focused Apps
- ArcWeb Services………………Hosted - LBS
- ArcGIS Engines………………...Desktop

ArcWeb - Hosted GIS Services

Building Web Applications Using Hosted Services

. . . On Demand Mapping and GIS

Three Types of Services
- *Public* - *Individuals, Public Service & Developers*
- *Commercial* - *Government & Business*
- *Hosted* - *Outsourced Application Hosting*

- Imagery
- Weather
- Geocoding
- Streets
- Mapping
- Routing
- Demographics
- Hazards
- Business locations
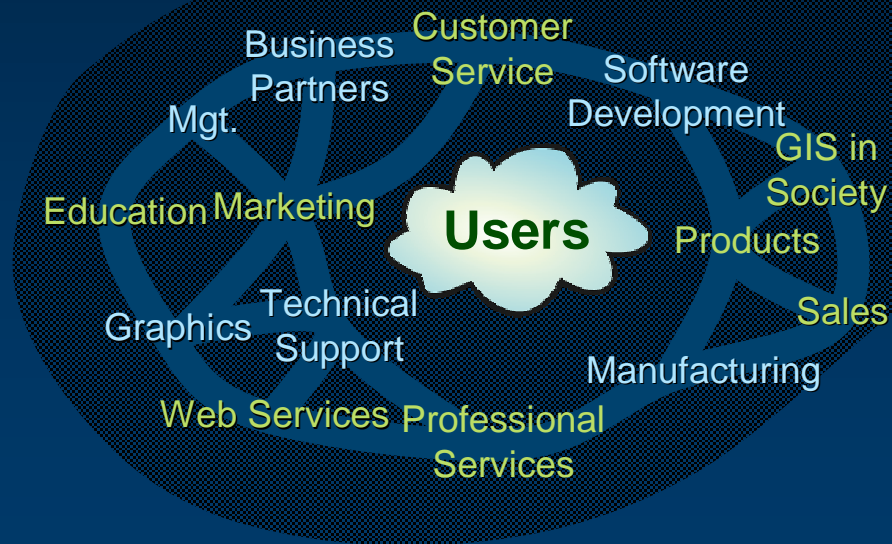- Traffic
- Hydrographic Maps
- Gazetteer
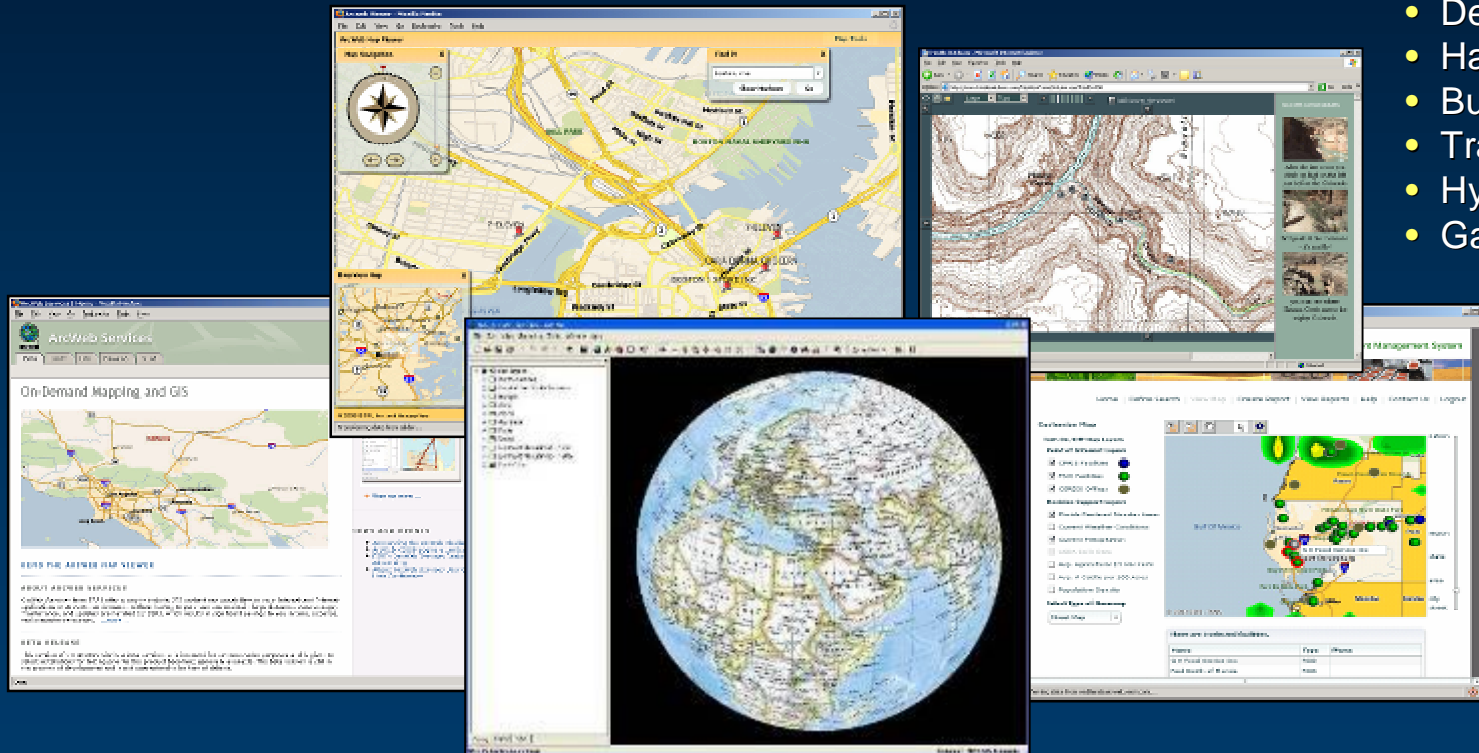
Hundreds of Successful Applications & Solutions

