Beneficios de una Infraestructura Nacional de Datos Espaciales: Una Vision Global

Dr David Maguire
Director of Products
ESRI, USA
Chile

Outline

- Introduction
- The value of Geographic Information Systems
- Examples
- Strategies for developing GIS
- Spatial Data Infrastructures
  - Evolution
  - Geoportals
- Conclusions

Our World Faces Many Challenges

Increasing

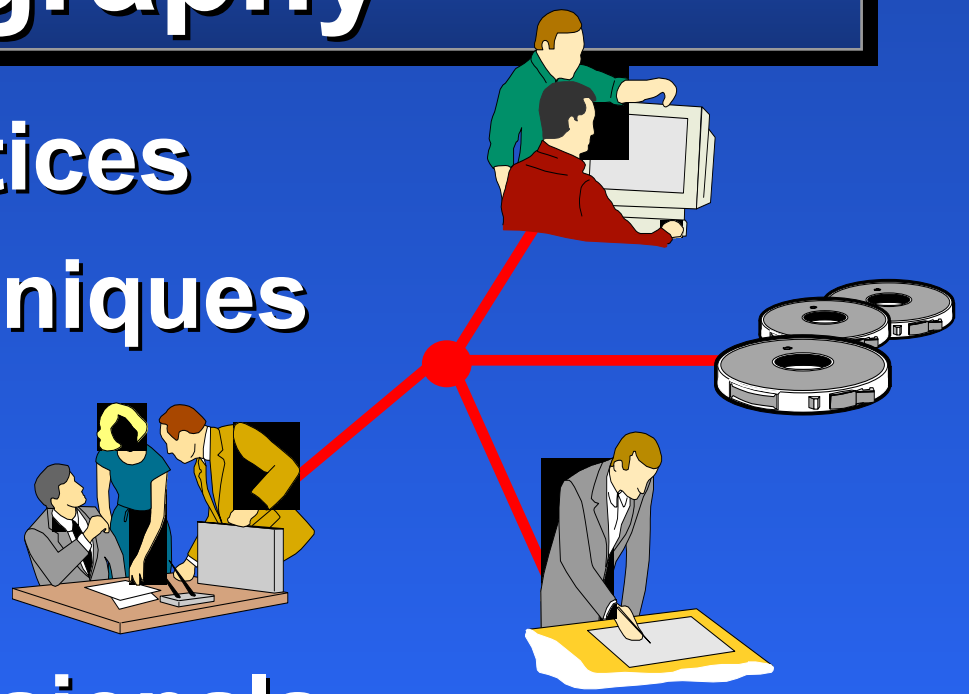
- Population
- Consumption
- Land Use Conflicts
- Disasters

Declining

- Resources
- Diversity
- Natural Areas
- Security

Solving Such Complex Problems Requires Geography

- Policies / practices
- Methods / techniques
- Technology
- Data
- Trained professionals



Geographic Information
A Valuable Resource

- Everything is located somewhere
- 80% of government data is geographic
  - Address
  - Postal codes
  - Roads, Railways
  - Census boundaries
  - Election areas
  - Facilities (hospitals, schools, maintenance depots, pipes)
  - Natural resources (minerals, forests, vineyards..)

GIS Integrates All Types of Data

Geography is a "key"

Vehicle locations

Weather information

Roads/Infrastructure

Land use/Land cover

Raster imagery

Environment

Basemaps

Forming collections of data to create information …

Palabras

A Map is Worth Millions of Bytes

Attributes of pcode

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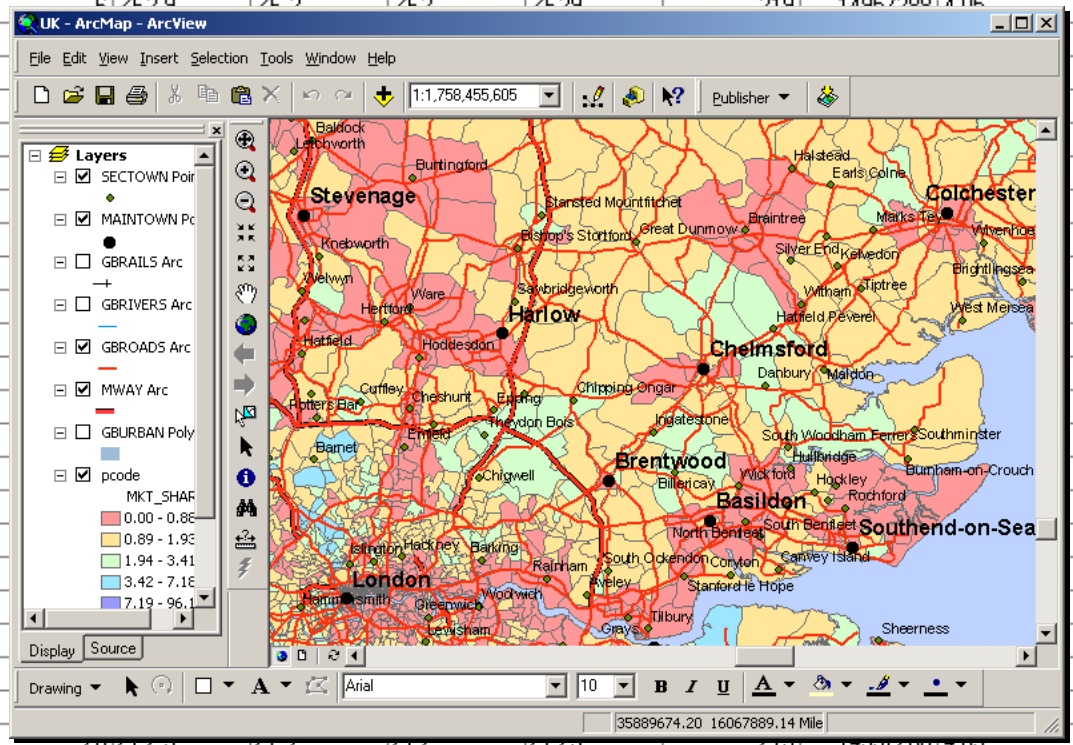


Value of GIS

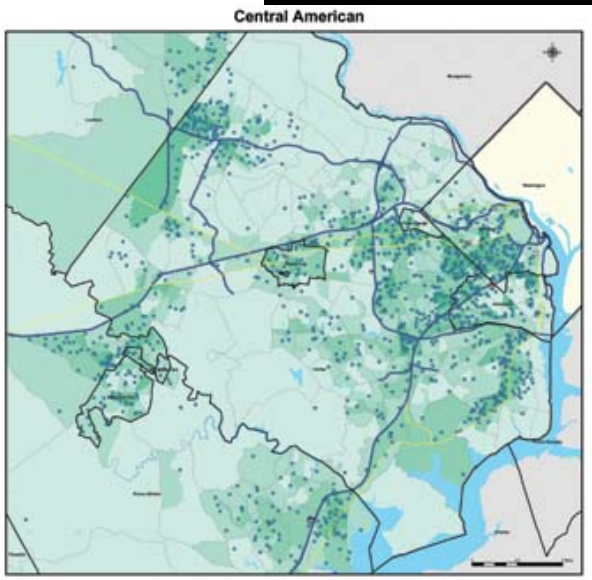
- Oxford Economic Research Associates Ltd (OXERA) -1996
- Ordnance Survey added +£100m to UK economy per year
  - Government, Utilities, Transport
- Developing the economy
- Opening up new markets

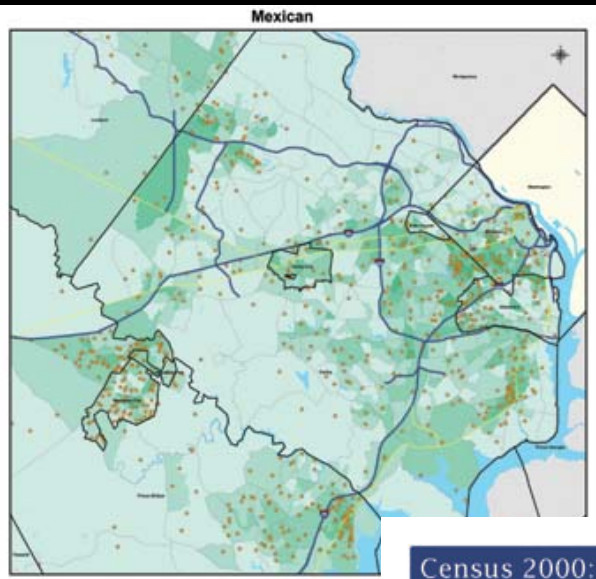
GIS Applications Are Diverse

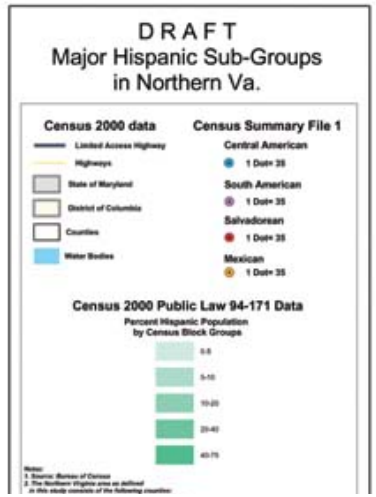
- Population
- Economic development
- Bio-diversity
- Homeland Security
- Urbanization
- Pollution
- Congestion
- Conservation
- Land Use
- Oceans
- Humanitarian
- Water Resources
- Crime
- Health
- Education
- Logistics
- Energy
- Defense/Security
- Environment
- Government
- Efficiency
- Agriculture/Forestry
- Public Safety

