ESRI technology in support of the Global Earth Observation System of Systems (GEOSS)

Nick Thomas
Environmental Industry Manager
ESRI Redlands

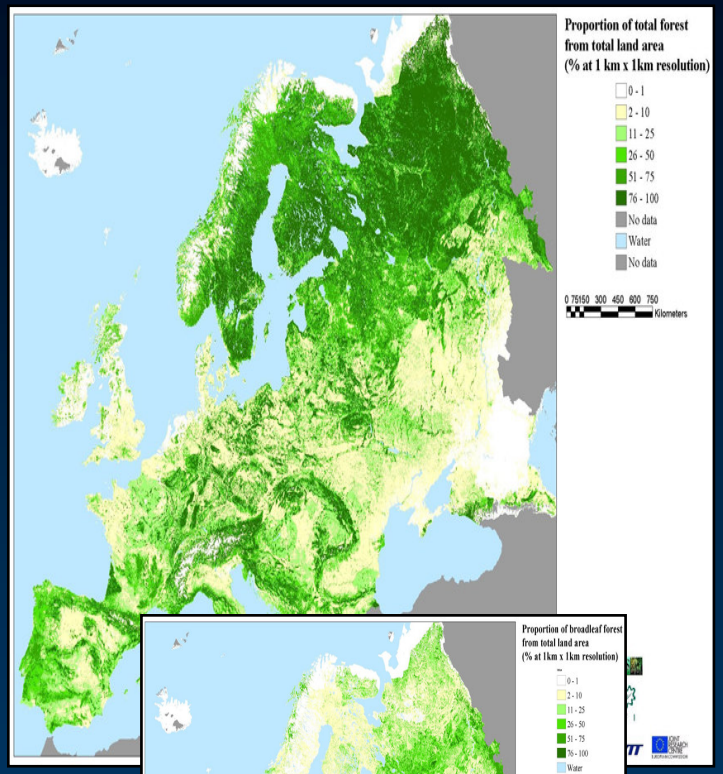
What exactly is GEOSS?

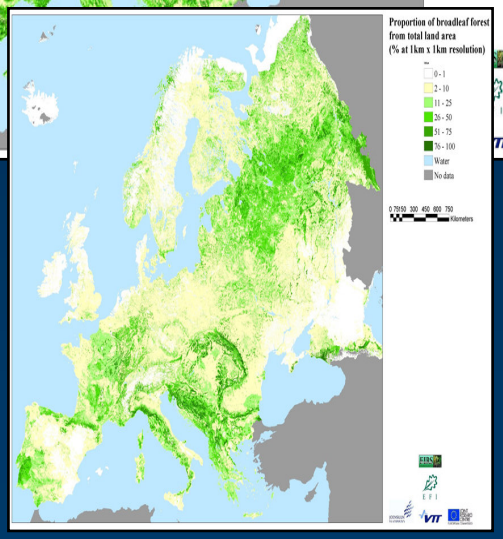
“GEOSS will provide a framework to collate and access environmental data which will be used to improve understanding of global environmental systems”.

A System that will include many types of spatial data for varied application areas.