Our Work

- – Software
- – Education
- – Technical Support
- – Professional Services
- – Relationships
- – GIS in Society

Our Organization

A Global Network of Teams

Business Partners
Customer Service
Software Development
Mgt.
GIS in Society
Education
Marketing
Users
Products
Graphics
Technical Support
Sales
Manufacturing
Web Services
Professional Services

Supporting Your Work

Our Relationship with Our Users is Important

Business Partners
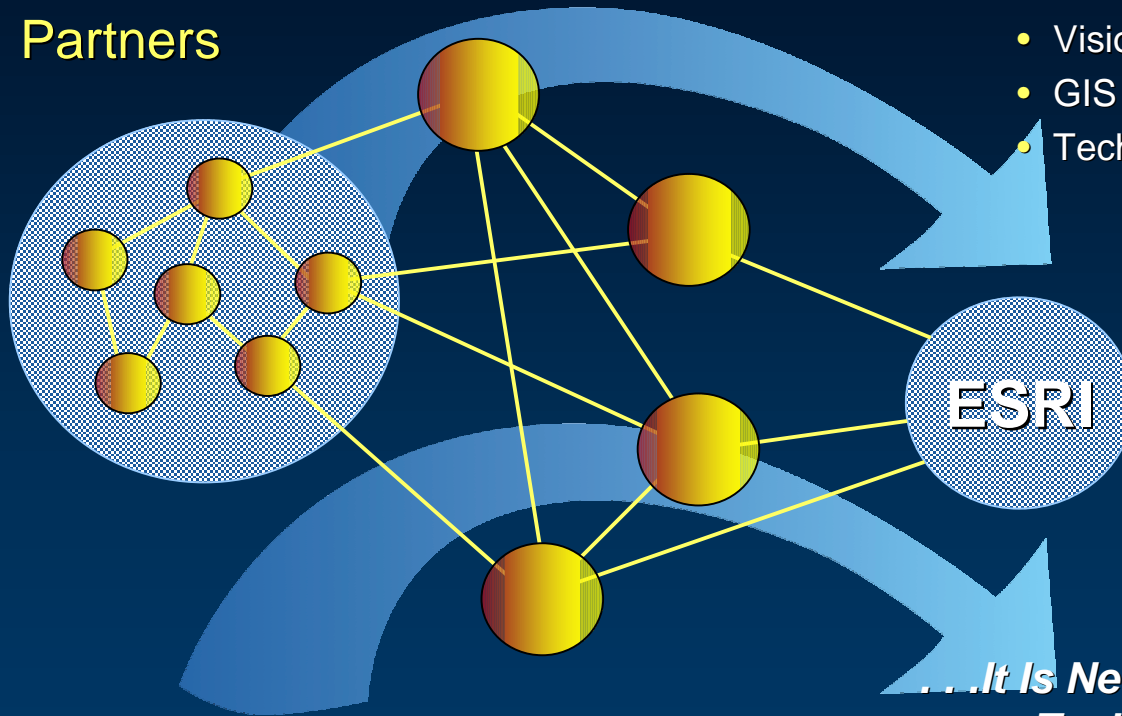
Understanding Their

- Vision, Mission & Requirements
- GIS Platform Needs
- Technology Challenges

ESRI

…..It Is Necessary For Improving Our Technology and How We Serve Many GIS Disciplines

Development based upon Feedback / Direction

Our World Needs Better Management

. . . More Rational Approach That Considers
& Integrates All the Factors . . .
. . . A Geographic Science Approach

gis helping manage our world

esri