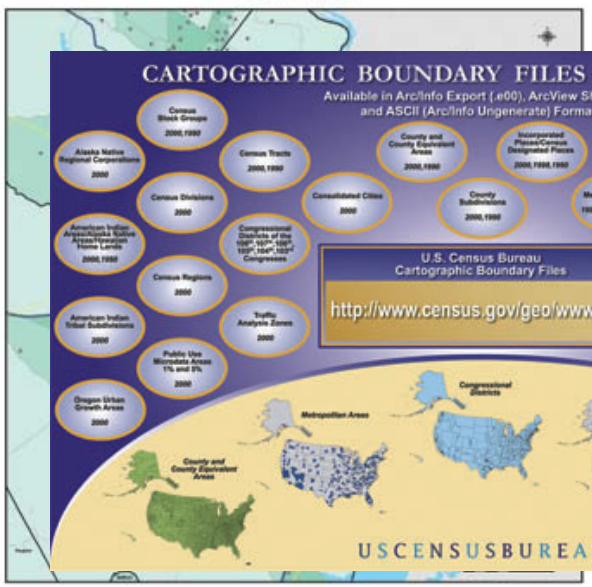
…GIS is Important

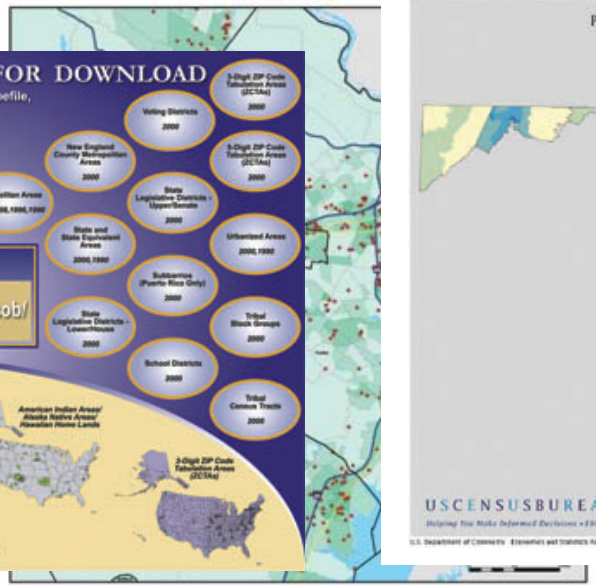
Census / Elections

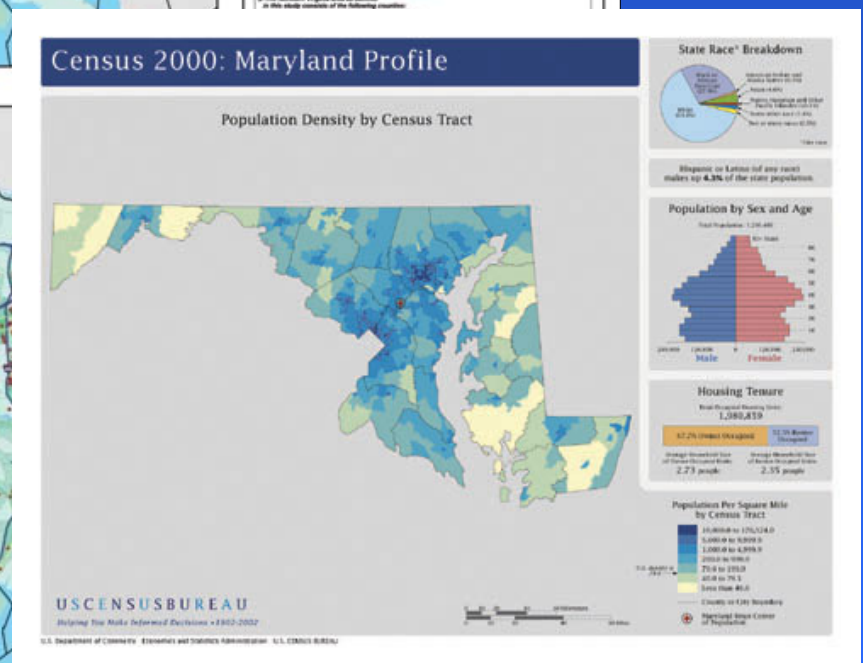




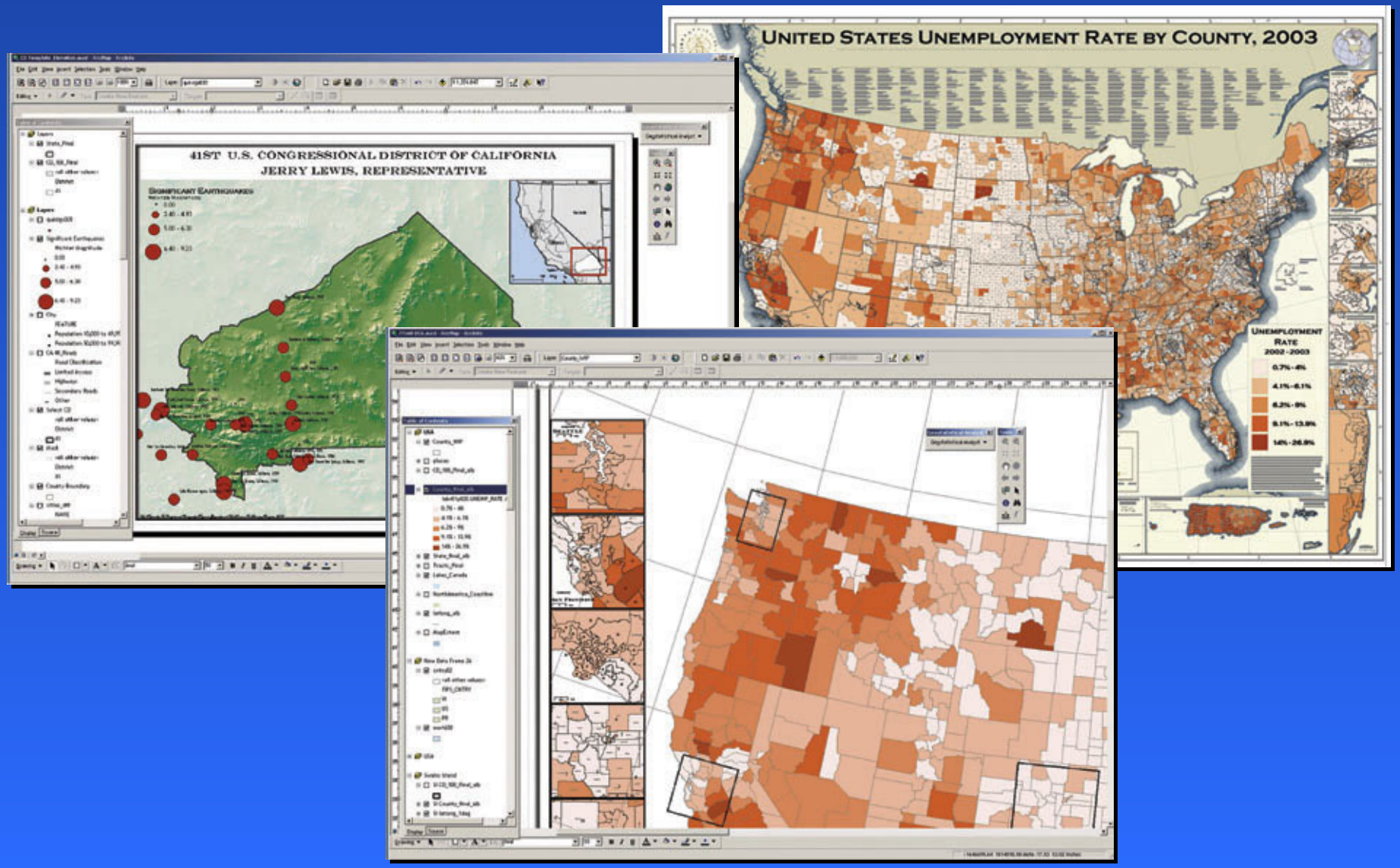






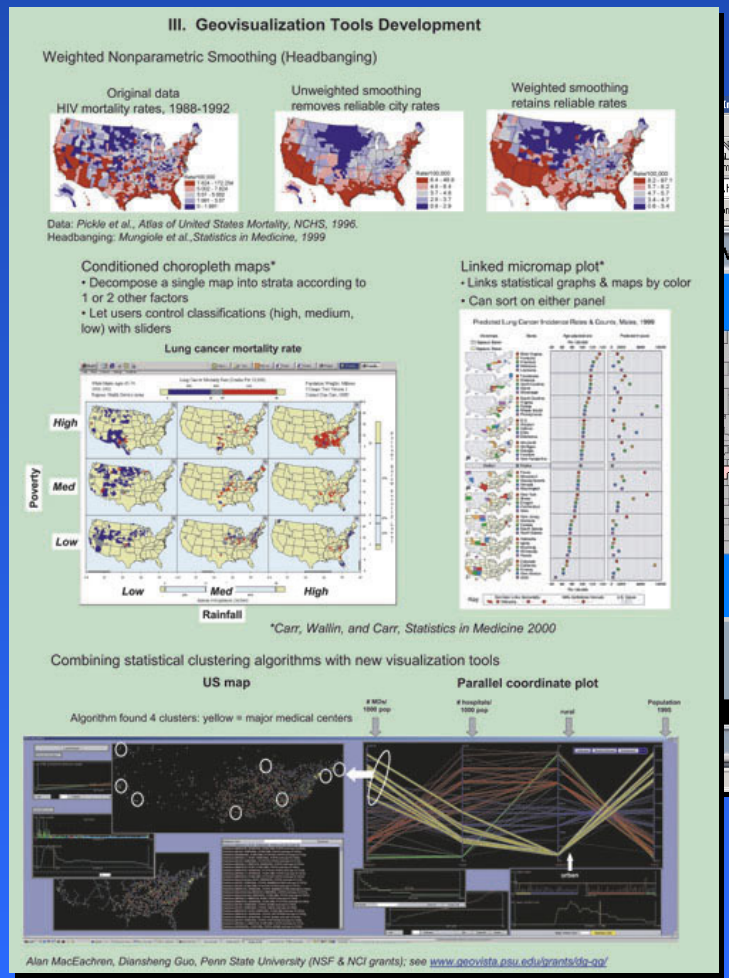


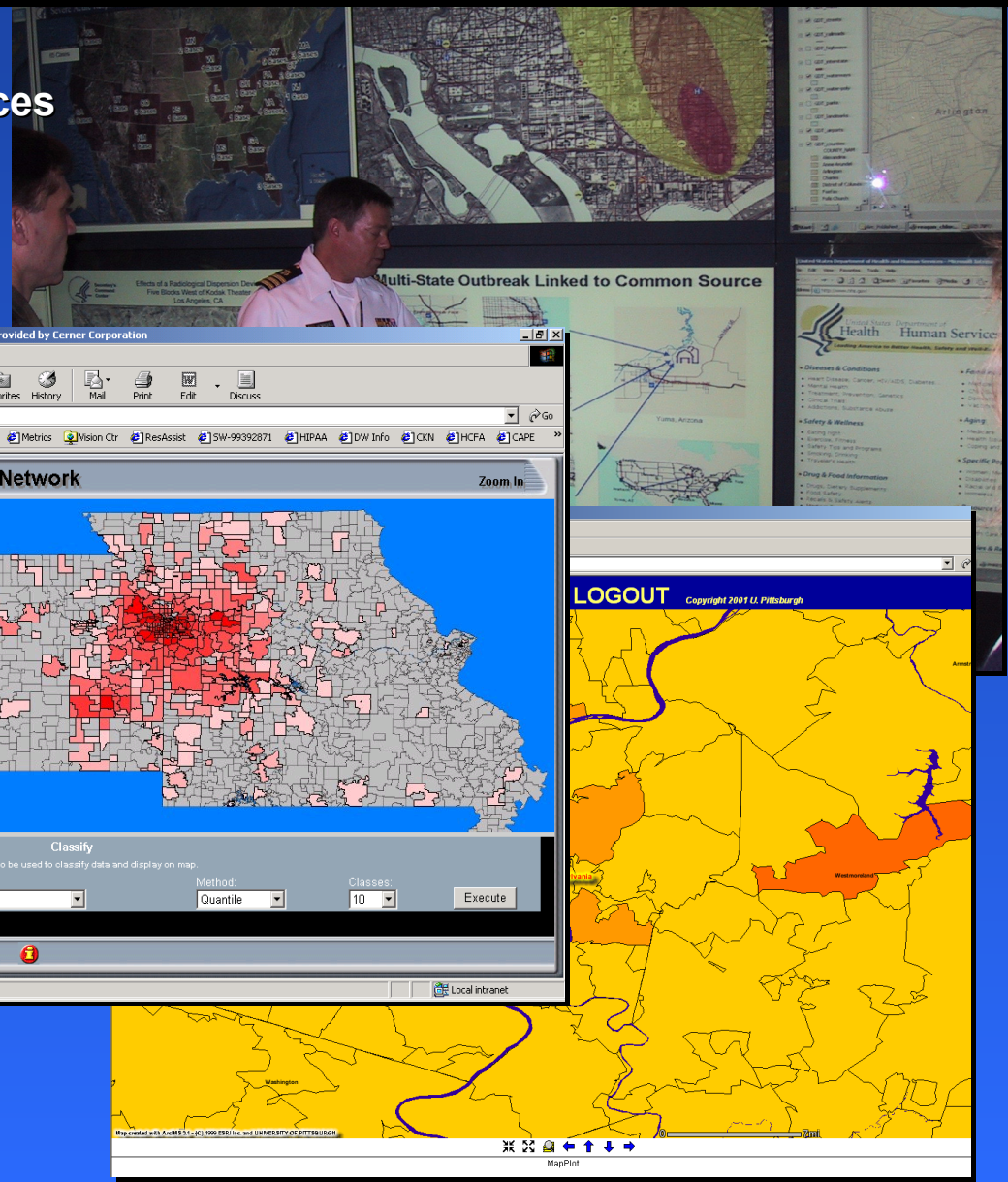
Library Information Systems



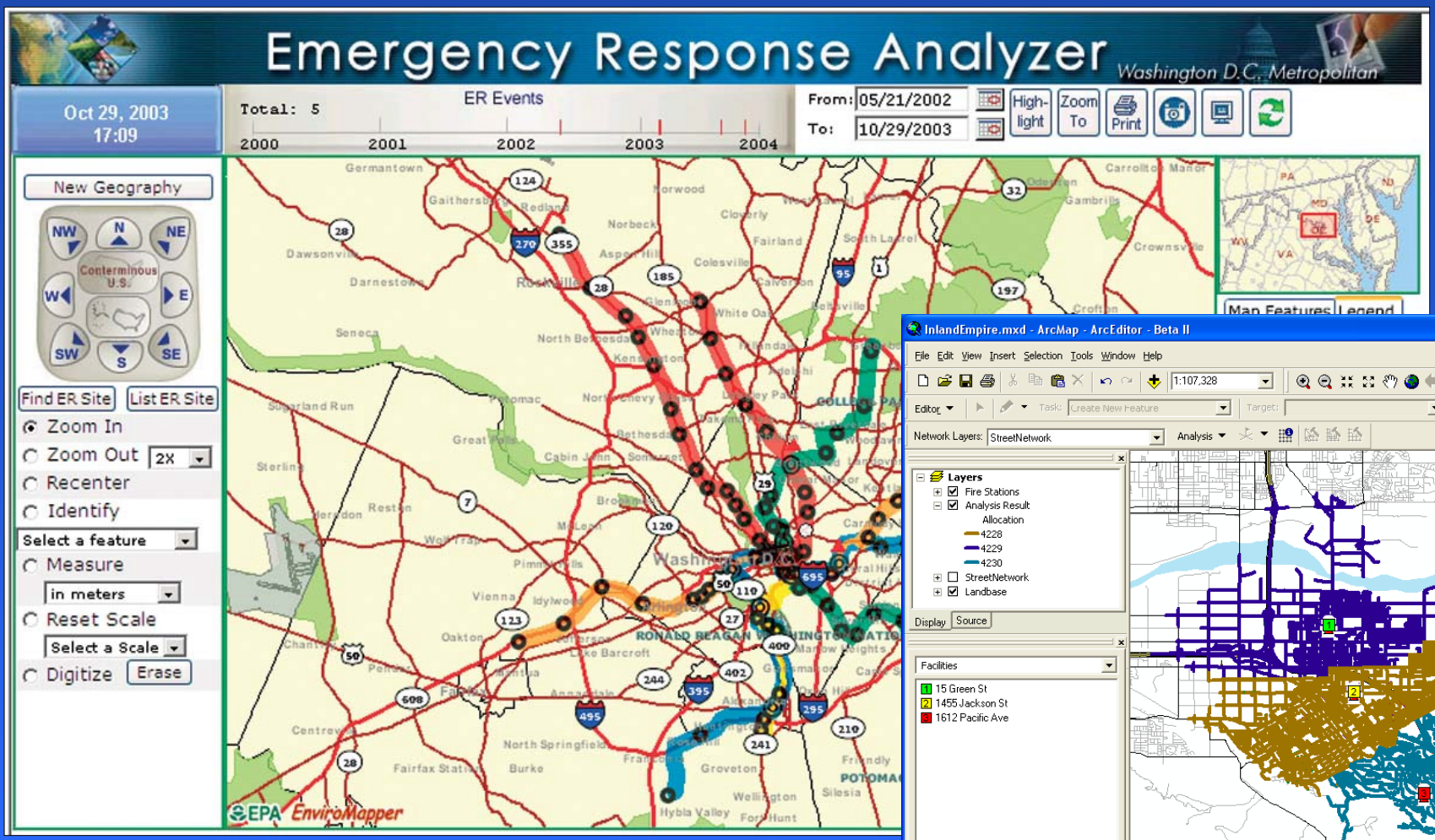
Human Health and Disease Surveillance

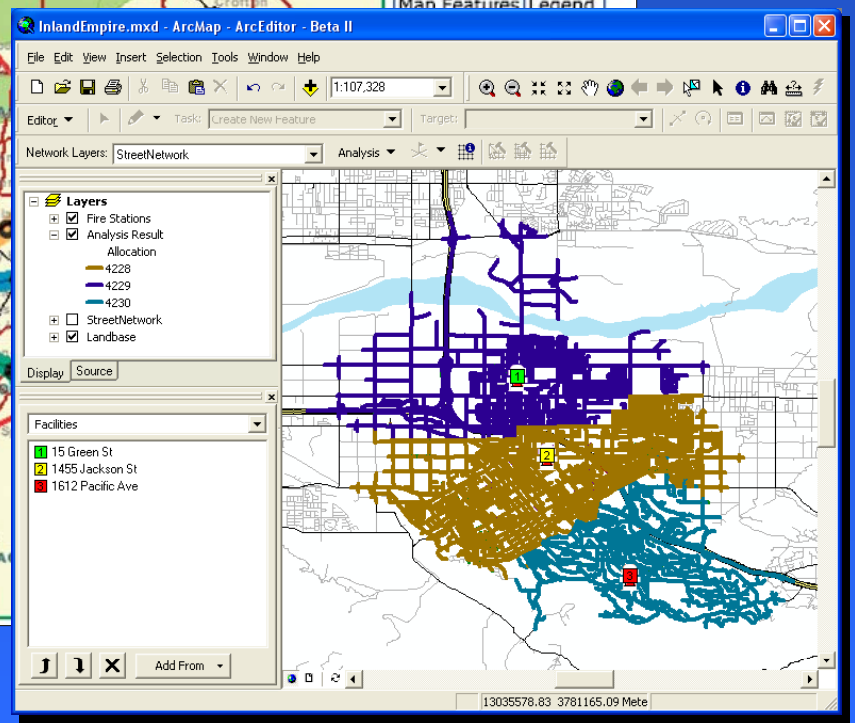
Health Secretary's Command Center
US Department of Health & Human Services