Natural Resource Inventories

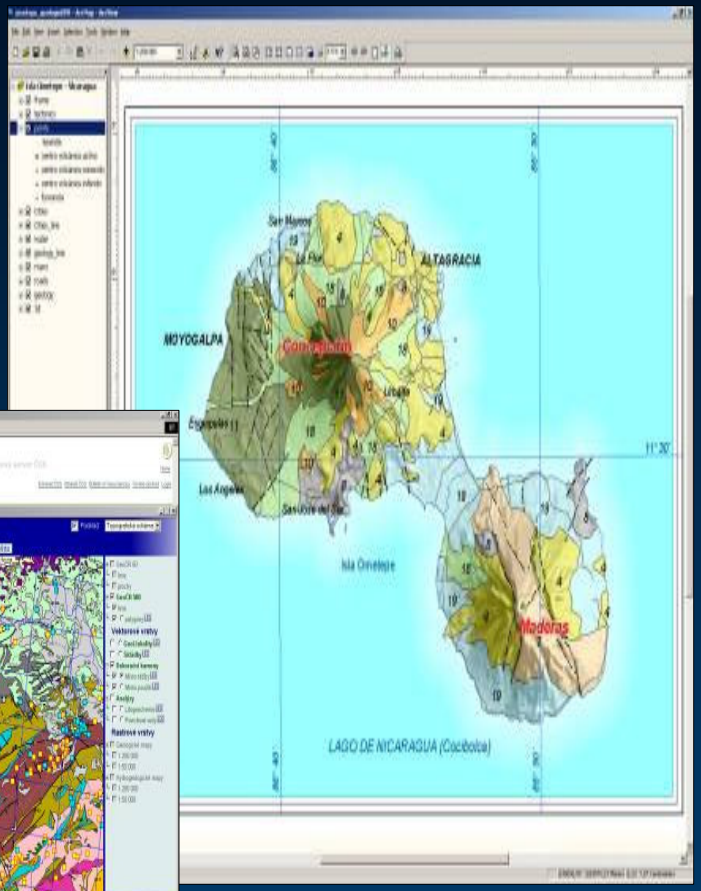
Forests



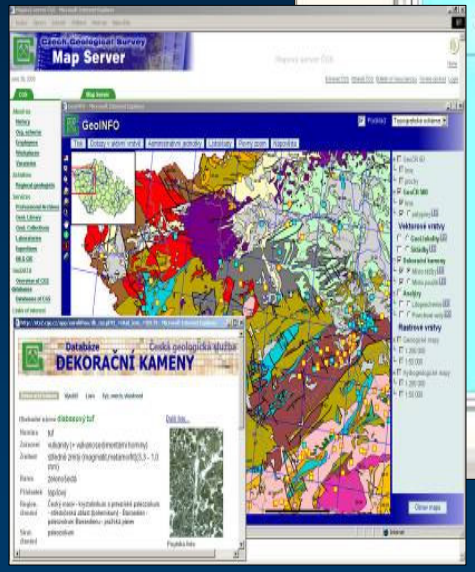


Europe

Geology

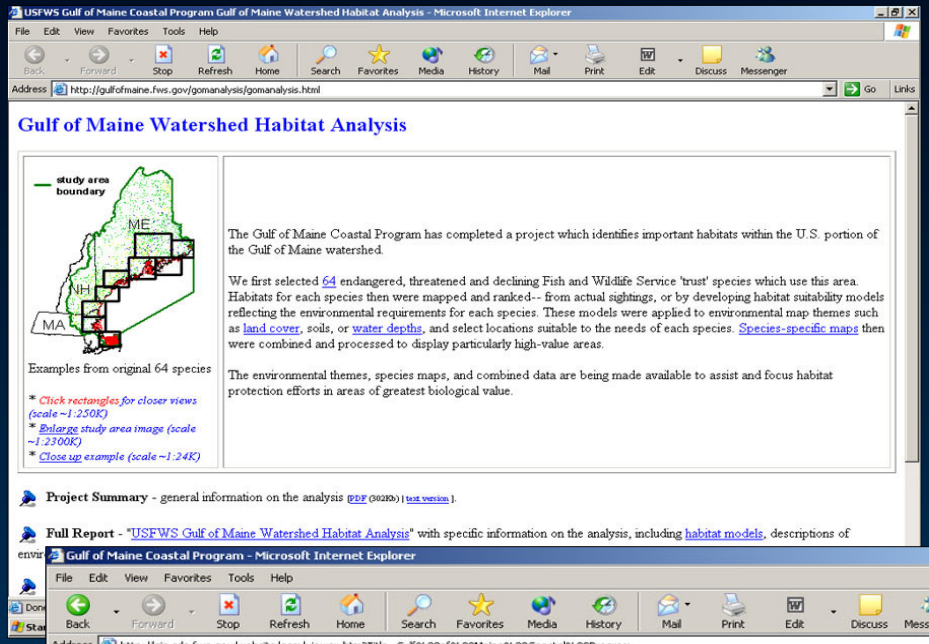


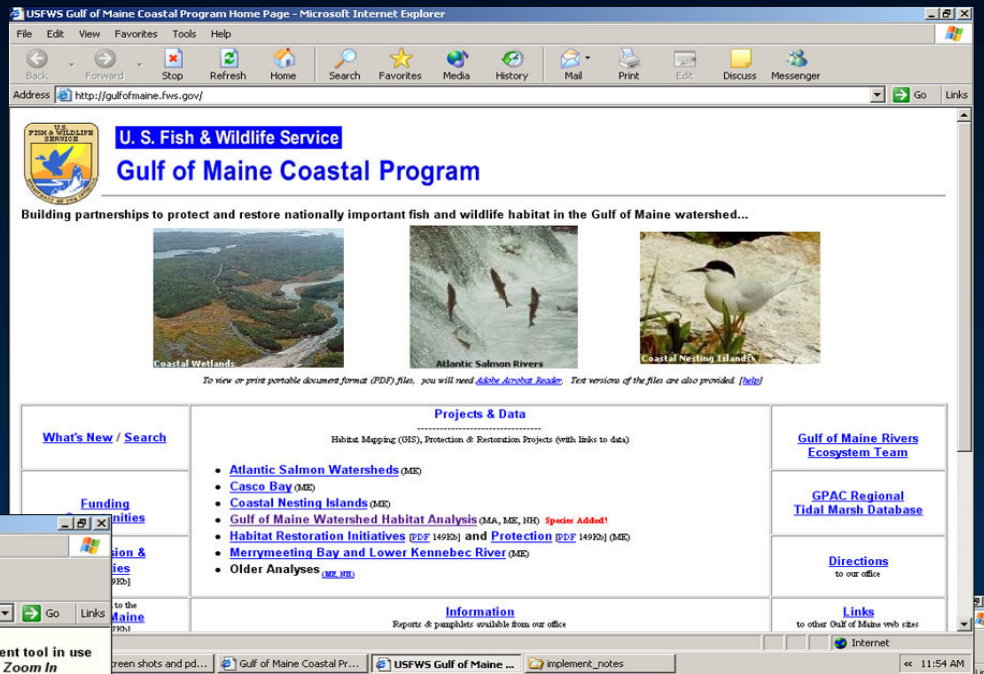
Nicaragua

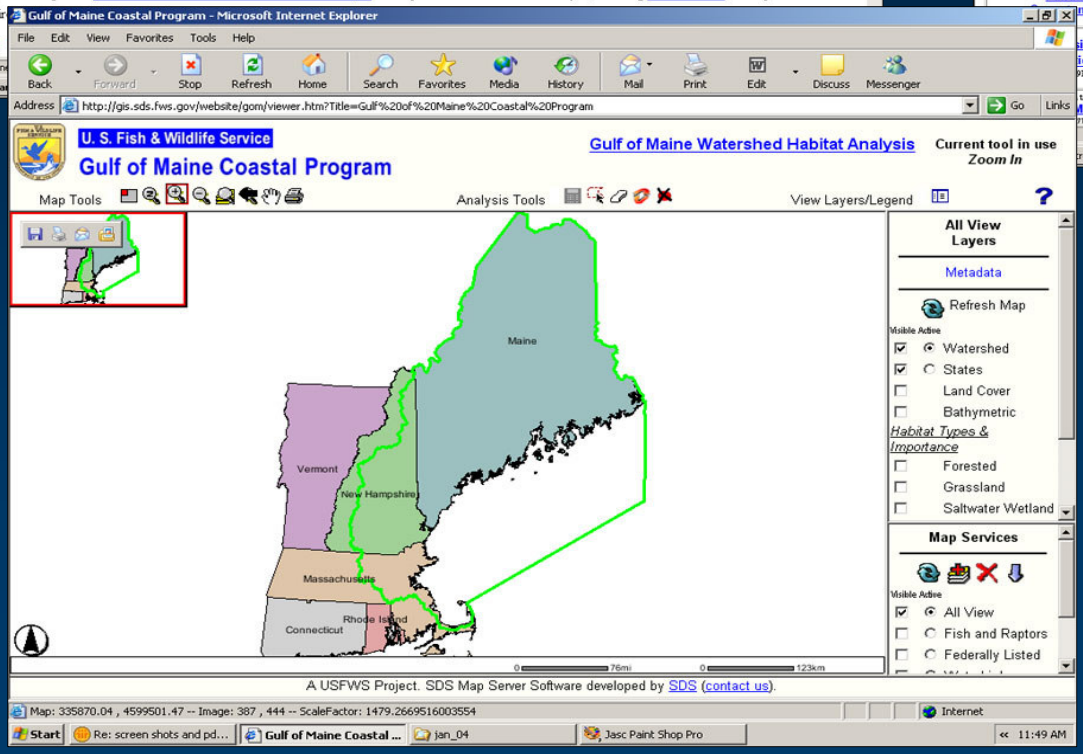


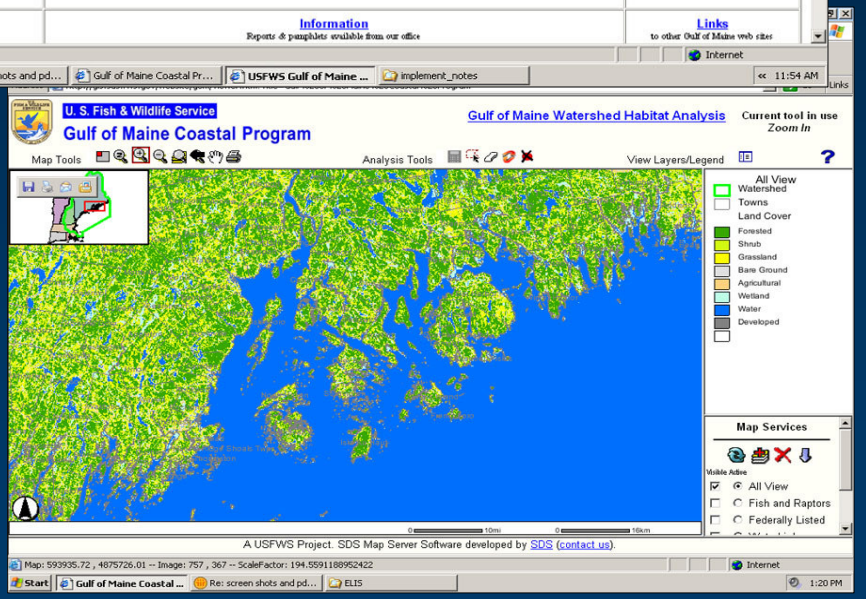
Czech Republic

Coastal Zone Management

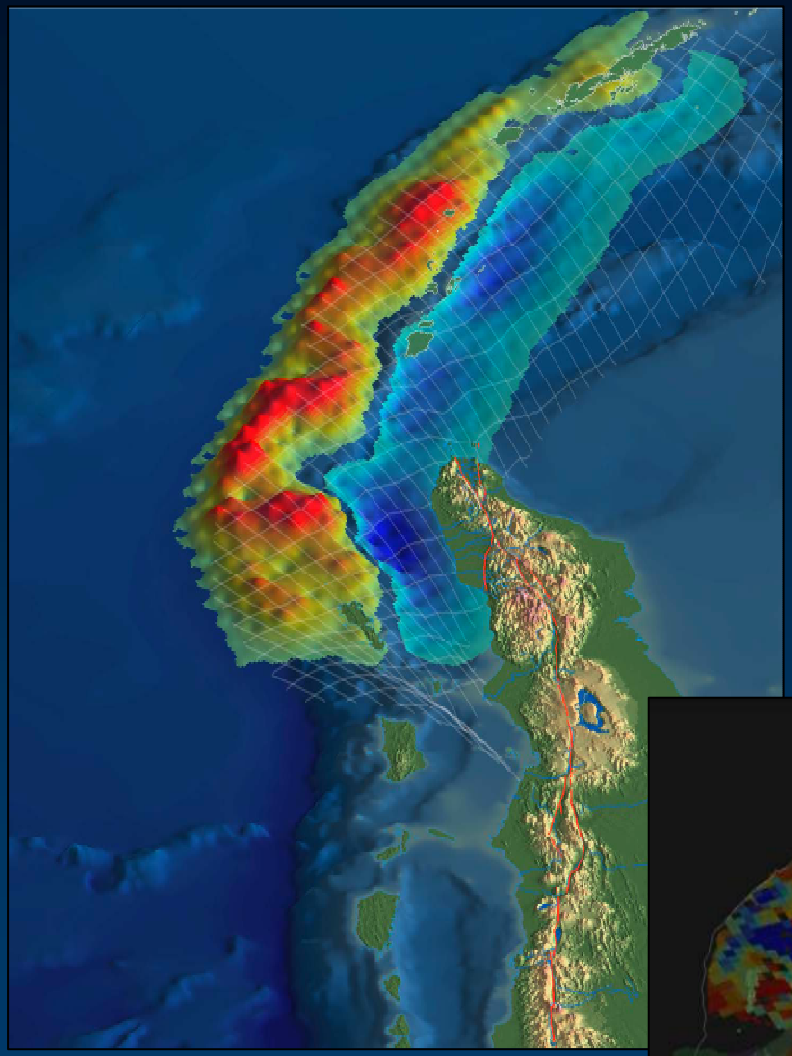




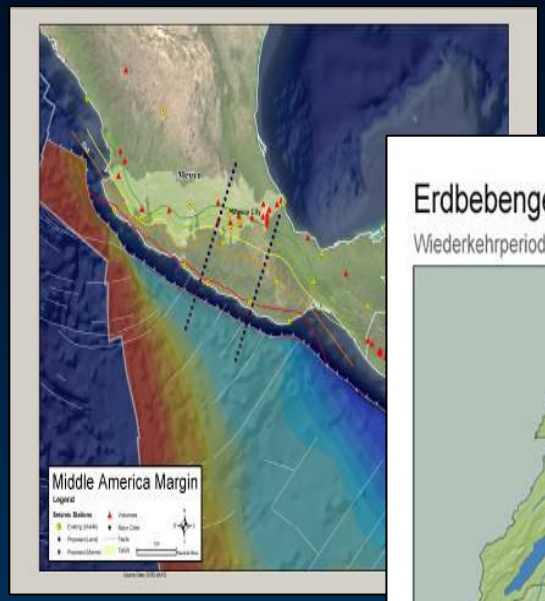




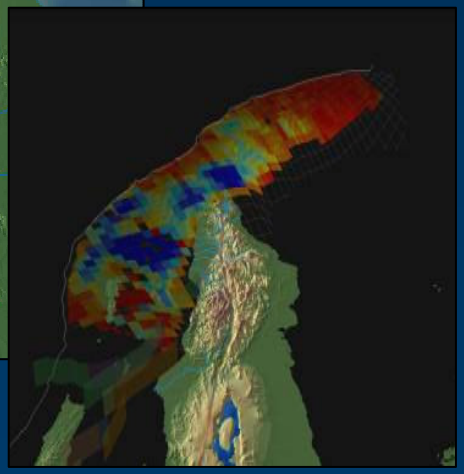
Earthquake Modeling and Visualization

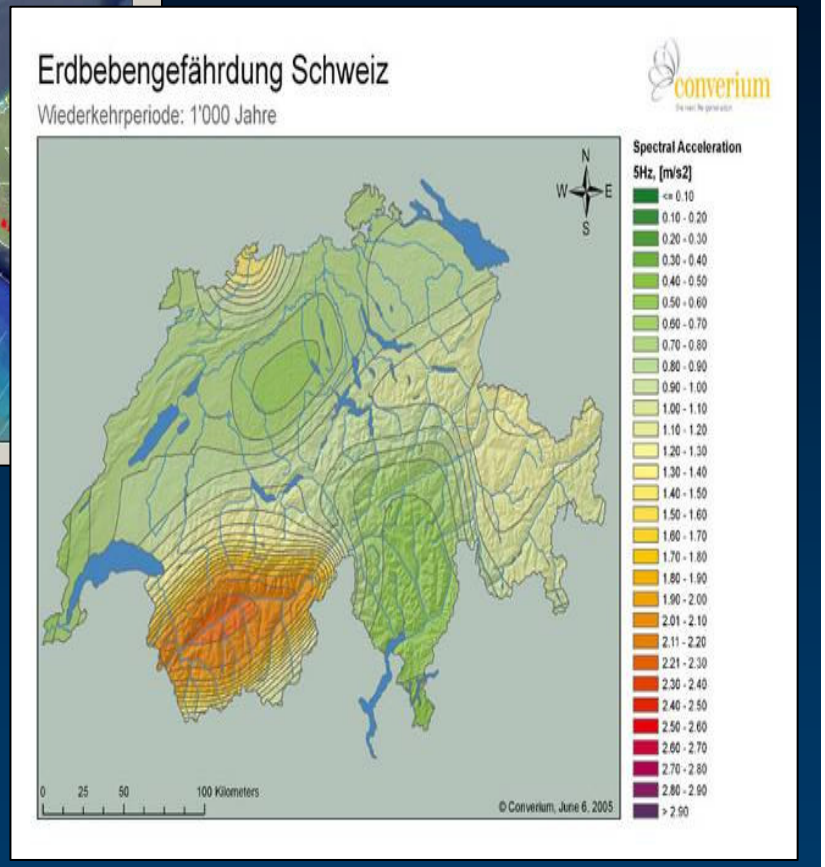


Indonesia



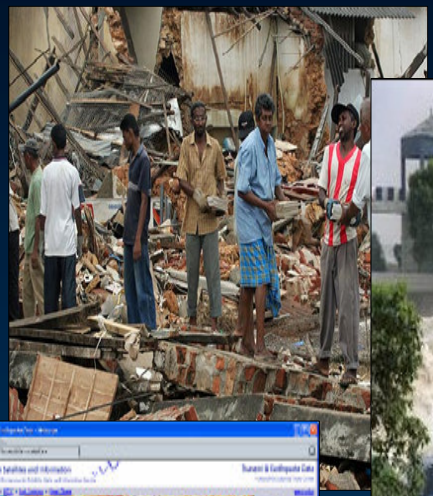
Mexico

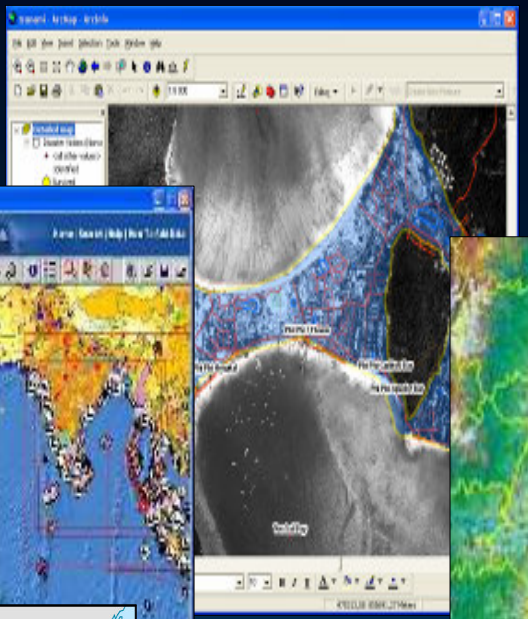


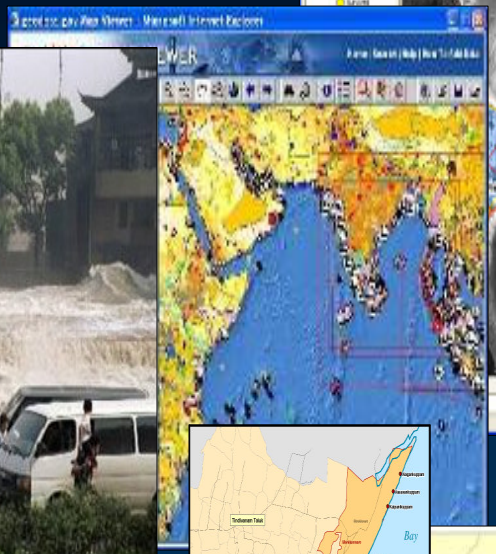


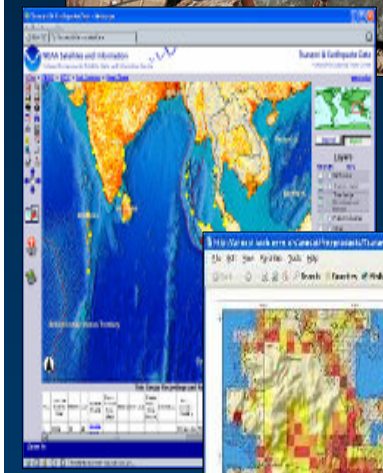
Switzerland

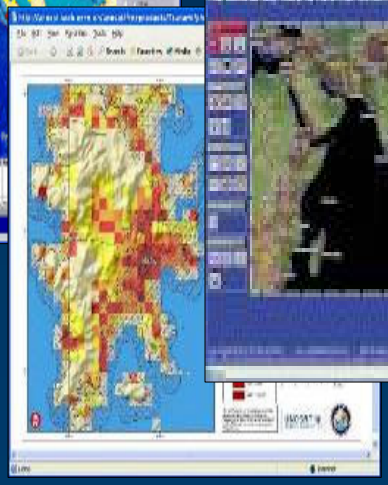