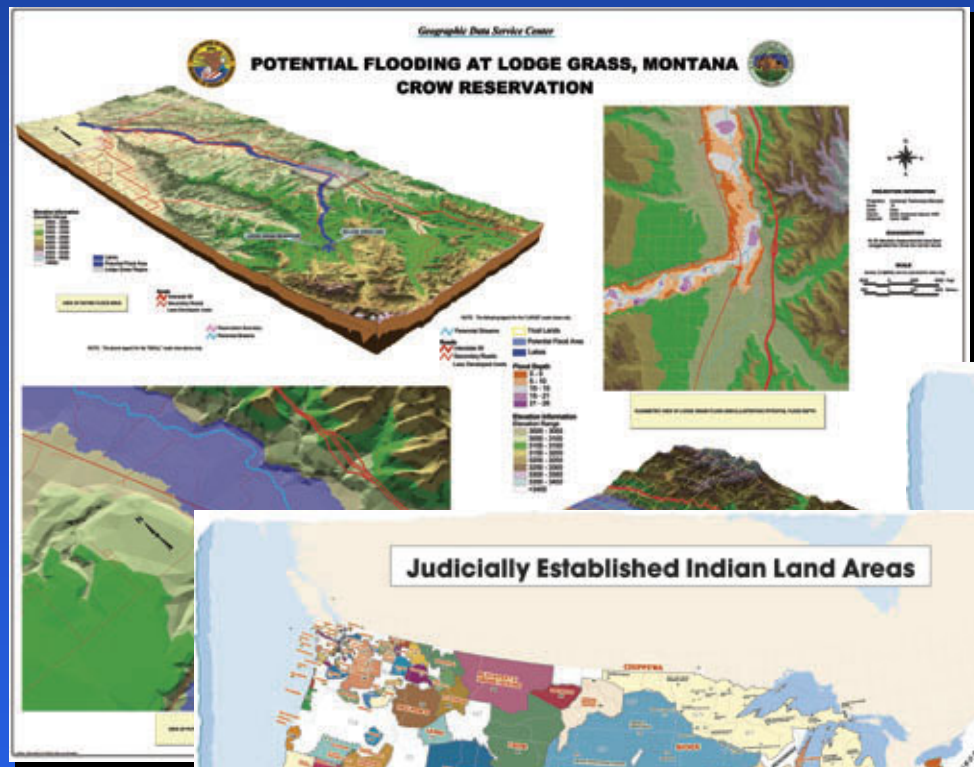


Transportation Planning / Management

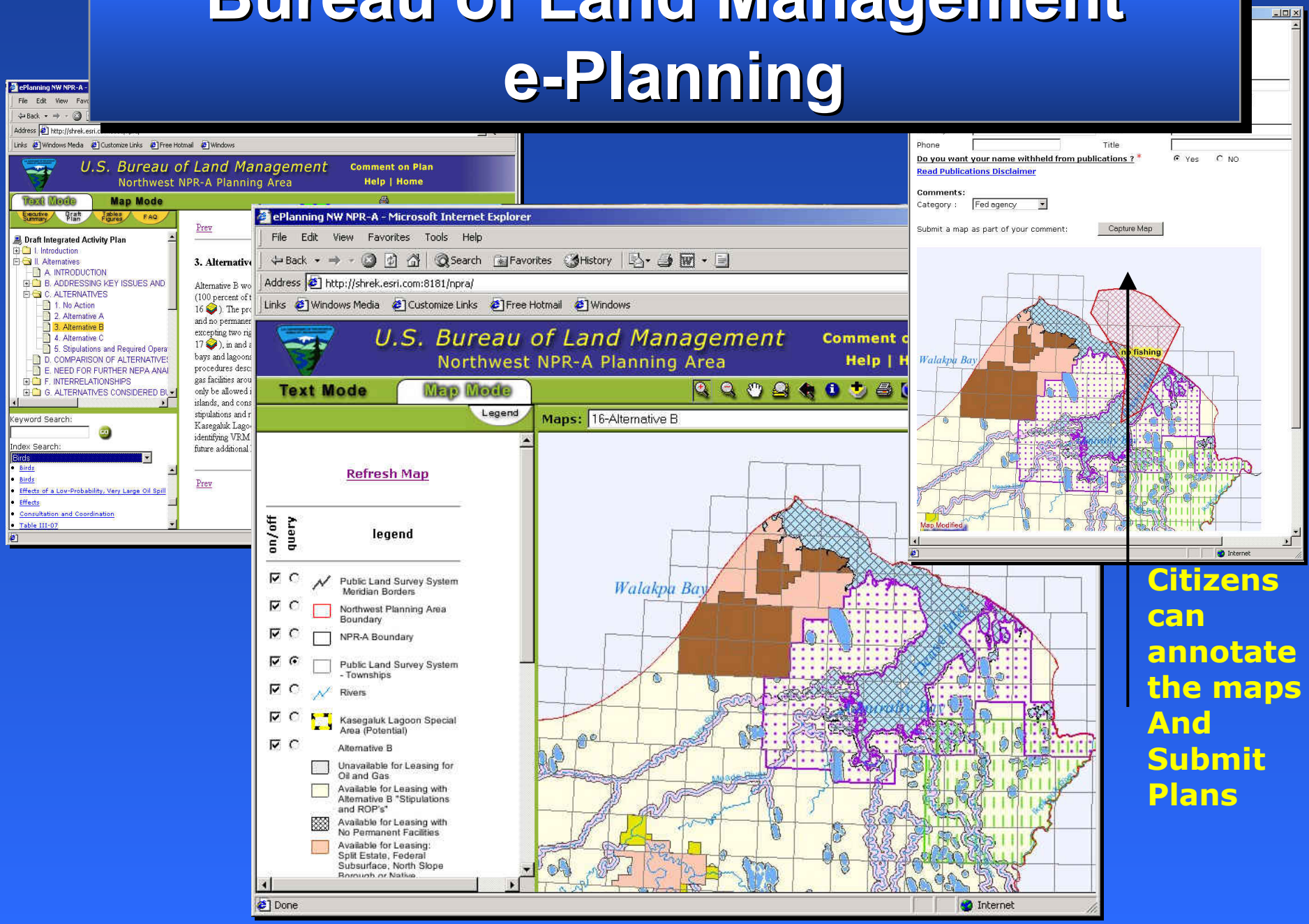




Native American Land Management - BIA

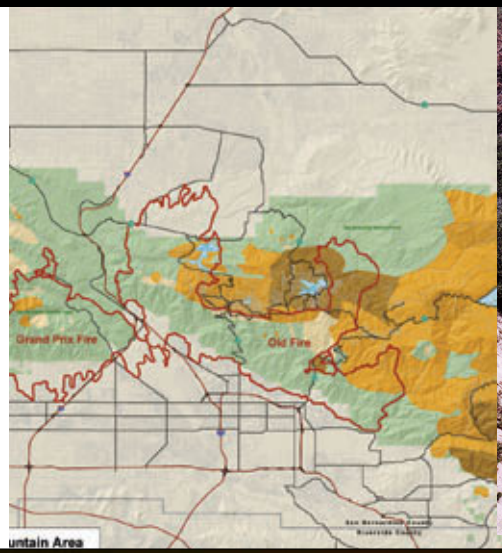


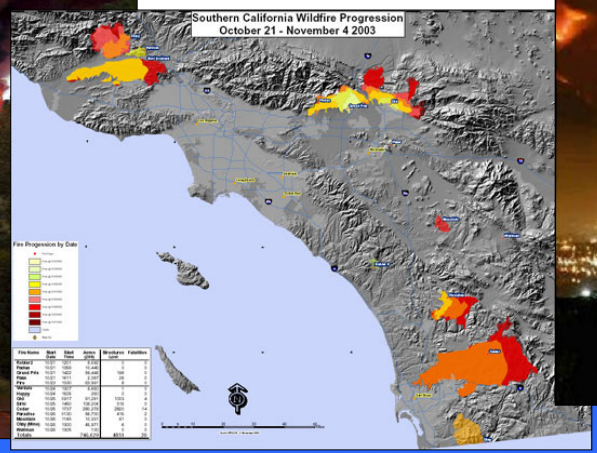
Bureau of Land Management e-Planning



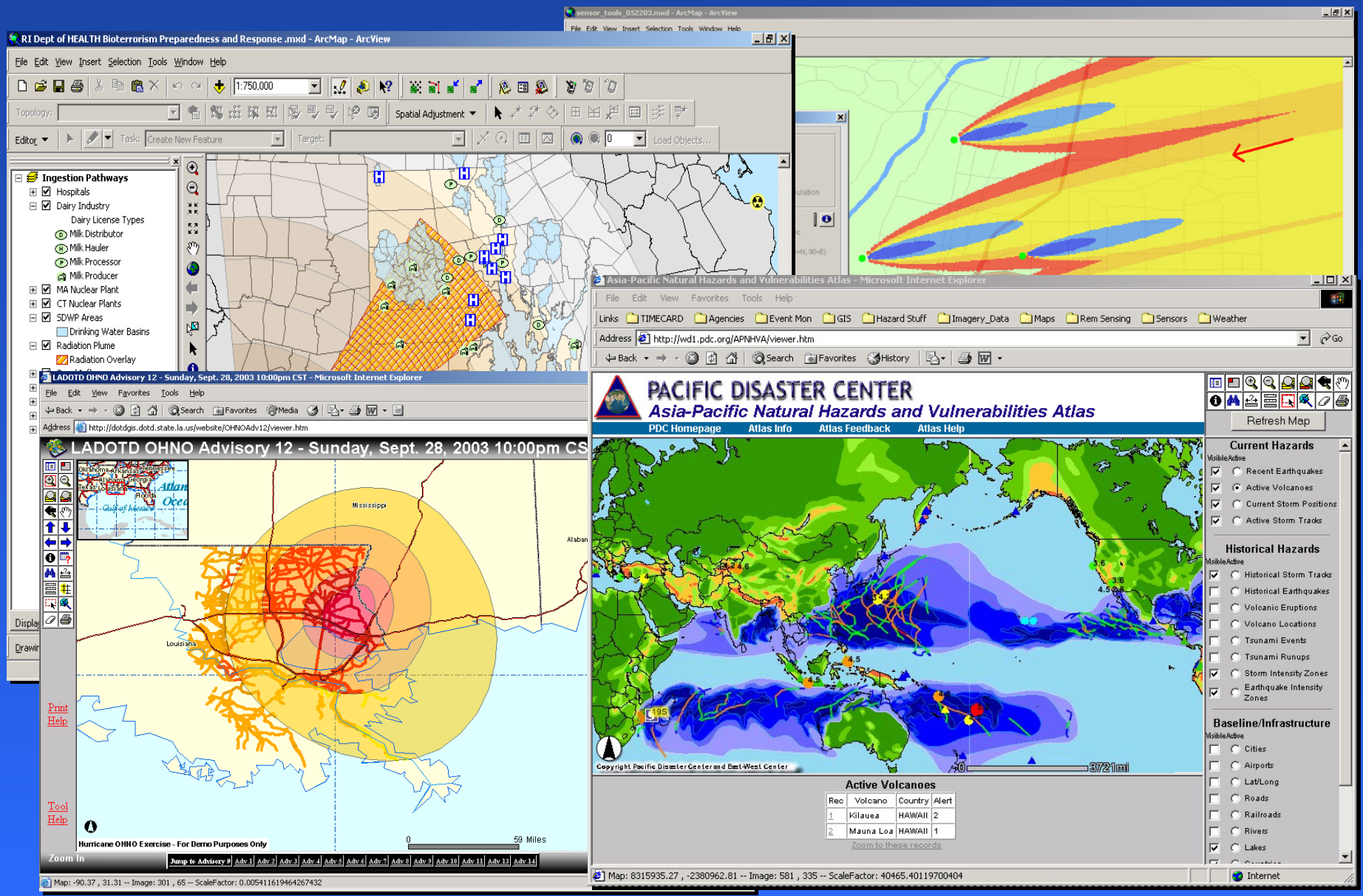
Citizens can annotate the maps And Submit Plans