Managing Tsunami Disaster Relief

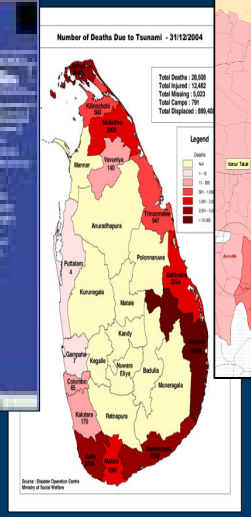


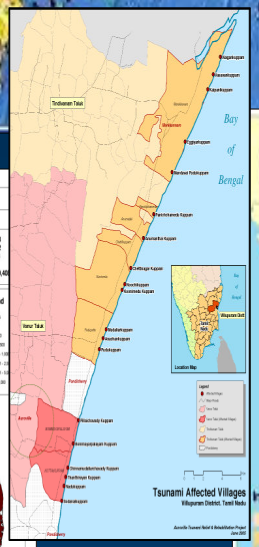


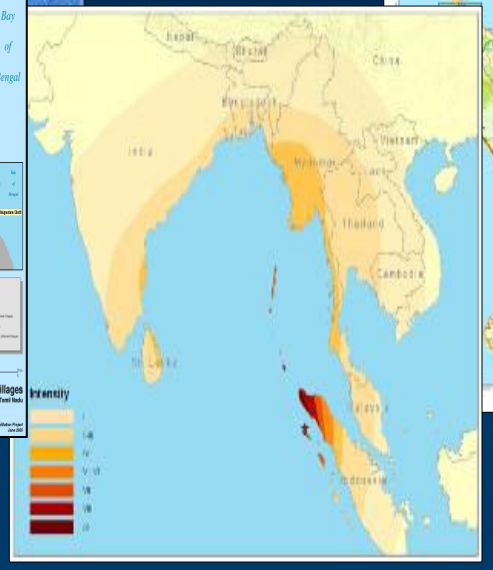








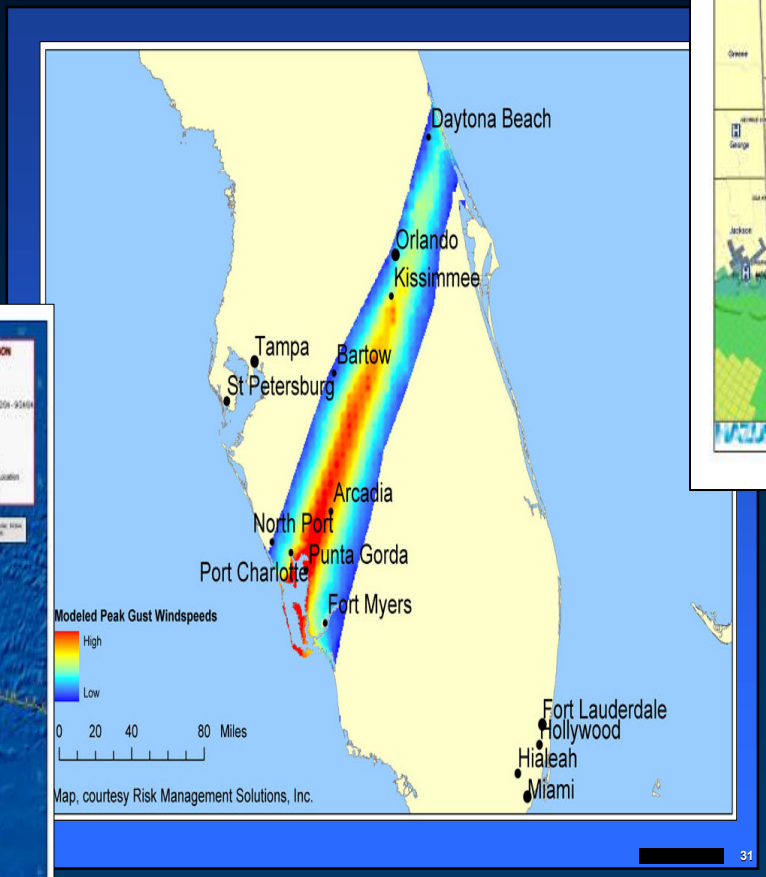




Many Participants

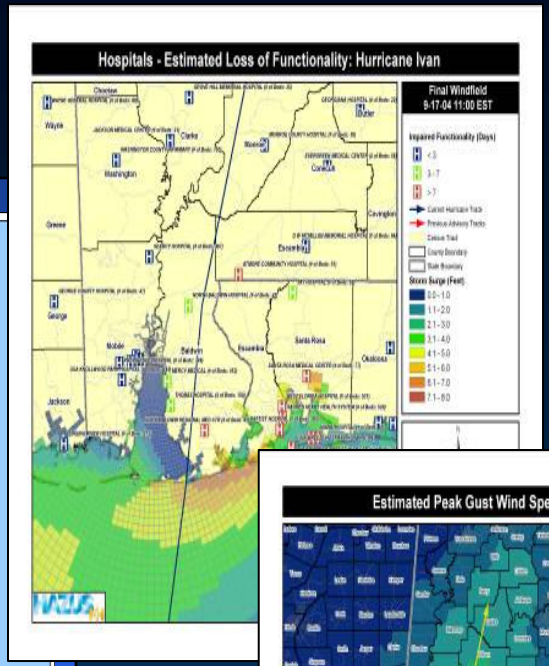
Hurricane Events

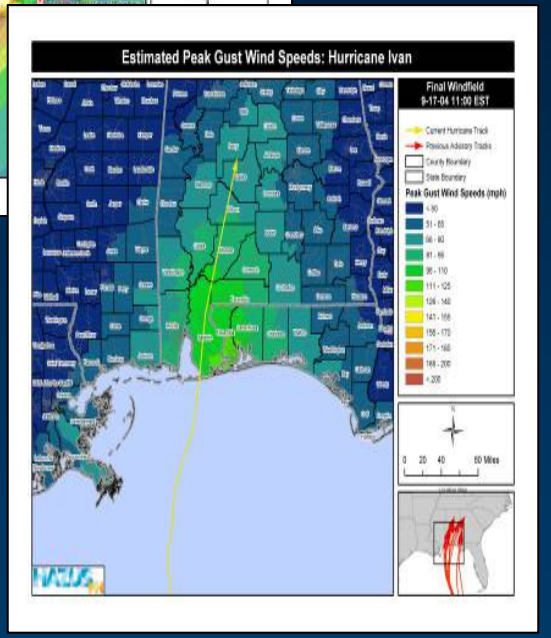
Modeling



Florida

Damage Assessment





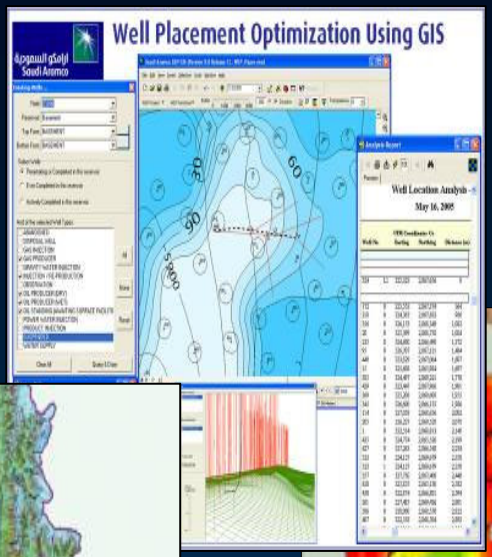
Alabama/Florida

Real Time Tracking

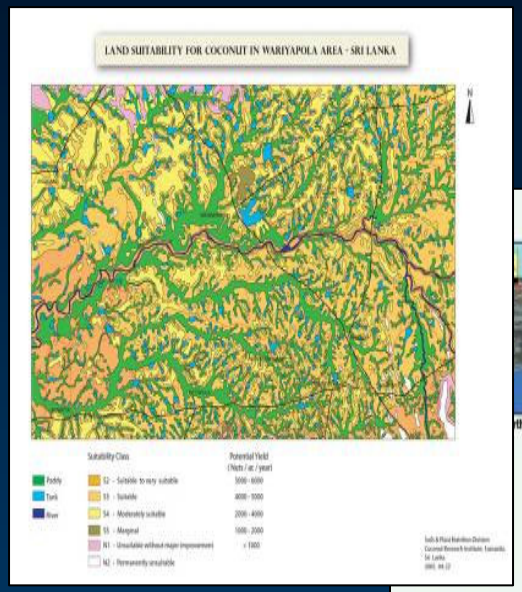
Caribbean

Suitability Modeling

Oil Well Placement Saudi Arabia

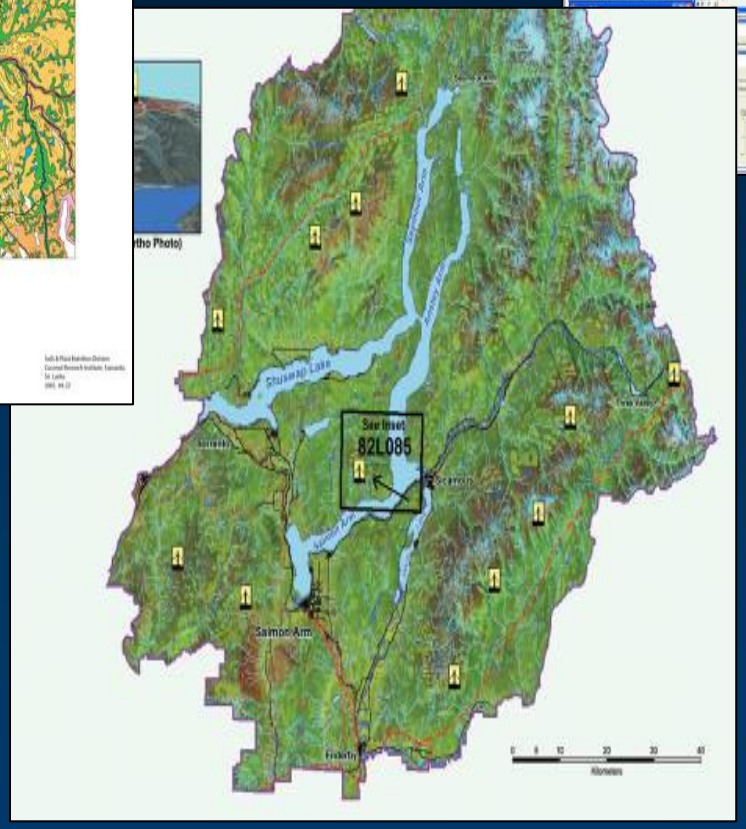


Agriculture



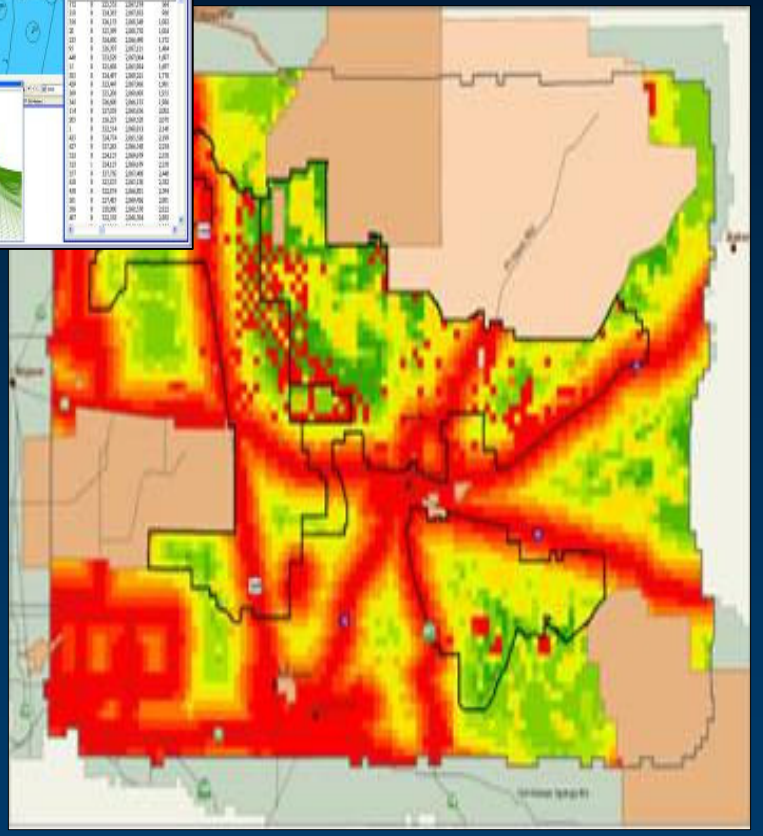
Sri Lanka

Wind Turbines



Canada

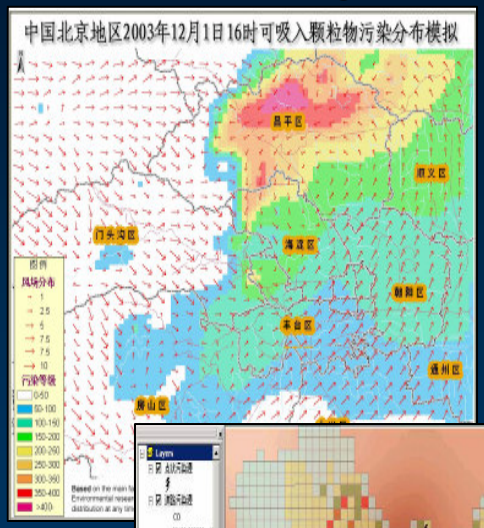
Desert Tortoise Habitats

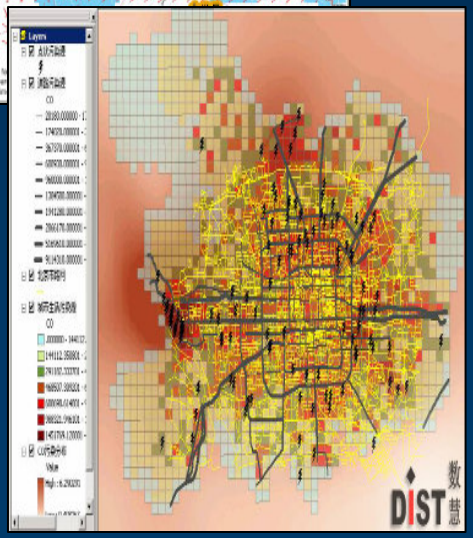


California

Human Health and the Environment

Air Pollution Modeling & Monitoring



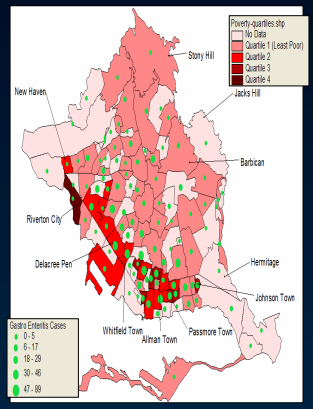


Beijing

EPA Citizen Access

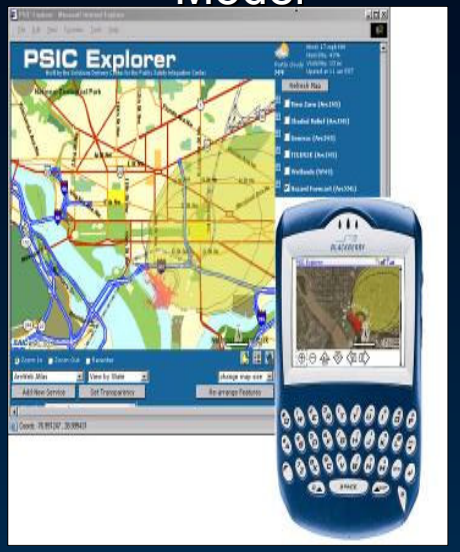
USA

Typhoid Epidemiology



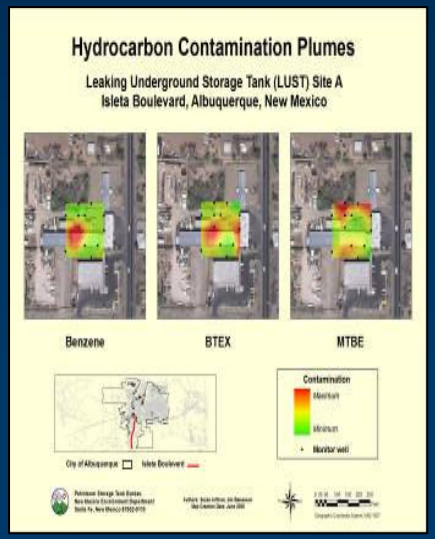
Jamaica

Web Based Diffusion Model



Washington D.C.

Contamination Plume

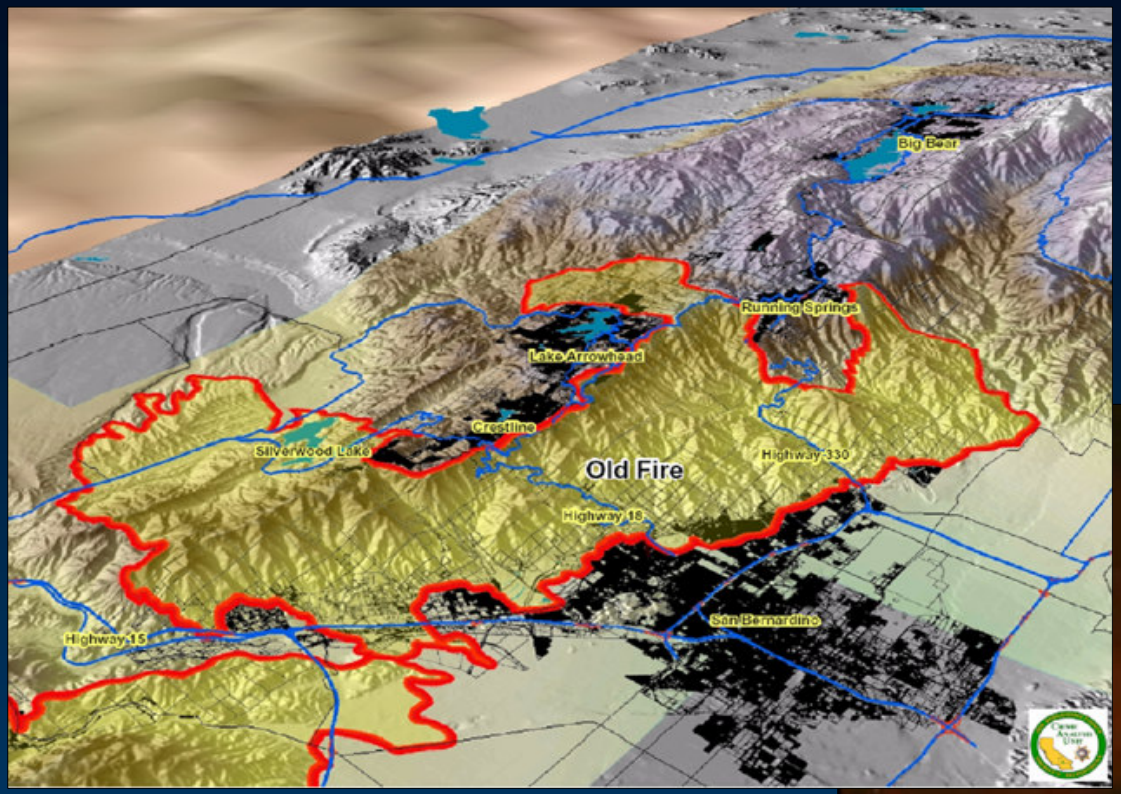


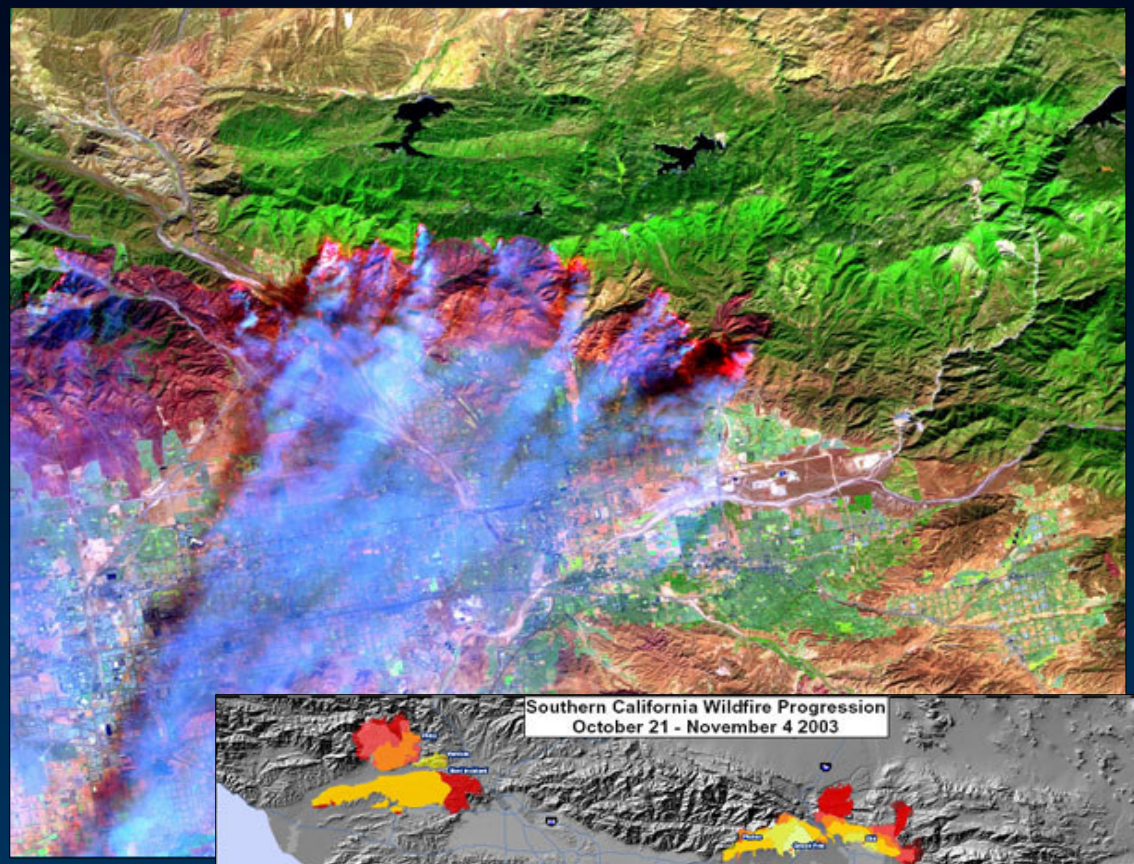
New Mexico

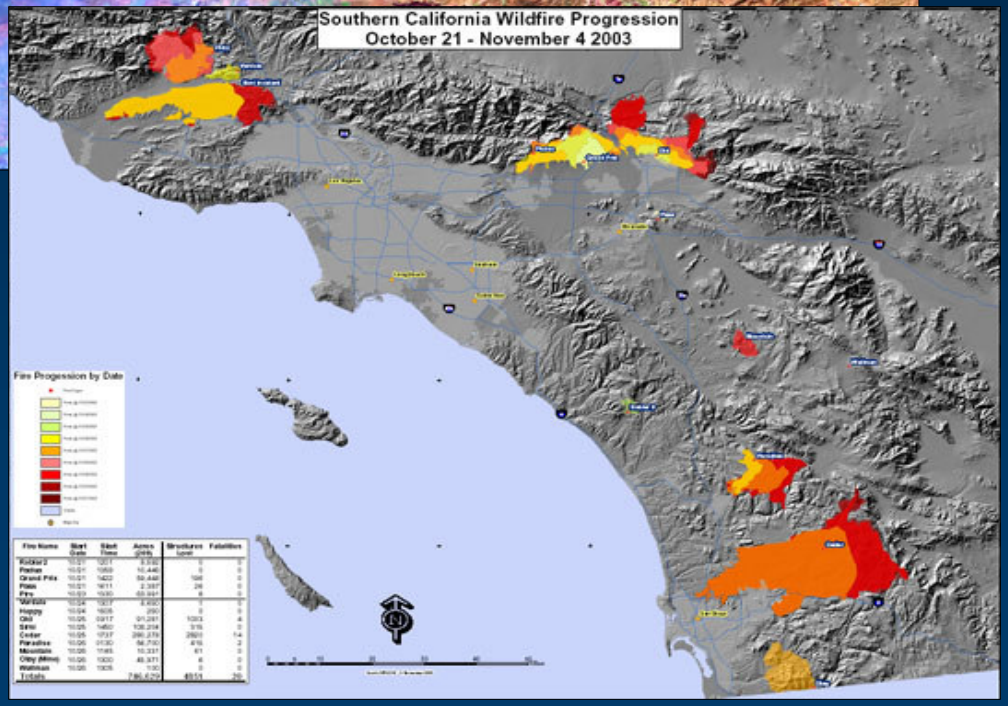
Forest Mortality due to environmental factors

- Drought
- Air Pollution
- Bark Beetle

Fire Visualization






Southern California Wildfire Progression
October 21 - November 4 2003
Fire Progression by Date

Remembering that,

“GEOSS will provide a framework to collate and access environmental data which will be used to improve understanding of global systems”.