US Forest Service
Forest Mortality / Wildfire

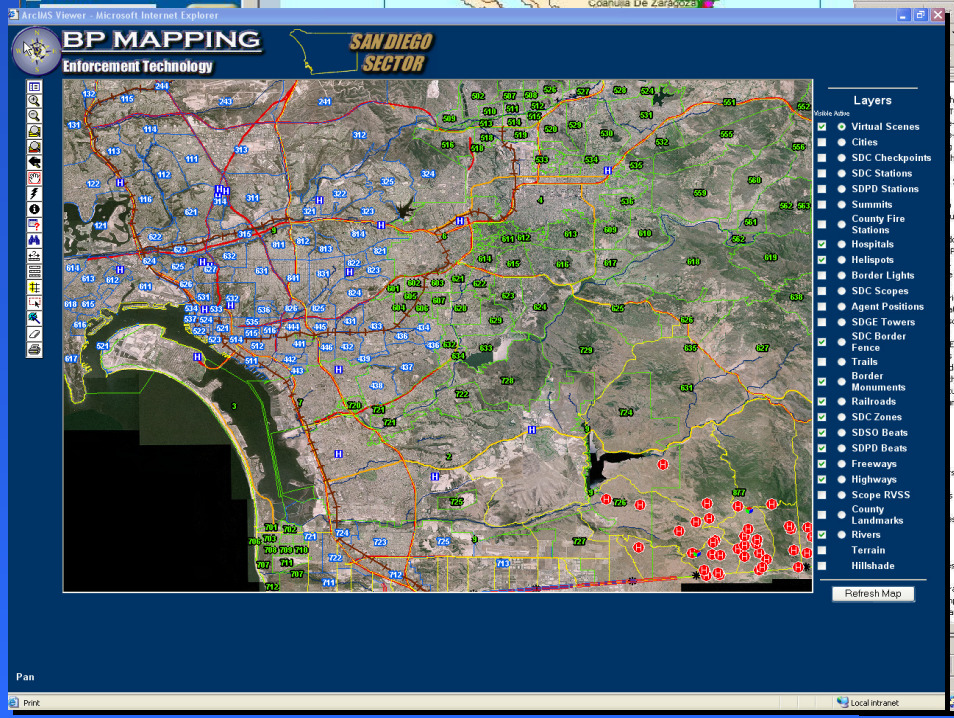


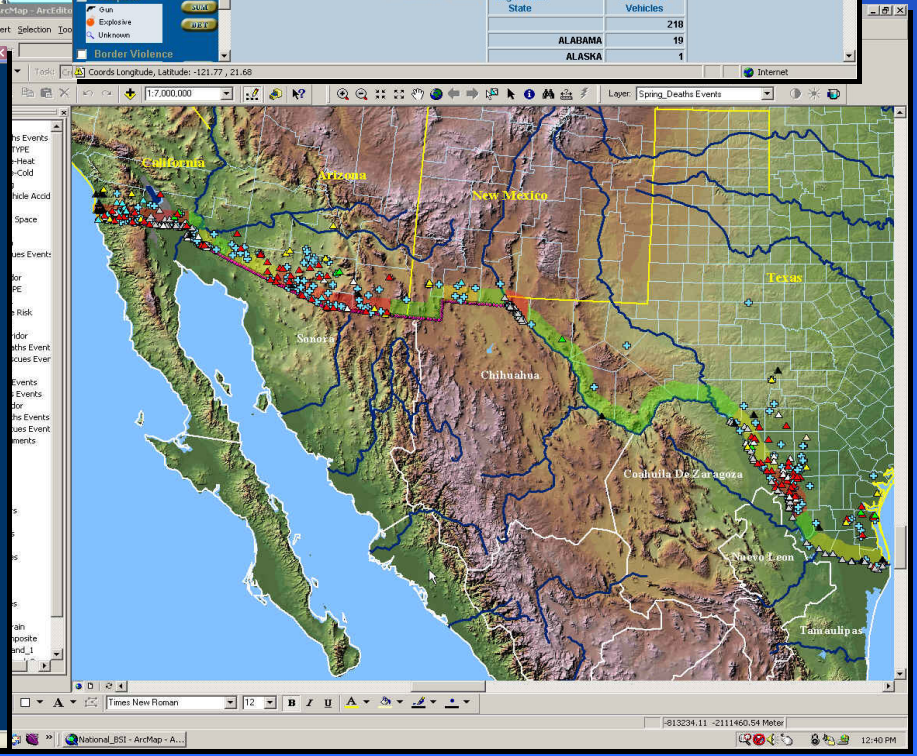


Risk Assessment Simulation Modeling

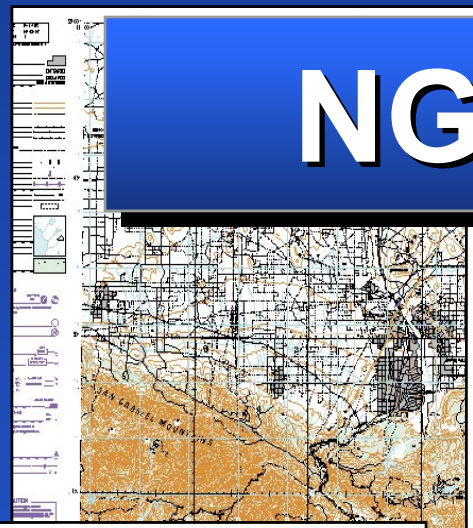


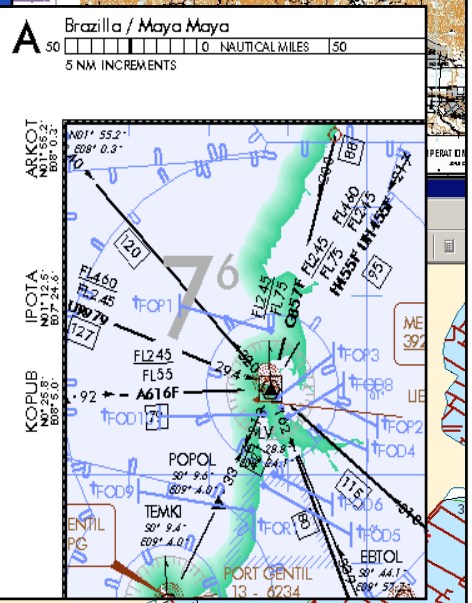
National Law Enforcement / Security

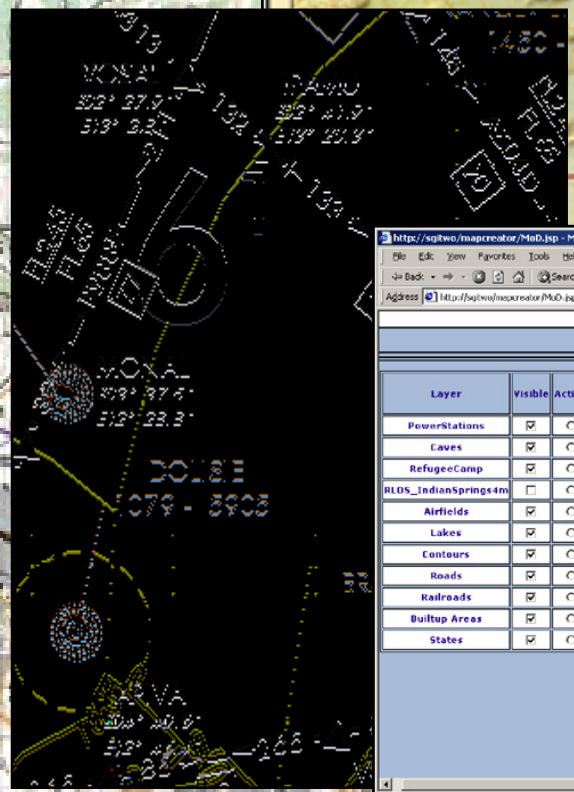


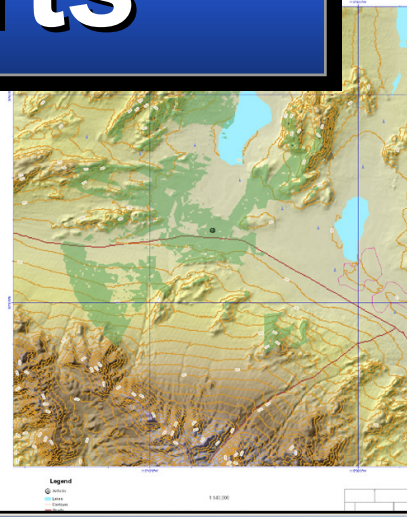


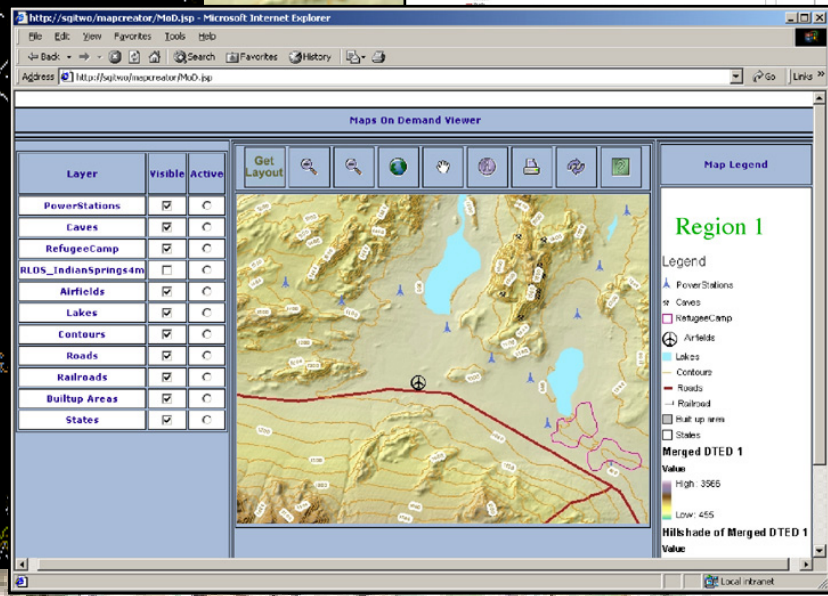
NGA Maps and Charts



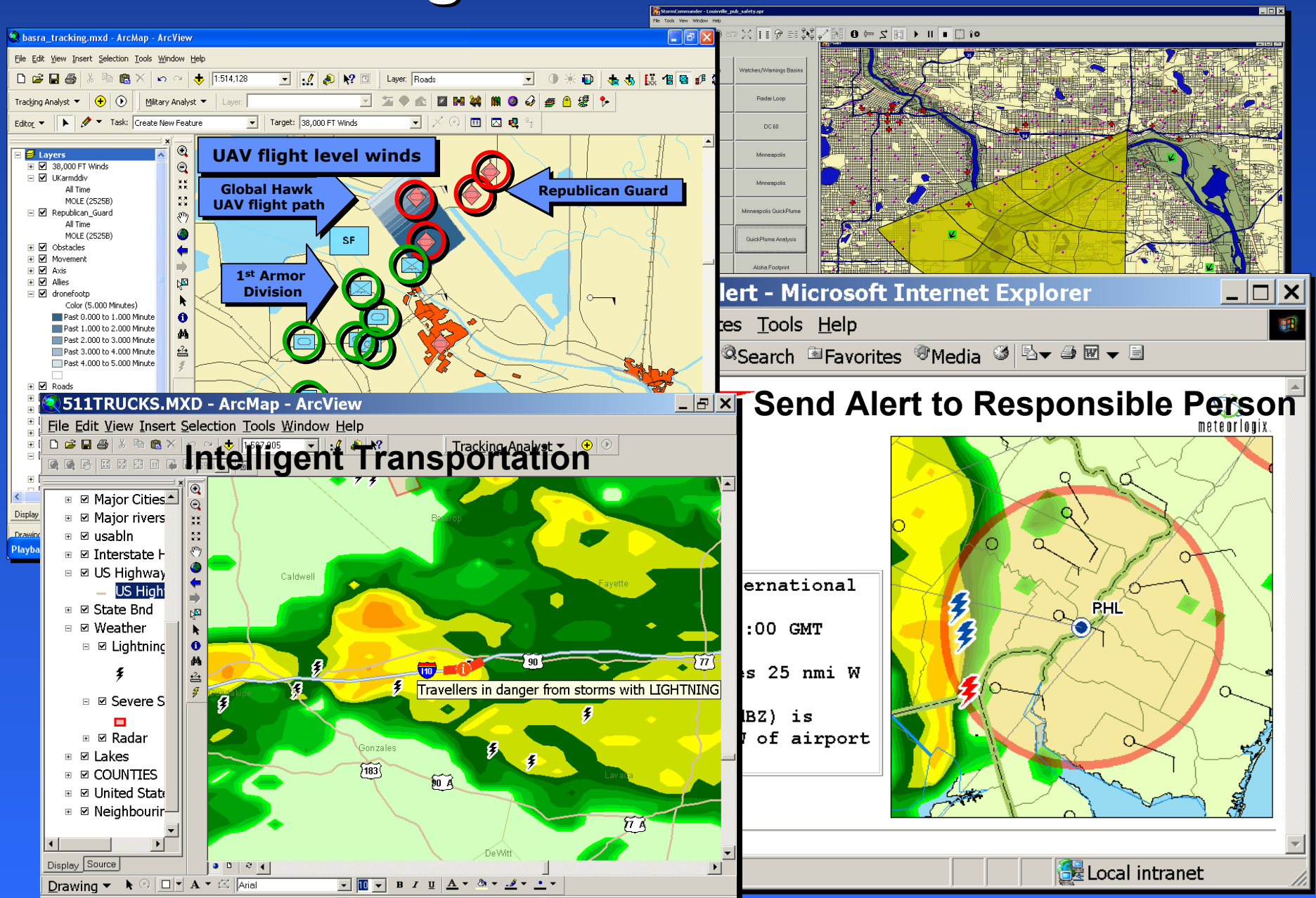








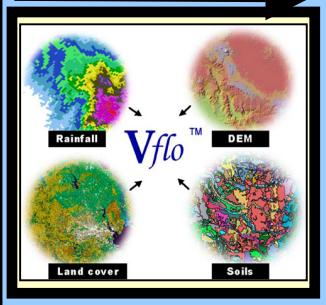
Integration of Weather



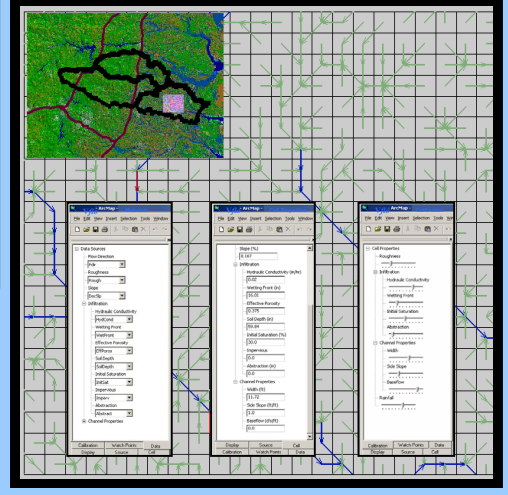
Natural Resources / Mining

Turn Your GIS Data Into An Advanced Hydrologic Model

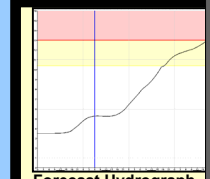
ArcGIS + *Vflo*™ for ArcGIS = Unparalleled Analysis

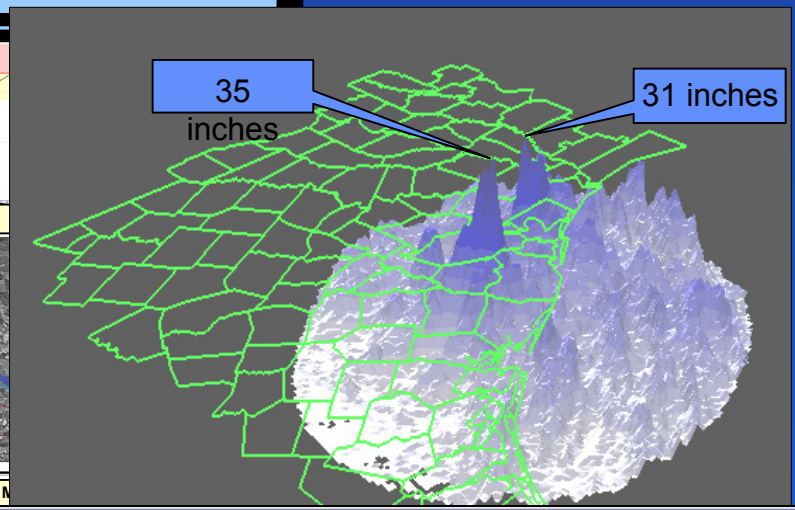


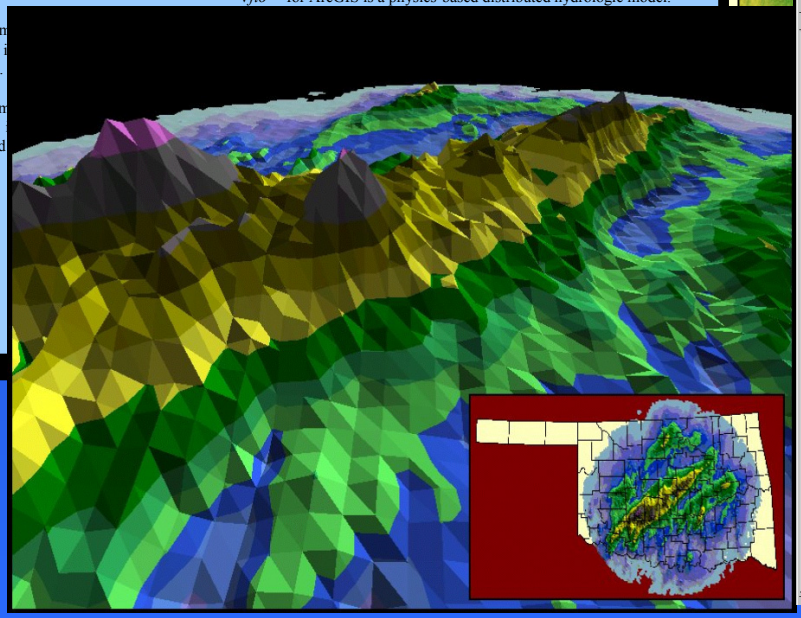
- Both data preparation and modeling are accomplished using the industry-standard ArcGIS interface.
- Existing geospatial data are leveraged using ESRI's powerful tools and unified data management system.
- Model creation, simulation and verification are done in a controlled desktop environment.
- The same n… implemented i… time systems.
- The V*flo*™ m… can enhance … and ungauged …

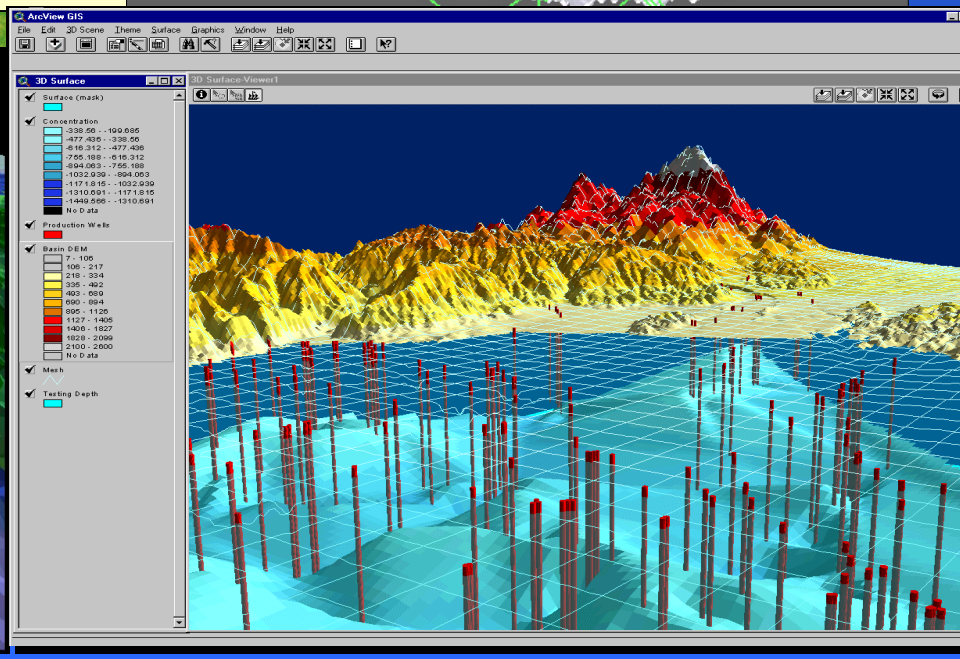


- V*flo*™ for ArcGIS is a physics-based distributed hydrologic model.









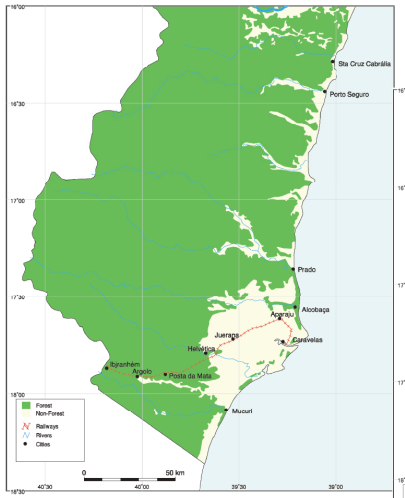
Forest Loss, Brazil

FRAGMENTATION OF FOREST COVER IN SOUTHERN BAHIA, BRAZIL. 1945 - 1990

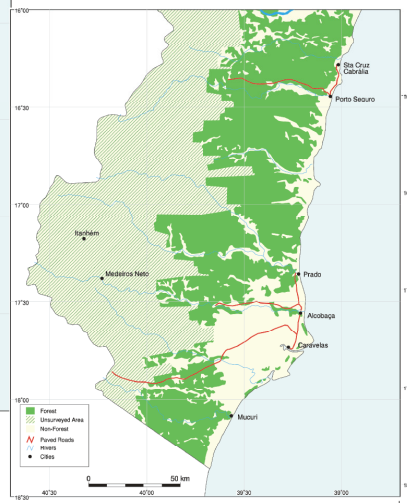
Research by The New York Botanical Garden and the Centro de Pesquisas do Cacau

The Atlantic Forest once stretched uninterrupted along the entire Eastern coast of Brazil, occupying more than one million square kilometres. Today it is one of the world's most endangered ecosystems; less than 8% of the original forest remains, and the large majority of the remainder is highly fragmented.