- What is needed to see this occur?
  - System Interoperability
  - Data models and standards
  - Web Accessibility
  - Tools to manipulate spatial datasets
  - Web based raster data management
  - Method to publish data
  - Reporting mechanisms

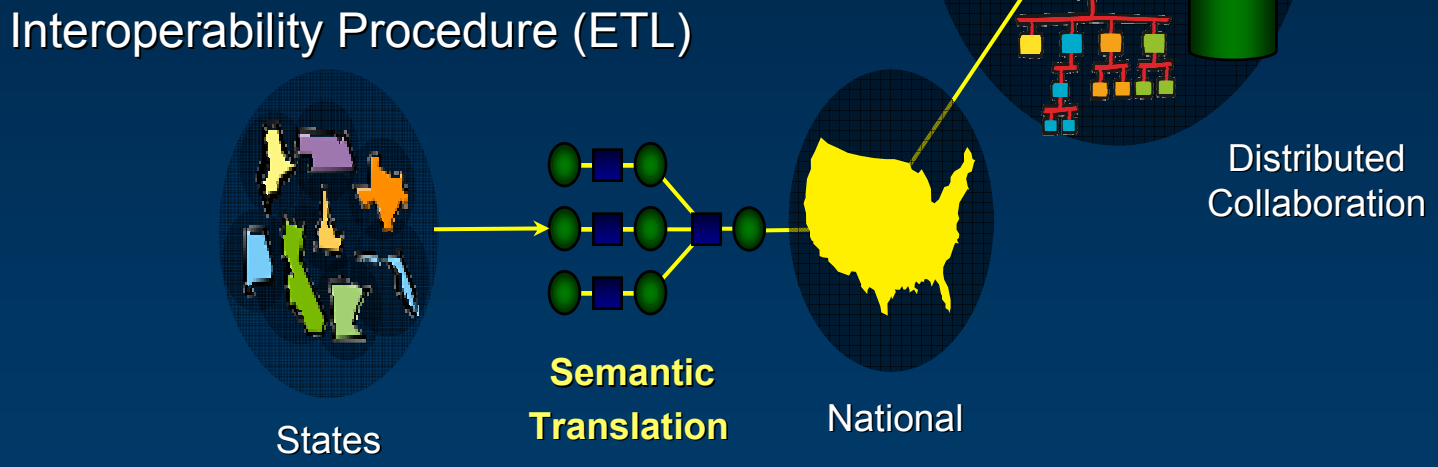
Interoperability Procedures Are Critical

The Key for Integrating Efforts

GeoWeb

Data Transformation

- Formats
- Data Models
- Schema
- Projections / Datum



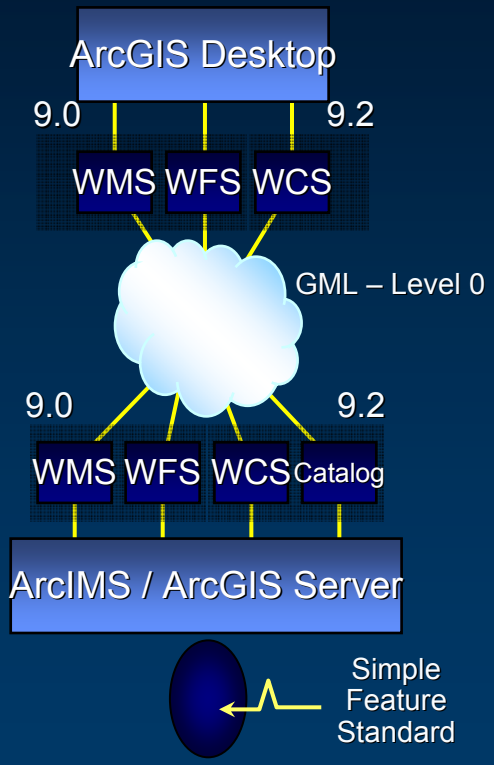
Interoperability

Ensuring an Open Platform

Data Interoperability Extension

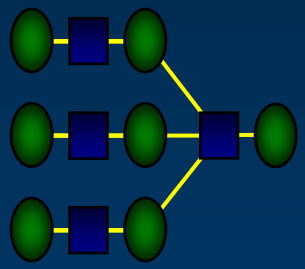
New Data Sources & Converters

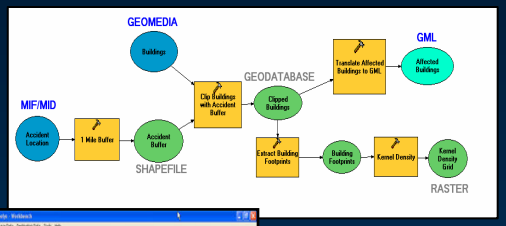
Support for OGC Standards

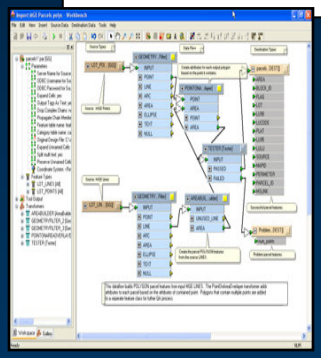


Supports Data Transformation

- Formats
- Data Models
- Schema
- Projections / Datum



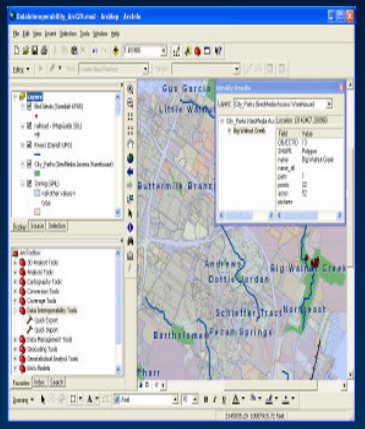




Creating Custom Format Converters

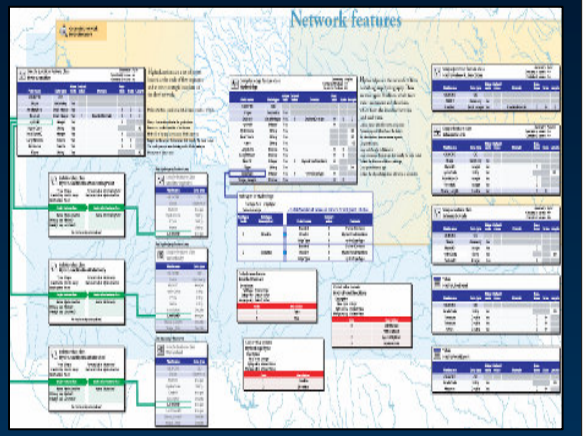
Integrated with ModelBuilder

Direct Read & Use

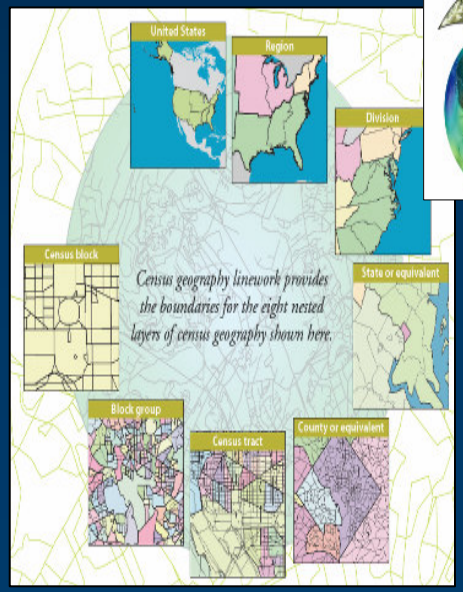


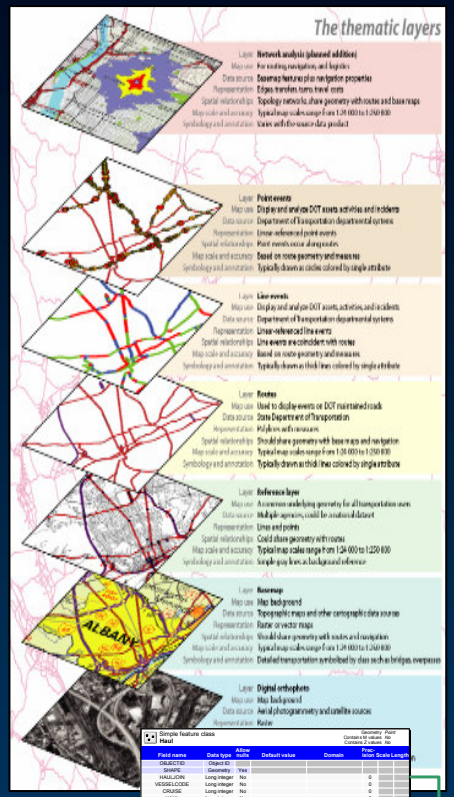
Geodatabase Data Models

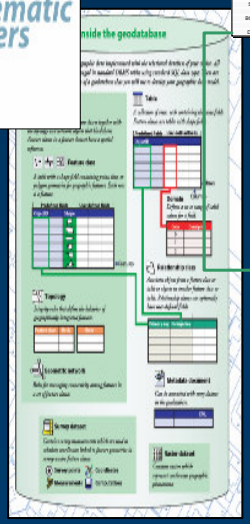
Standardized Templates for Many Fields

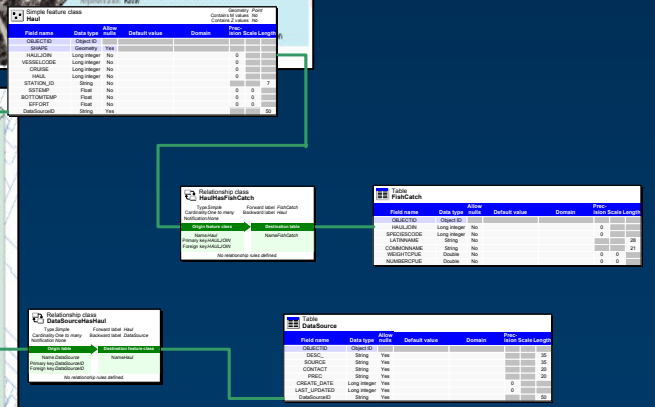


ArcHydro





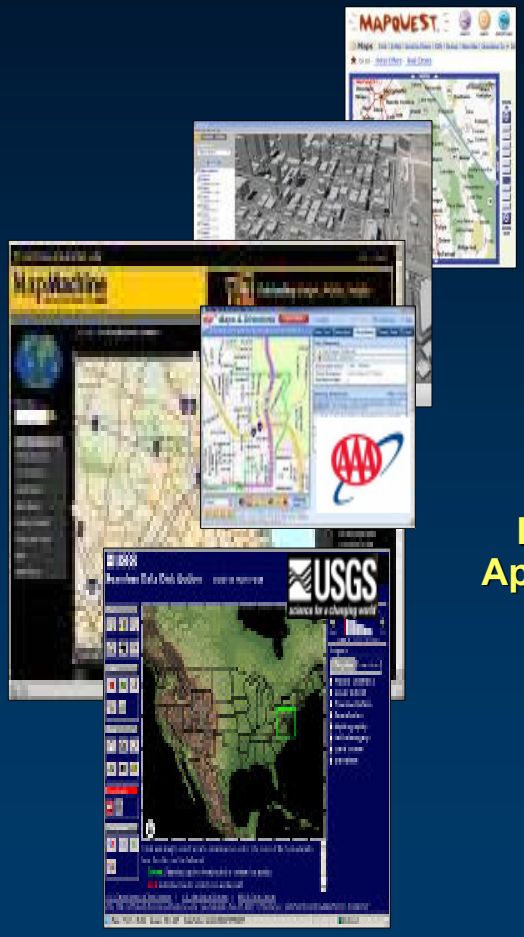




- Address
- Agricultural
- Atmospheric
- Base Map
- Biodiversity
- Census-Admin
- Boundaries
- Defense-Intel
- Energy Utilities
- Environmental
- Forestry
- Geology
- Groundwater
- Health
- Historic Preservation & Archaeology
- Homeland Security
- Hydro
- IHO
- Land Parcels
- Local Government
- Marine
- National Cadastre
- Petroleum
- Pipeline
- Telecommunications
- Transportation
- Water Utilities