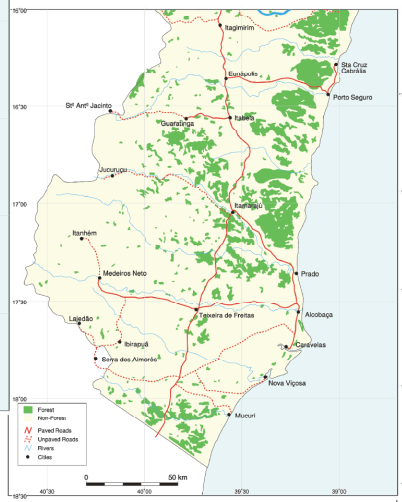
1945



1960



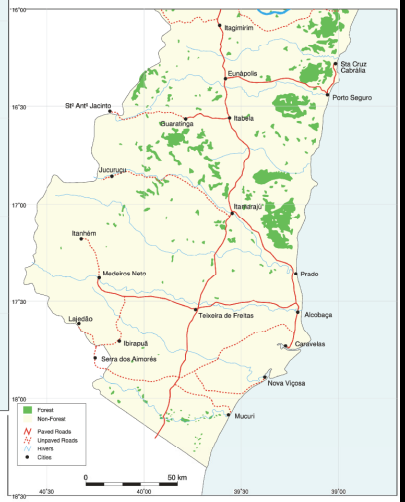
1974



©WWF/Edward Parker

Information derived from Atlas ...da Mata Atlantica. Fundacao SOS Mata Atlantica, INPE, IBAMA

1990



The remaining Atlantic Forest is one of the richest forests on earth: scientists from the New York Botanical Garden have found 450 tree species in one hectare of Atlantic Forest, the highest tree diversity recorded anywhere on earth. Of 680 bird species found in the Atlantic Forest, 199 are found nowhere else on earth; 73 mammals and 260 reptiles and amphibians are also unique to the region. These forests are a butterfly paradise with more than 2000 species. The Atlantic Forest is home to many endangered species, including the whitenecked hawk, the maned sloth, and the Goldenheaded Lion Tamarin (Leontopithecus chrysomelas), of which fewer than 1000 individuals remain in the wild.

The loss of the Atlantic Forest is due primarily to agricultural expansion, initially for sugar cane and more recently for cattle ranching. In southern Bahia logging for timber has increased since the late 1980s, as cocoa production in the forest understorey has been affected by crashing cocoa prices on international markets. The situation worsened in 1989 when "witch's broom" fungal disease swept through the cocoa plantations.

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L Ledgerwood/WWF-UK

David Lawson/WWF-UK

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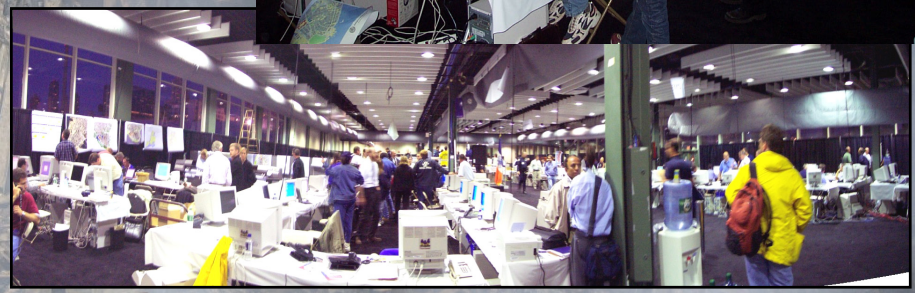
Mendonça, J. R., A. M. de Carvalho, L. A. Mattos Silva, and W. W. Thomas. 1994. 45 Anos de Desmatamento no Sul da Bahia. Remanescentes da Mata Atlantica - 1945, 1960, 1974, 1990. Projeto Mata Atlantica Nordeste, CEPEC, Ilhéus, Bahia, Brazil.

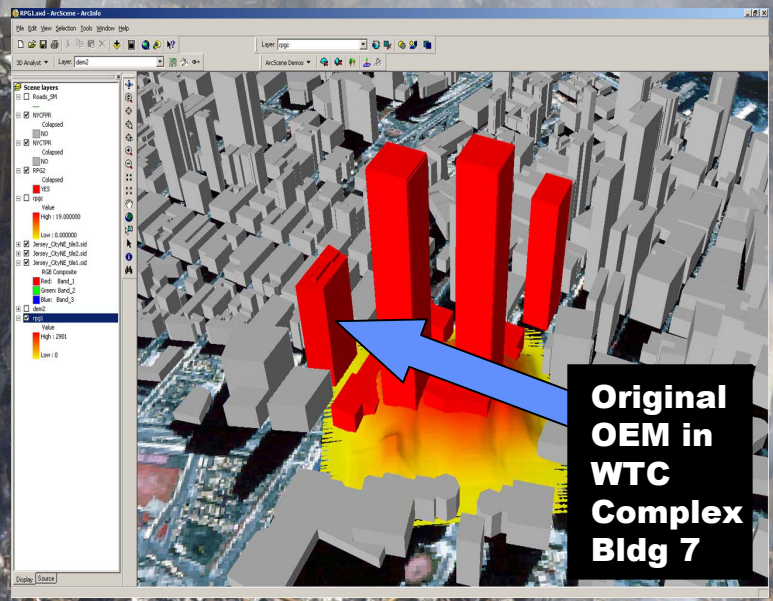
WWF

THE NEW YORK BOTANICAL GARDEN

WORLD CONSERVATION MONITORING CENTRE

GIS in the Office of Emergency Management, New York City

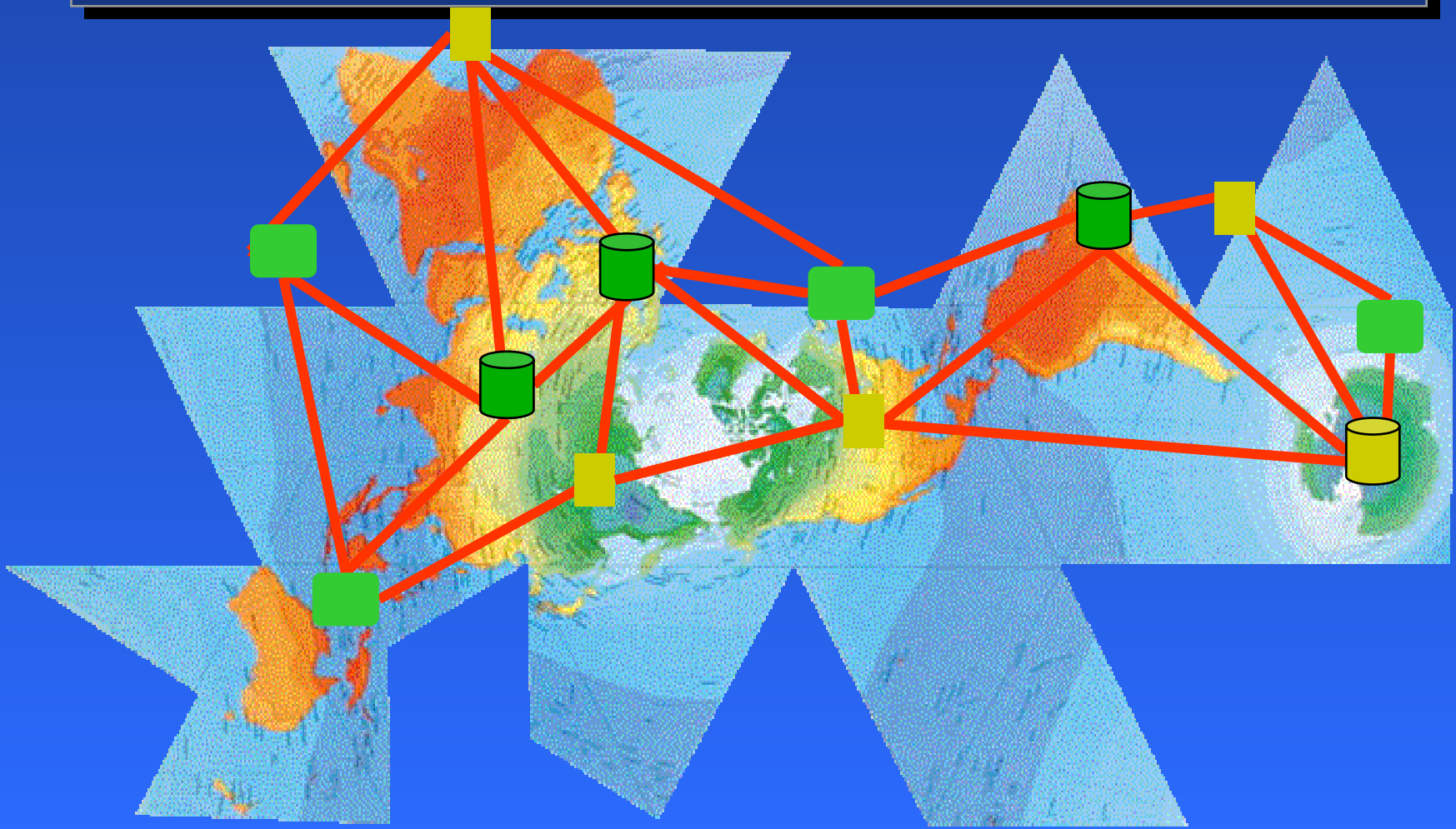




GIS Imperative

- **Strategic**: geography can organize
  - Create master plans
  - Manage resource allocation / usage
- **Tactical**: location improves services
  - Evaluate health / social locations
  - Estimate utility requirements
- **Operational**: overcoming distance
  - Plan facility maintenance
  - Raise property tax collection
  - Optimize deliveries

Strategies for Developing NSDI

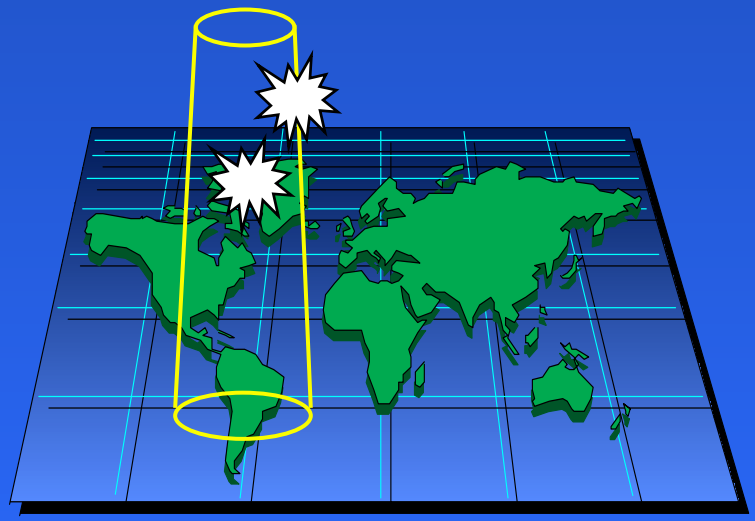


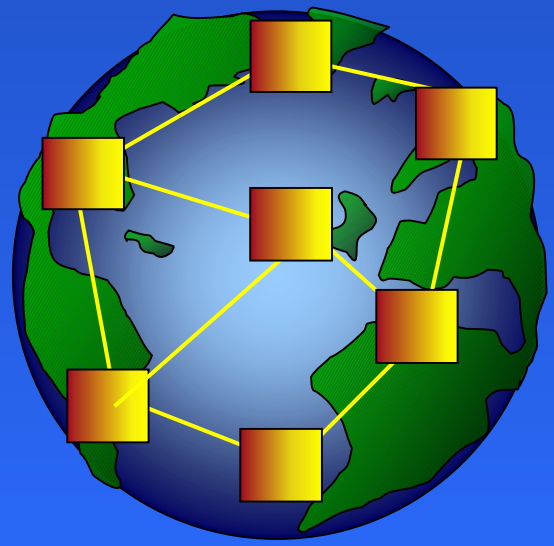
Building GIS Bottom Up

- Difficult to create common approaches / standards
  - Catalogs
  - Data exchange / integration
- Hard to build cooperation / sharing
- Too slow
- Too expensive

Many Countries Developing Top Down GIS Strategies

- Spatial Data Infrastructures



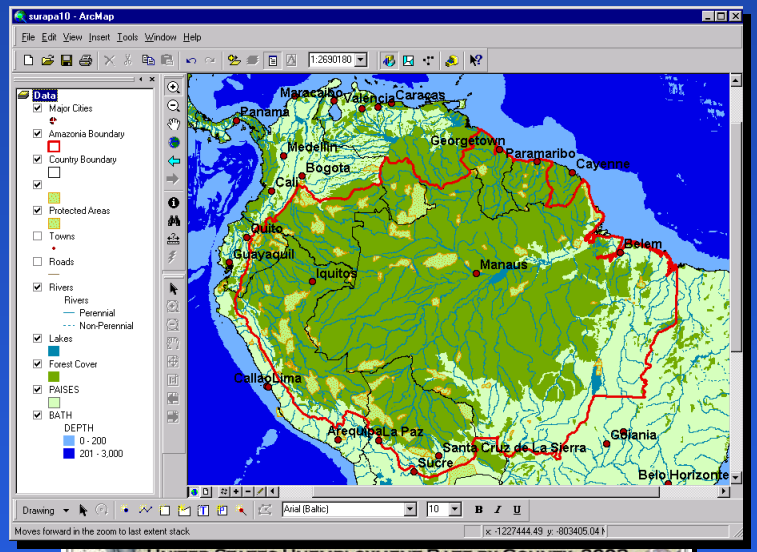


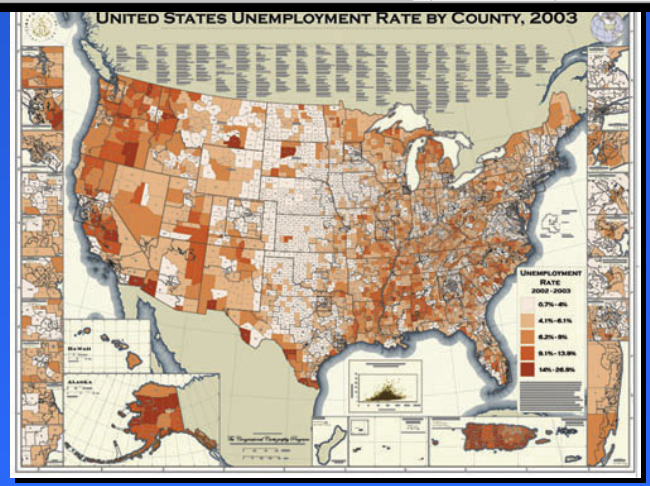
Spatial Data Infrastructure

- **Coined in 1993 by the US National Research Council**
- Technology, policies, standards, human resources, and related activities
- Acquire, process, distribute, use, maintain, and preserve spatial data
- All levels of government, the private and non-profit sectors, and academia

SDI Today

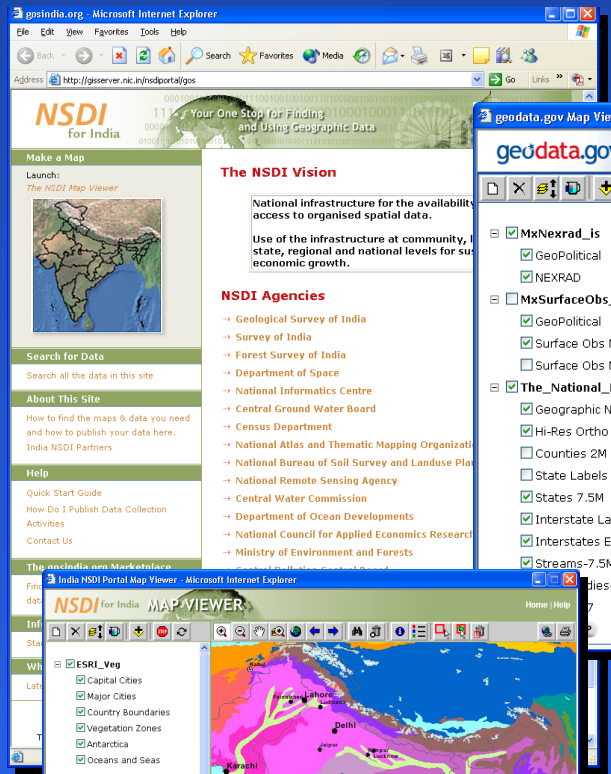
- Many scales
  - Global SDI
  - National SDI
  - Regional SDI
  - Local SDI
- Many programs
  - +100 NSDI
  - +1000 R+L SDI