GIS Web Services Will Provide the Framework

Supporting Many Geospatial Communities



GeoWeb

Enterprise Integration

Consumer Mapping

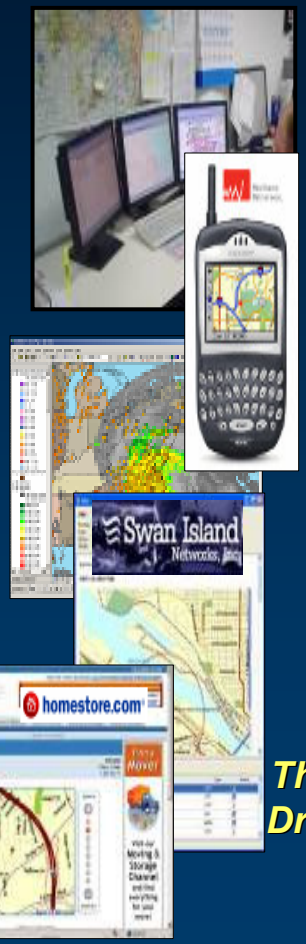
Location Based Services

Focused Applications

Sensor Networks

GIS Networks

Situational Awareness



Over Time

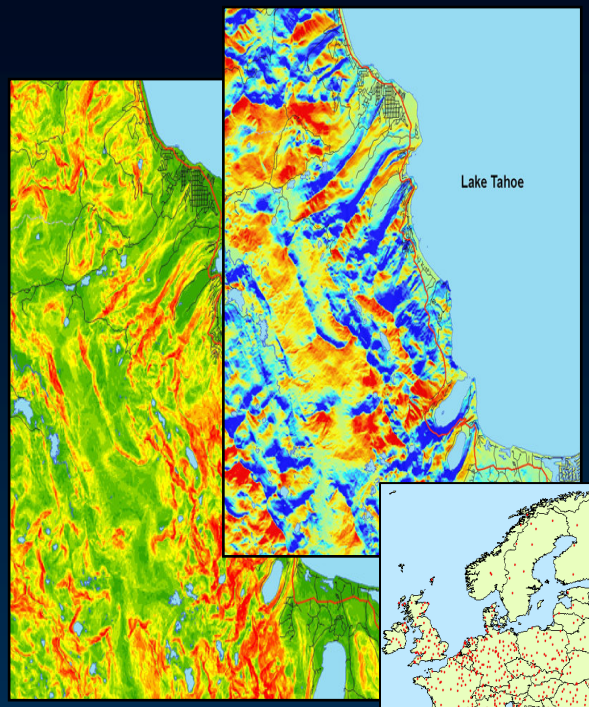
- Expanded GIS Services
- More Synergy
- Easier Exploration Tools
- Pervasive Use

The GeoWeb Will Evolve Rapidly Driven by Millions of Participants

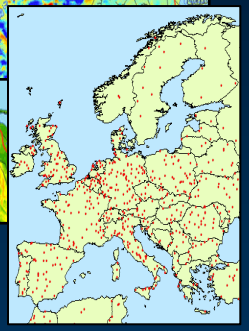
Geoprocessing

Improving the Capabilities

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

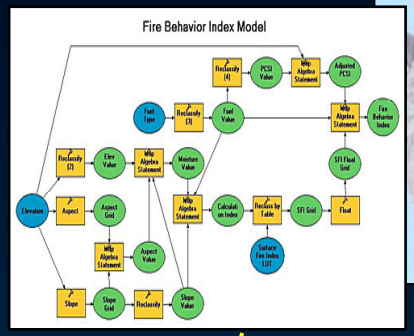


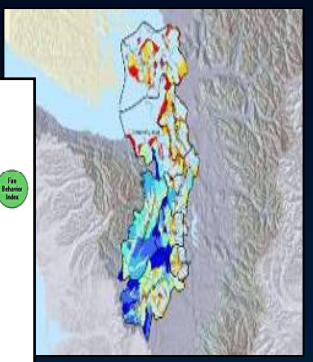
Solar Radiation



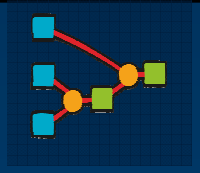
Random Sampling

Improved Modeling

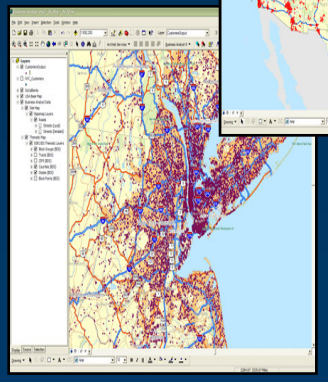


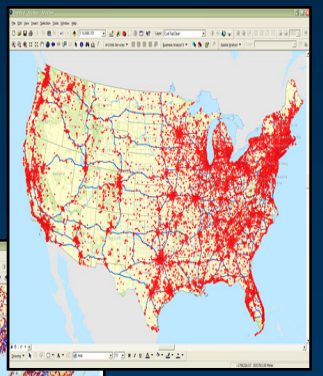


ArcGIS Server



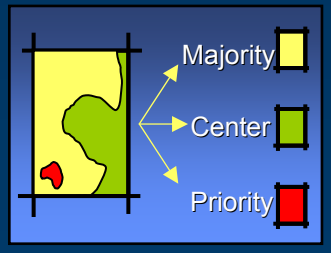
Geoprocessing on Server





Geocoding

Raster Conversion



Model Looping

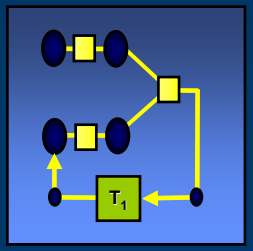
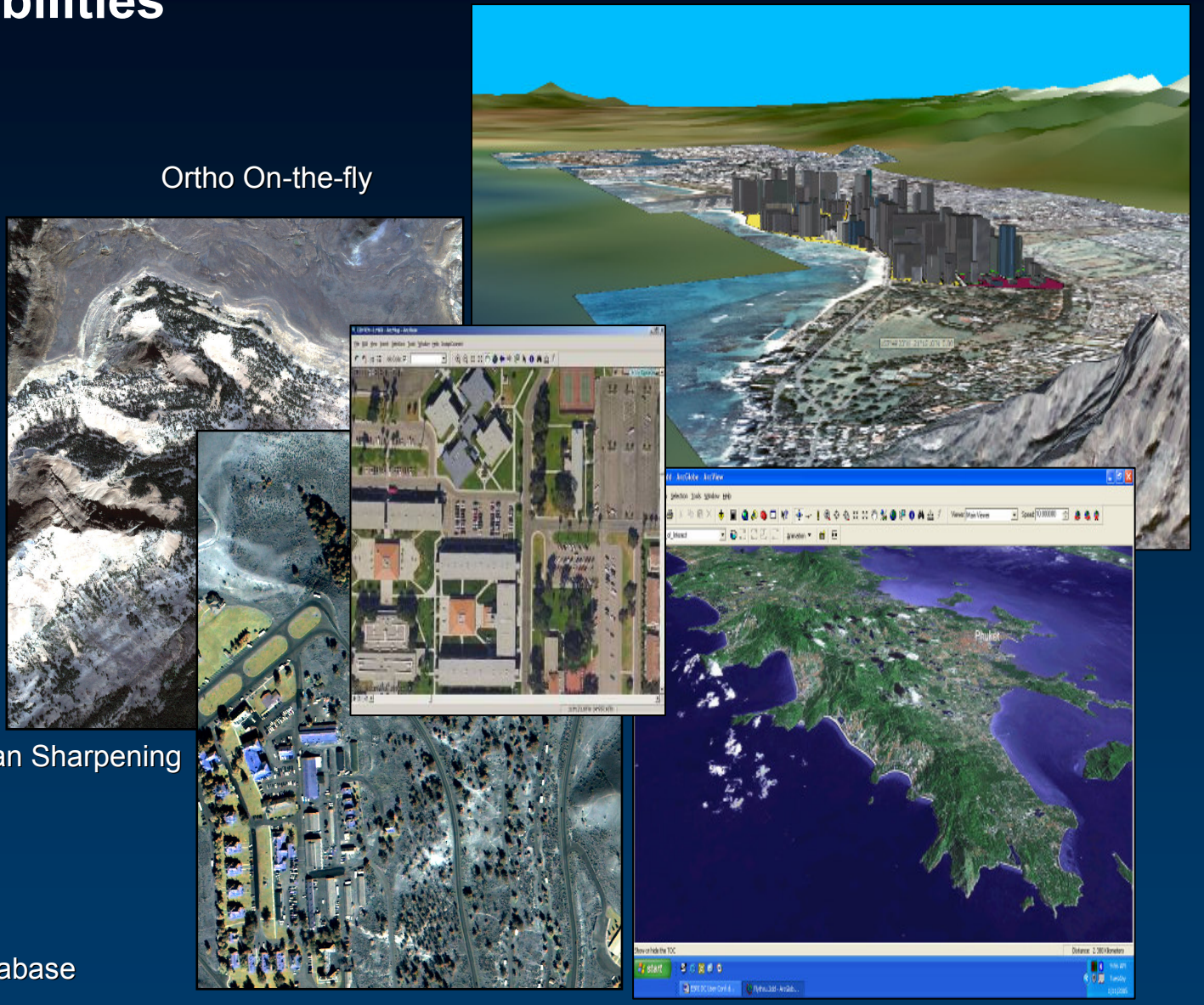


Image / Raster Capabilities

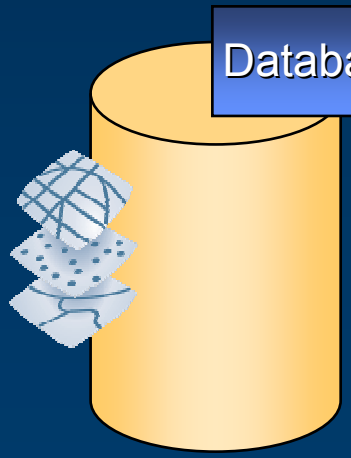
- Enhanced Projections
- Dynamic Ortho-Rectification and Pan Sharpening
- More Formats (JPEG 2000, ECW …)
- Raster Attribute Tables
- Fast Loading

Ortho On-the-fly



Database

Pan Sharpening

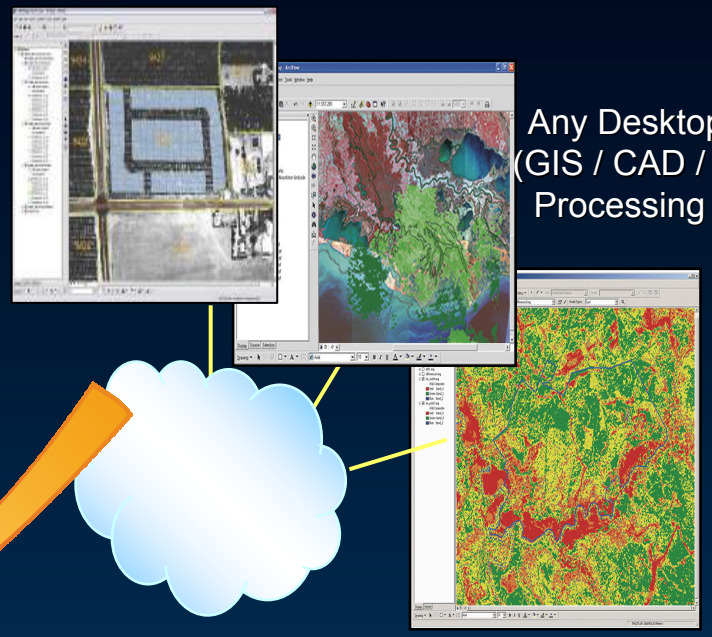


Geodatabase

Image Server

- 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

Acquisition

Processing and Distribution

Near Instant Server Processing

. . . Reduces Time Between Acquisition and Use

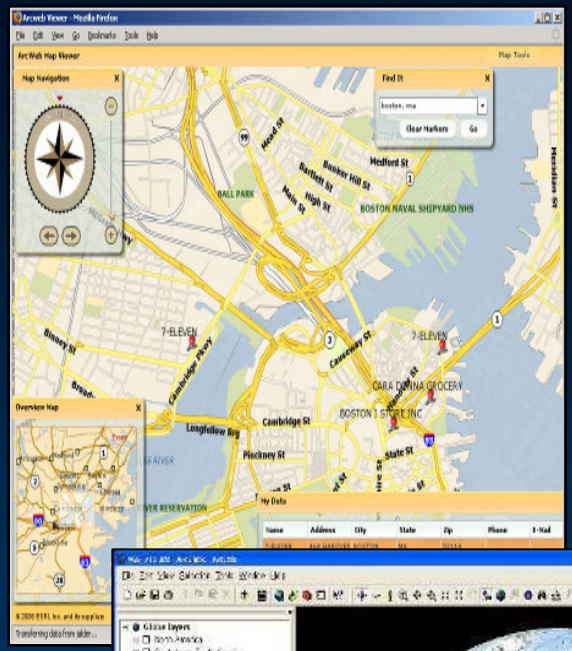
ArcWeb Services

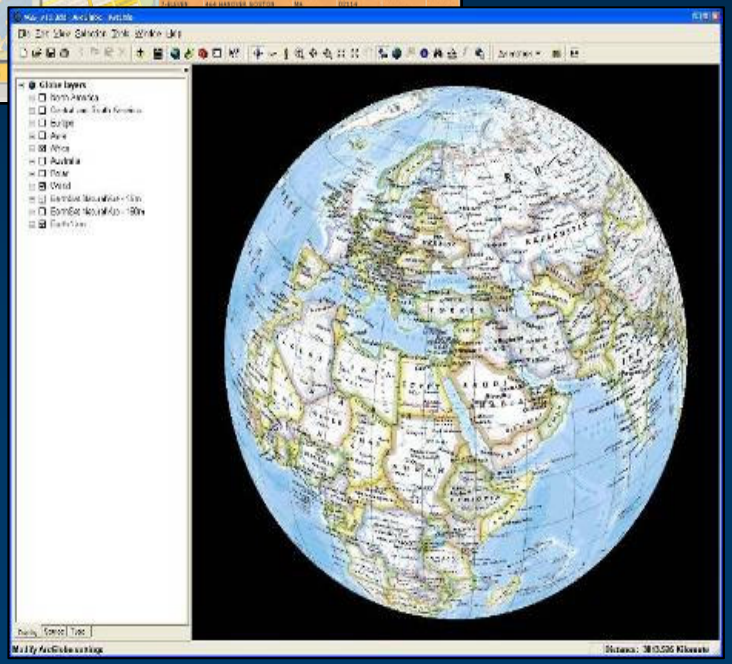
Hosted Services

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

Providing Online Access

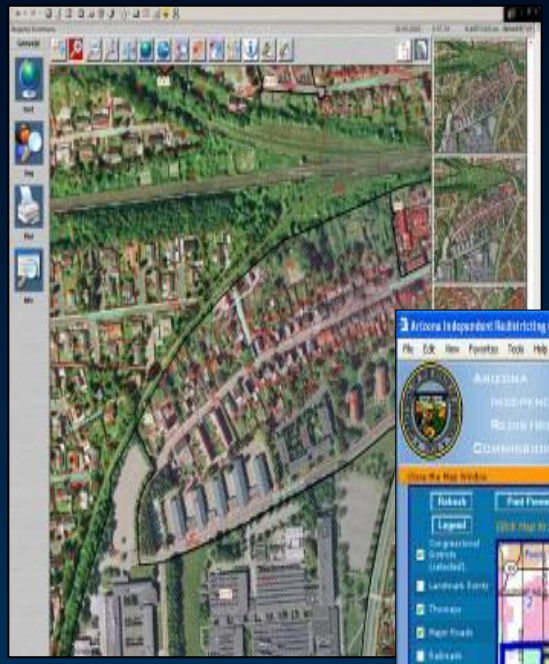
Permit Tracking

Nashville, Tennessee

Agriculture

Germany

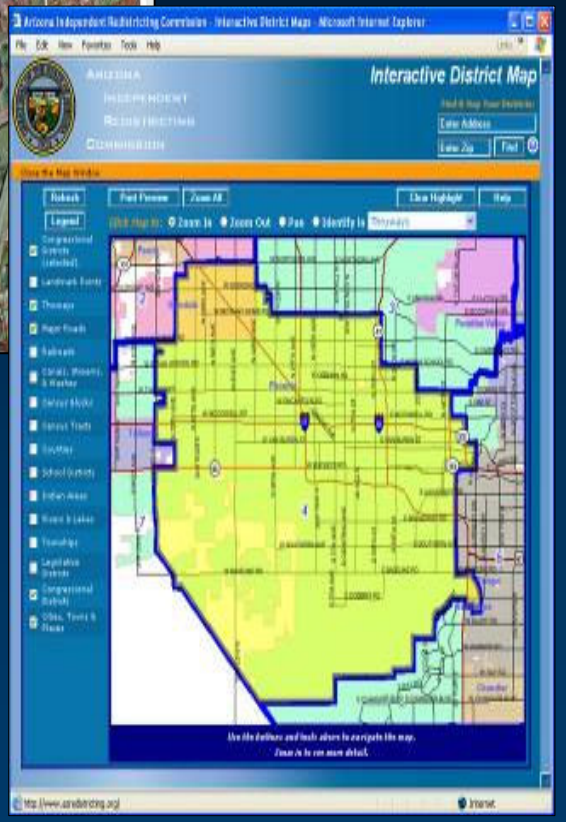
Land use Planning



Germany

Property rights

Fort Worth Texas



Sustainable Development

What should the GEOSS be providing its client community?

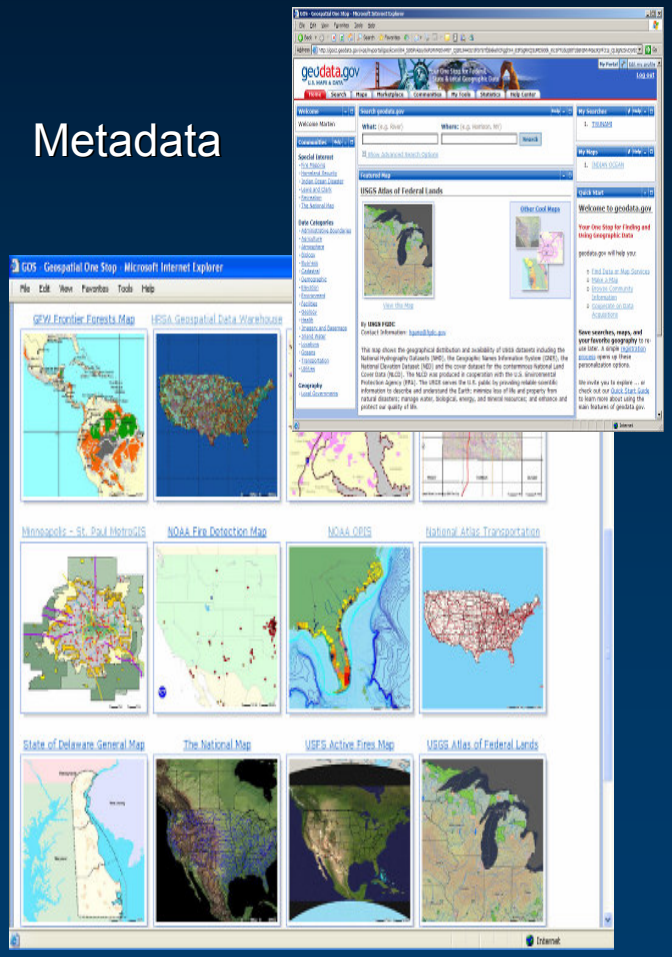
- A data search mechanism
- A metadata catalogue
- Modeling and Analytical tools
- Arguably a method to report results

GIS Portals

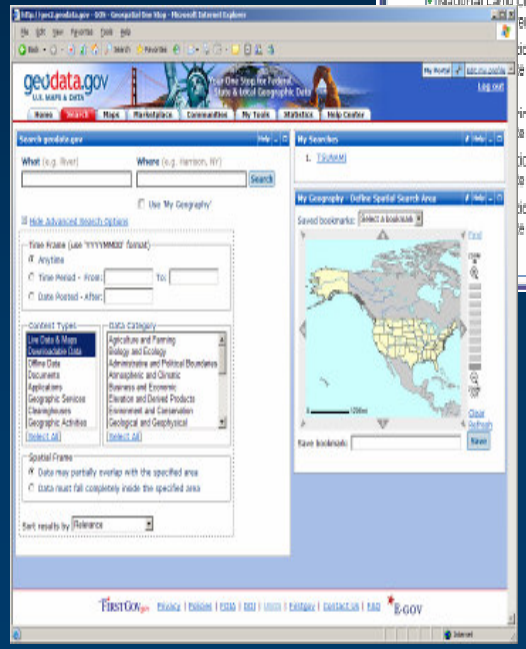
Geodata.Gov

(Geospatial One Stop)