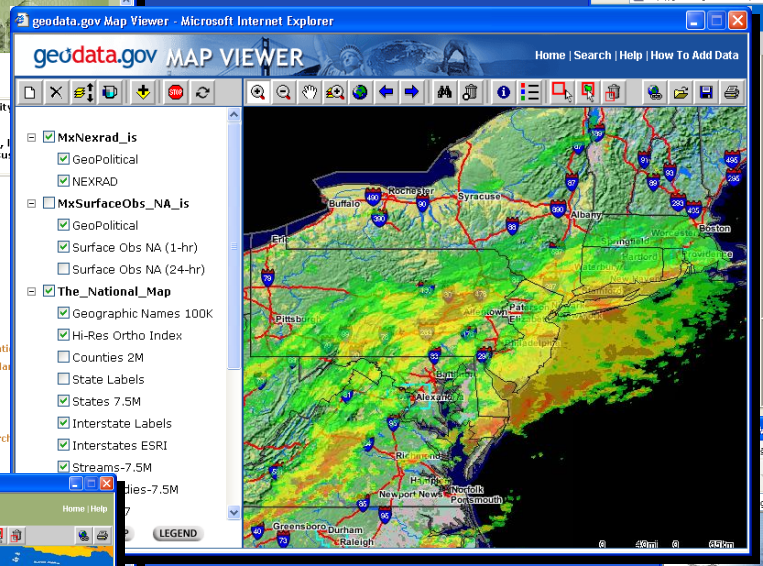


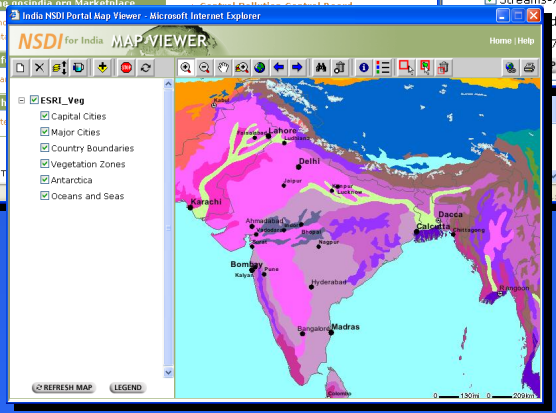


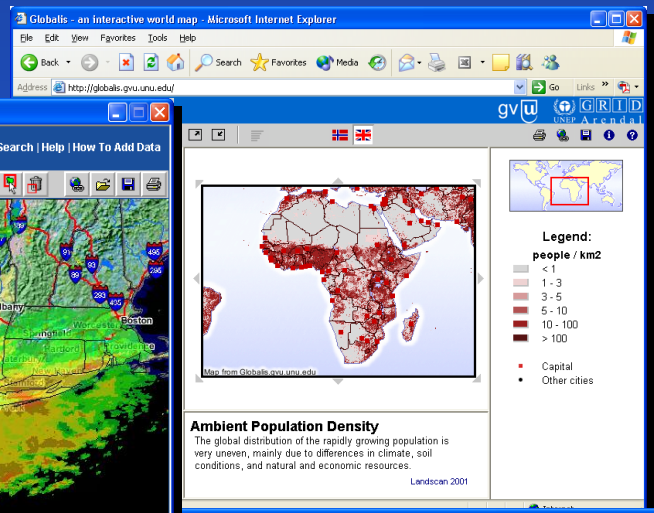
Many Global and National SDI

India, USA, Europe, UNEP





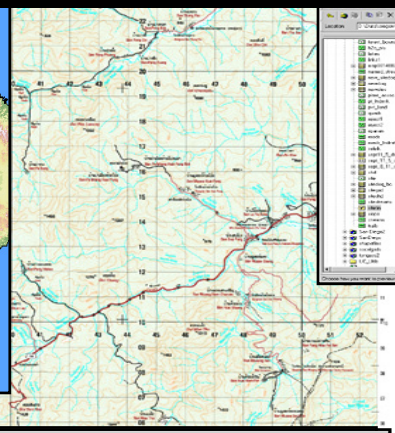


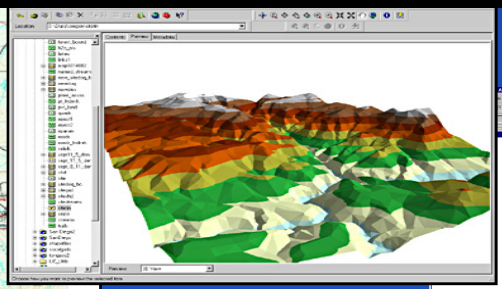


- GSDI
- Global Map
- Digital Earth

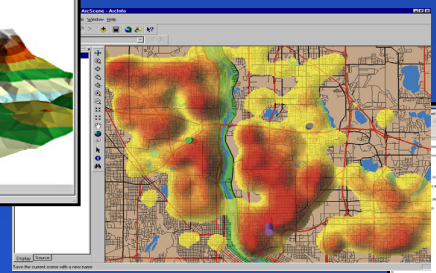
Thailand Base Map

Foundation for NSDI

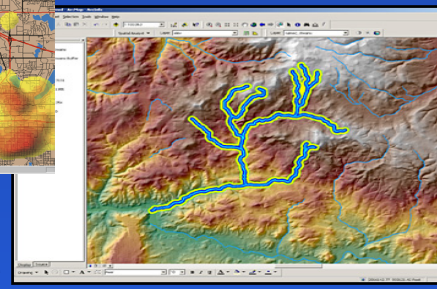




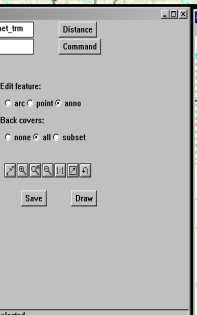
3-D Modeling & Analysis

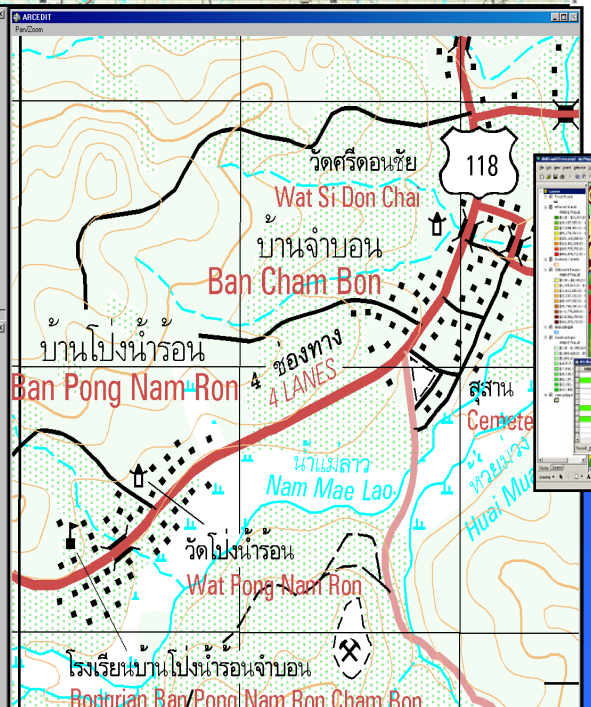


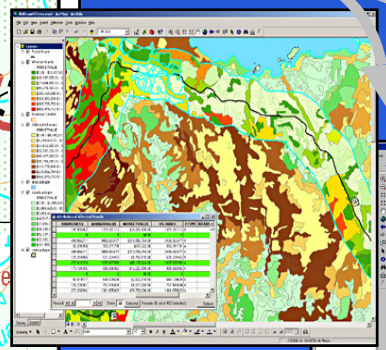
Emergency Management