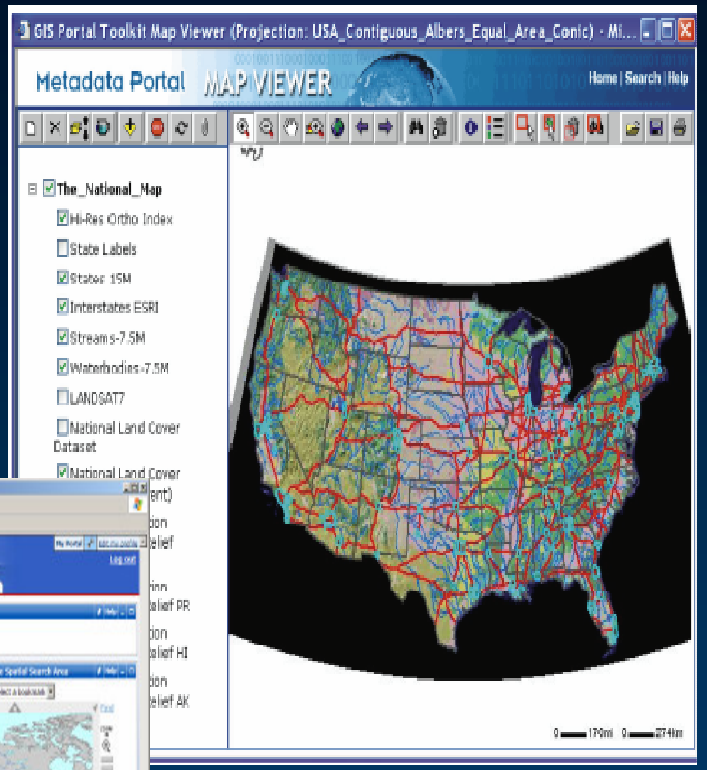
Metadata



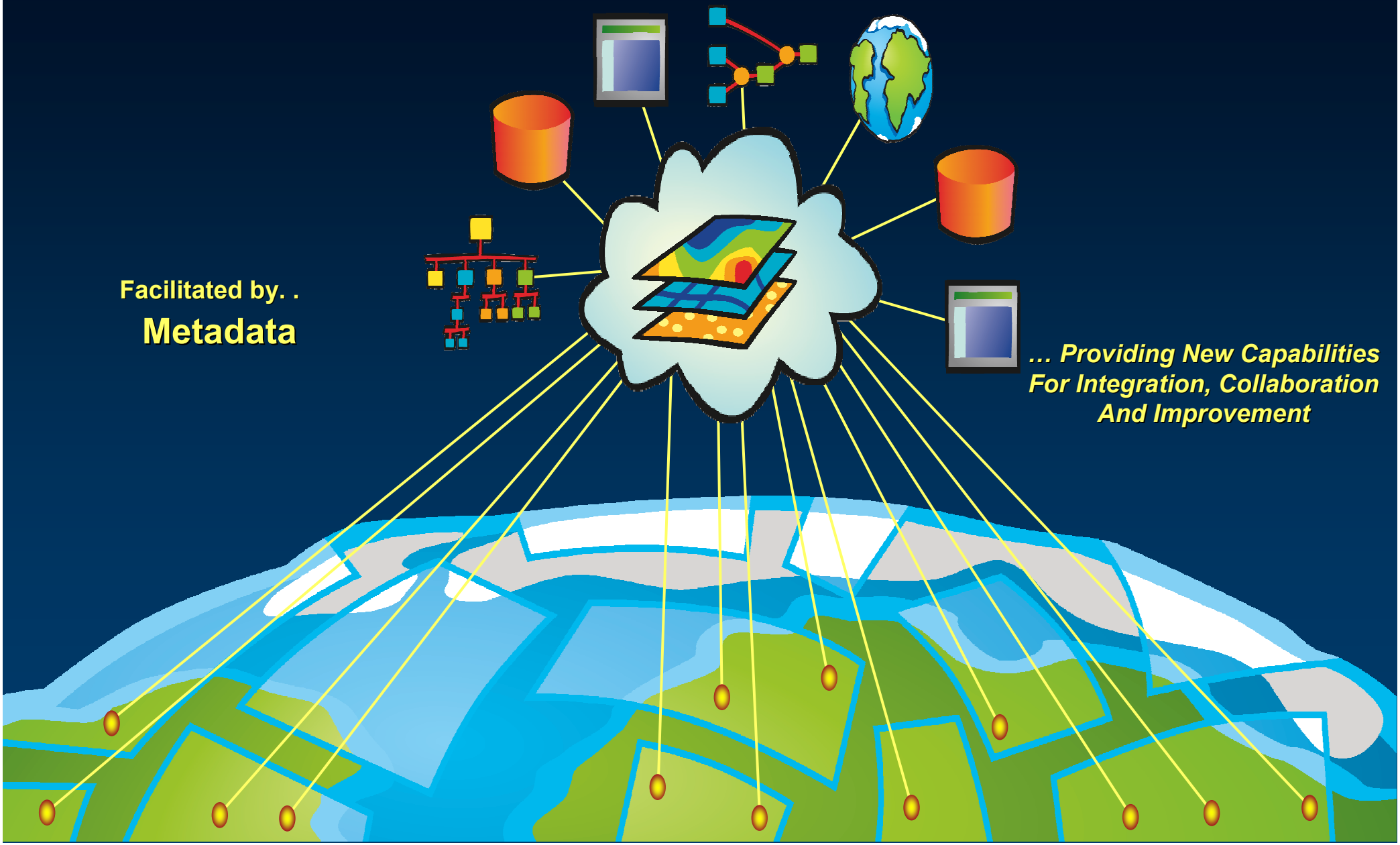
Fast / Simple / Intelligent Search



Open Map Viewer



Individual Systems Will Be Connected into a System of Systems



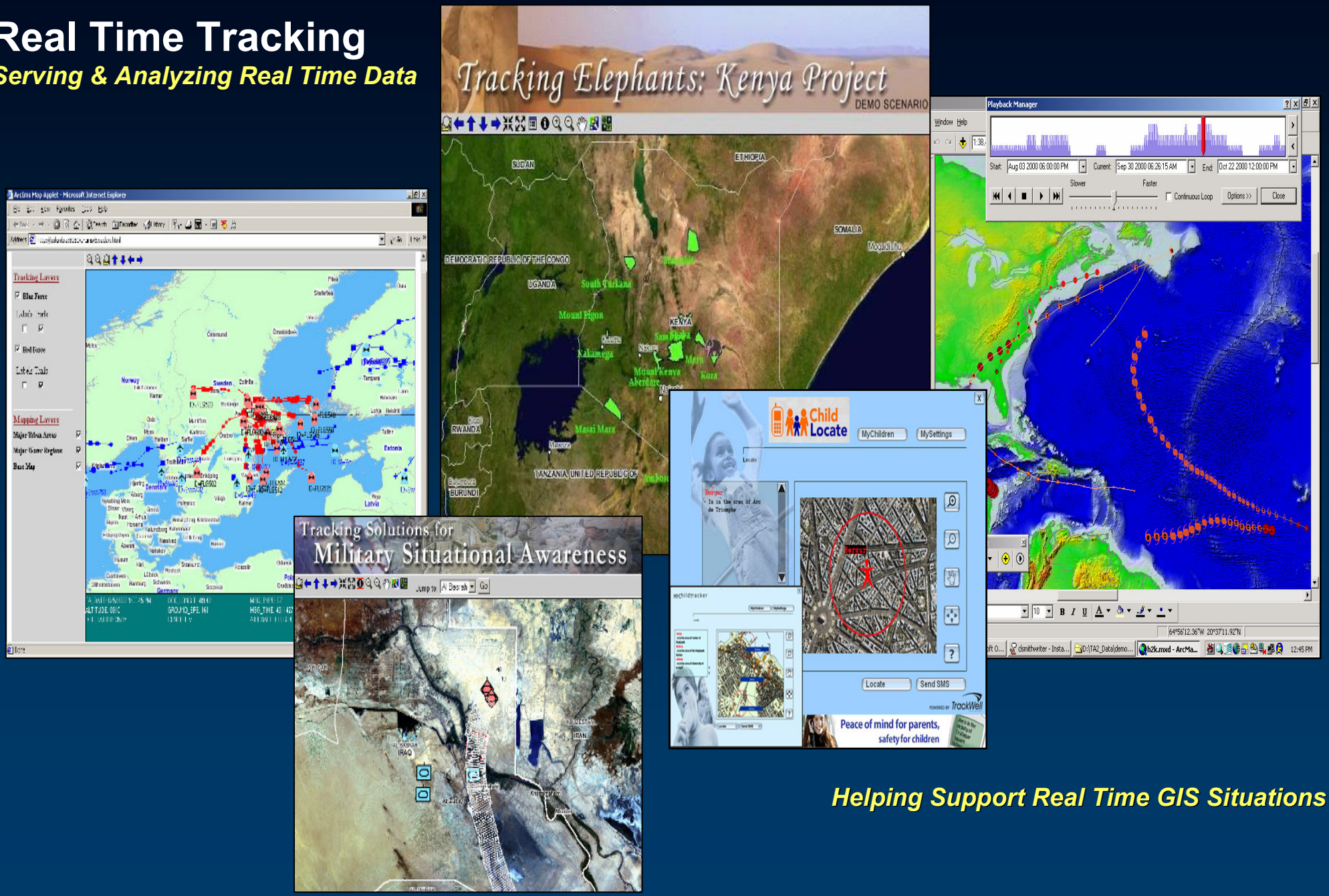
Facilitated by. .

Metadata

… Providing New Capabilities For Integration, Collaboration And Improvement

Real Time Tracking

Serving & Analyzing Real Time Data



Helping Support Real Time GIS Situations

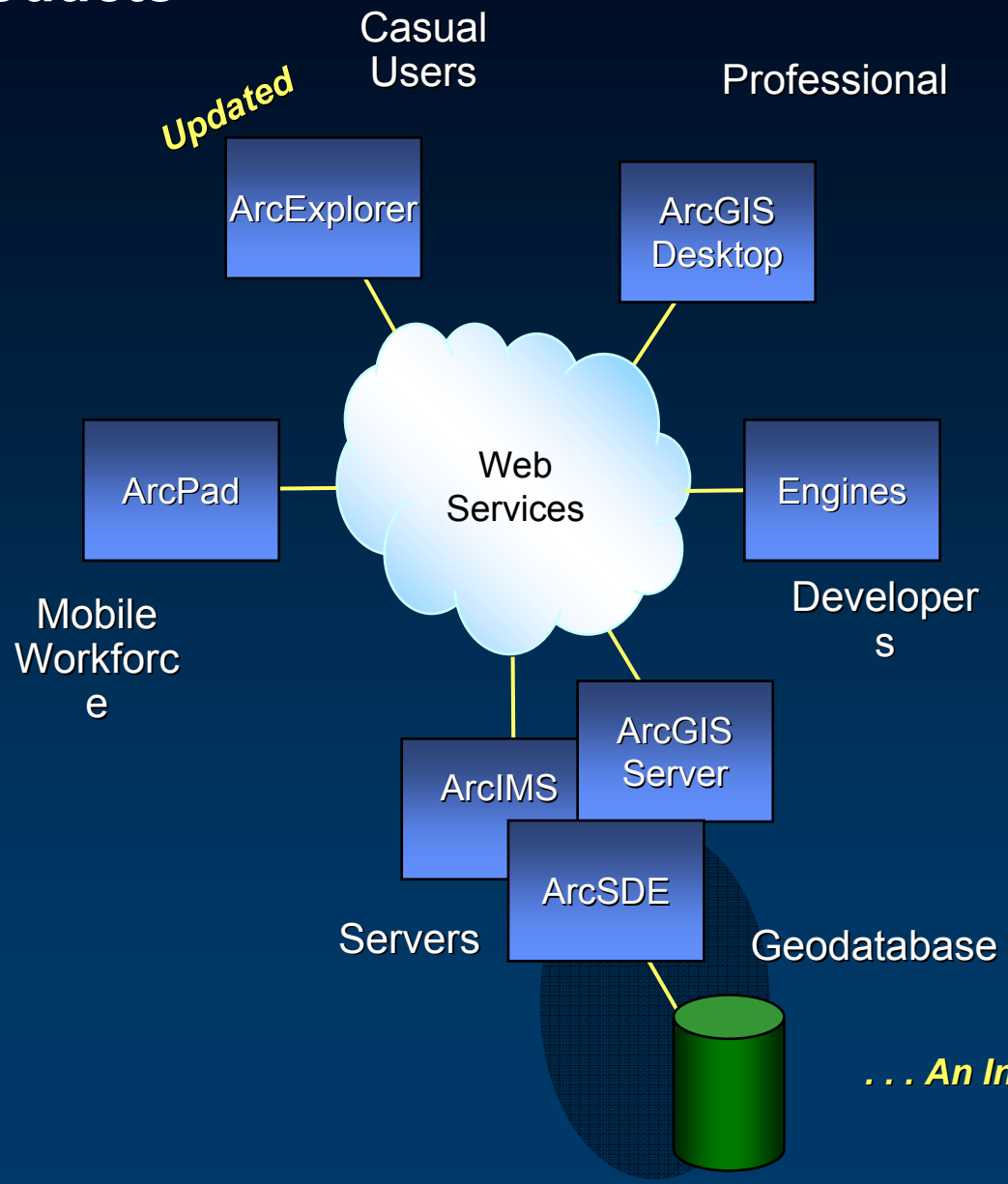
In Conclusion…

- The GEOSS is a monumental effort being undertaken by multitudes of organisations and individuals
- Geospatial technology should be a facilitator in this process not a hindrance
- Once GEOSS is a tangible resource, the scientific community must translate research into policy recommendations
- ESRI is prepared to support the GEOSS initiative

ESRI Software Products

GIS Platforms

- Desktop GIS
- Embedded GIS Components (Engines)
- GIS Servers
- Mobile GIS



- Compilation
- Mapping
- Geoprocessing
- Visualization
- Management
- Authoring
- Serving
- Viewing

. . . An Integrated Platform for Everybody