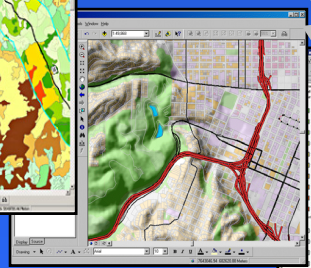
Environmental Management



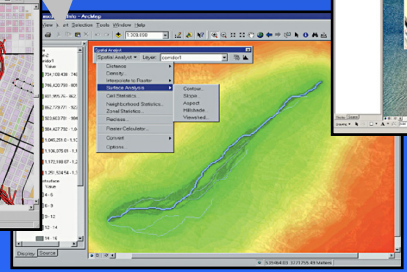




Forestry



Urban Planning



Flood Plain Studies

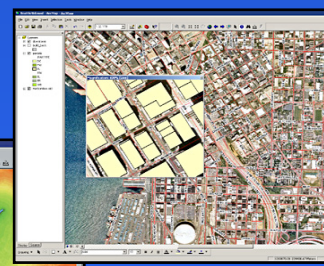
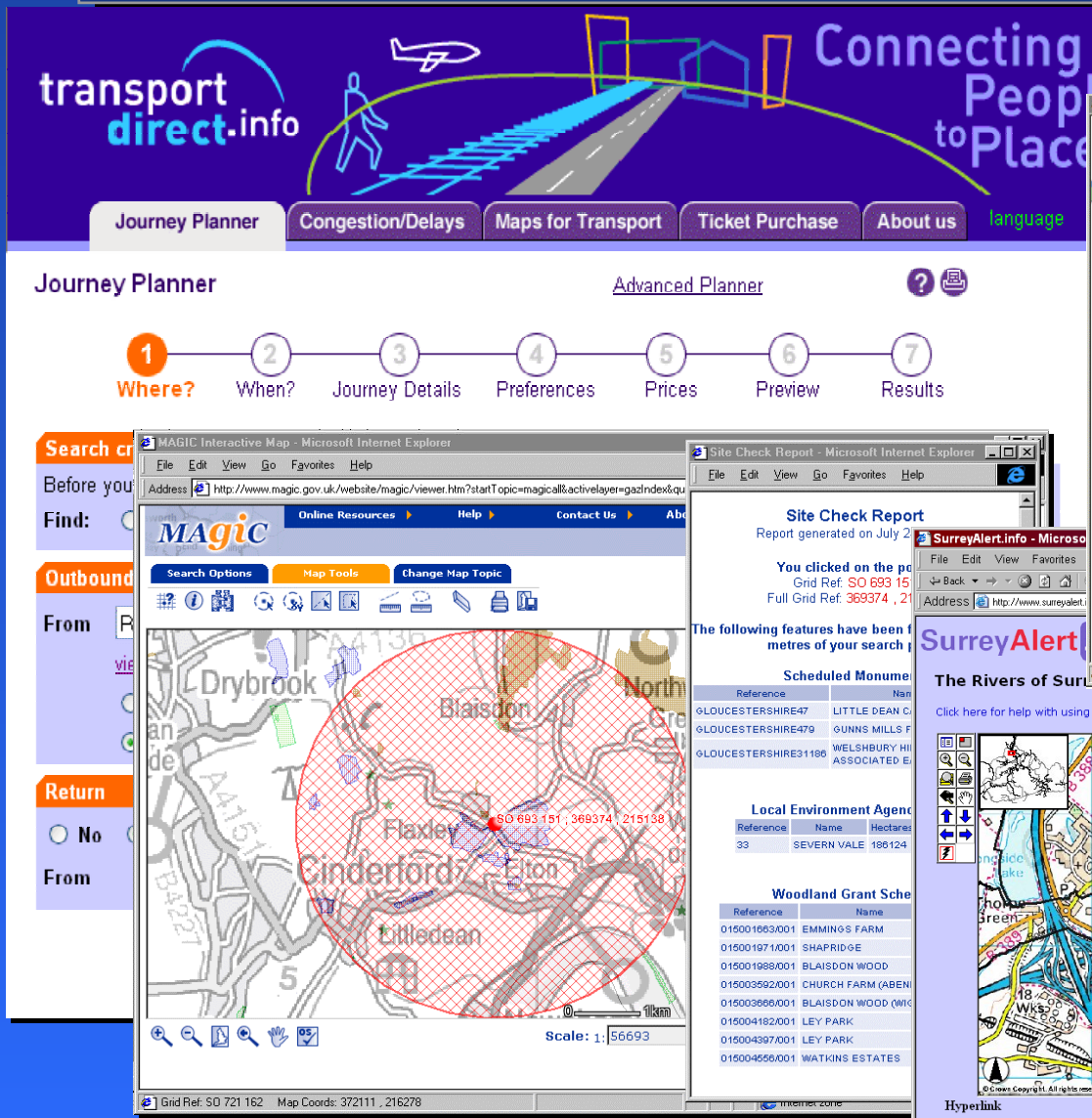
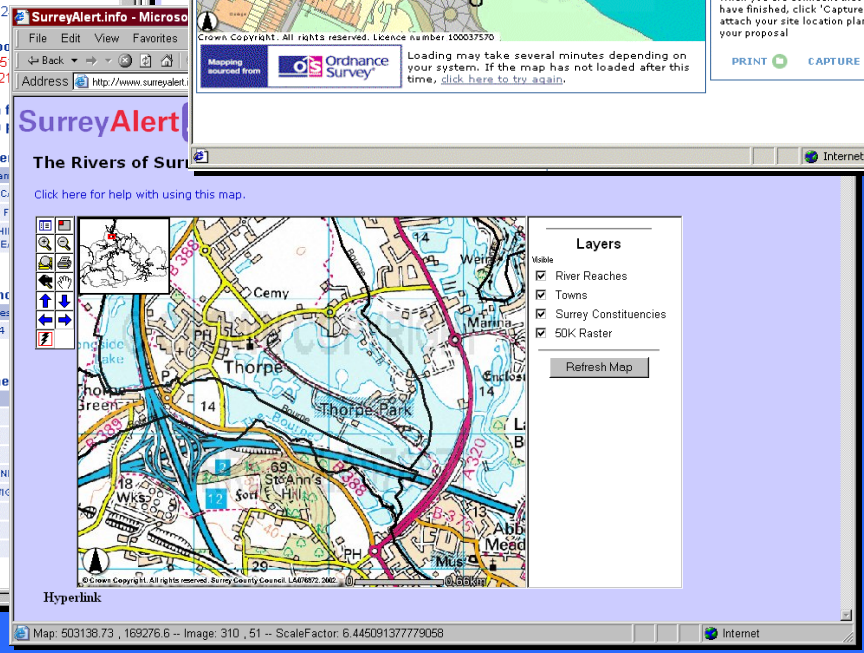
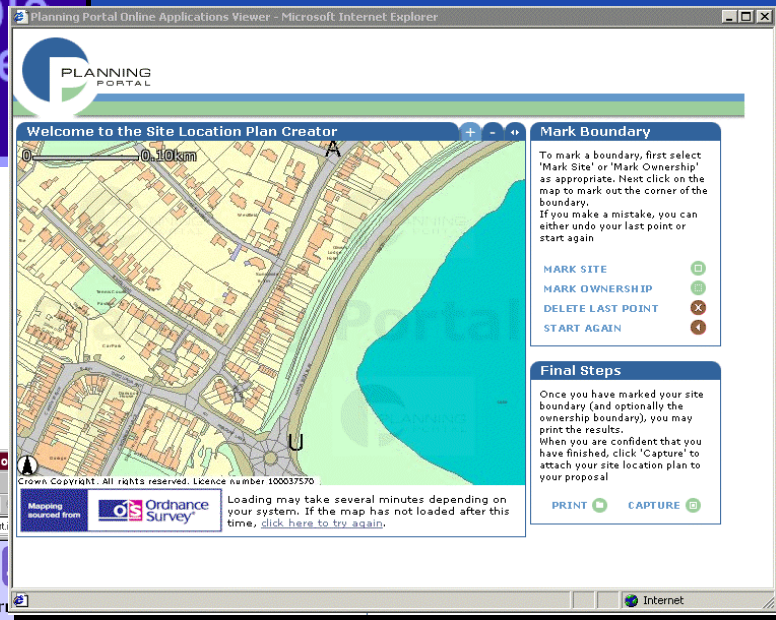


Image Analysis

UK Government On-line

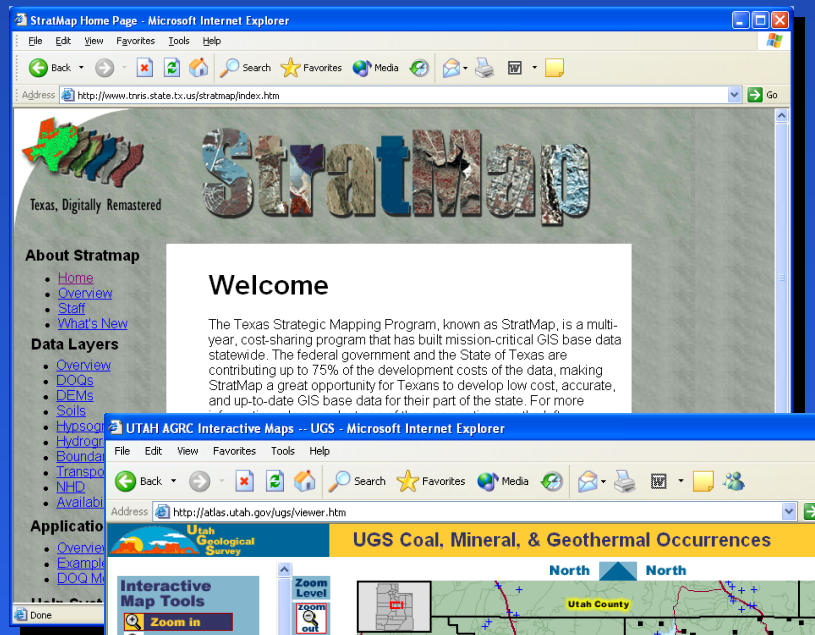


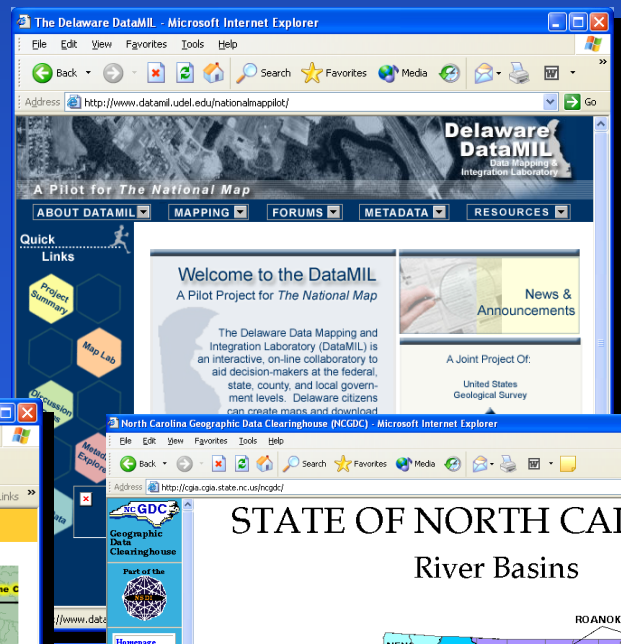


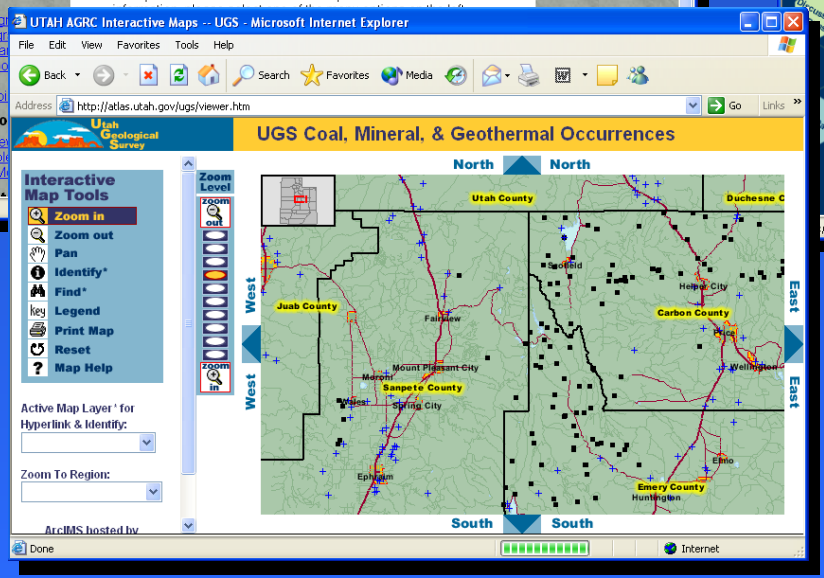


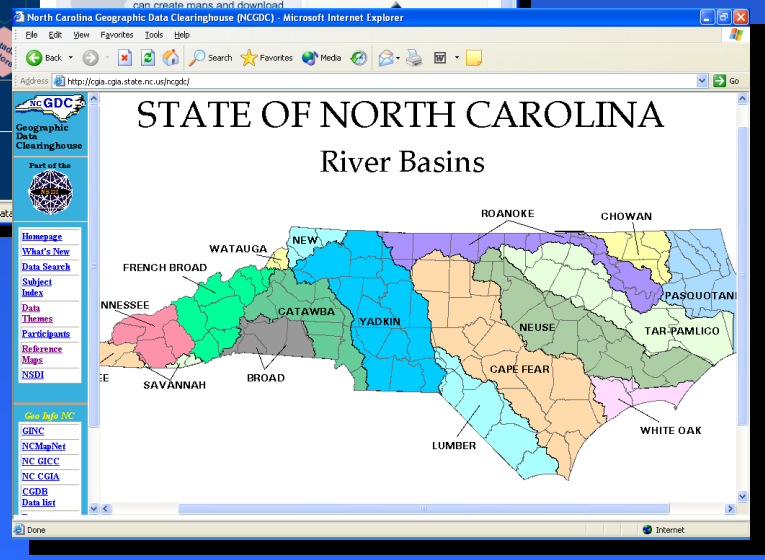
Many State Agencies

Delaware, North Carolina, Texas, Utah



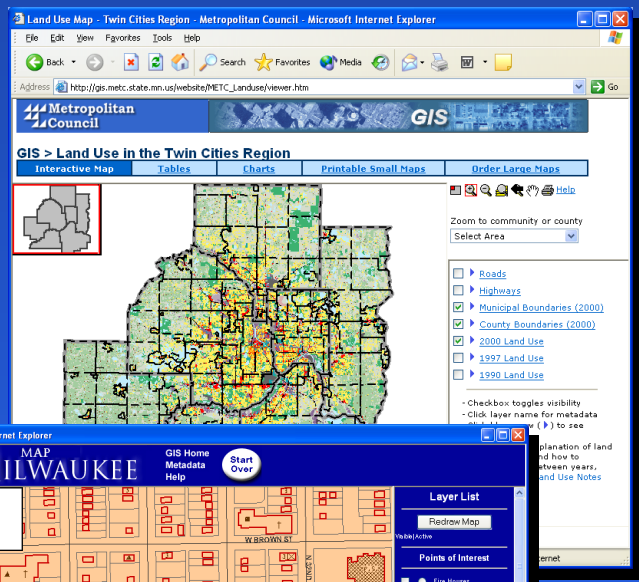


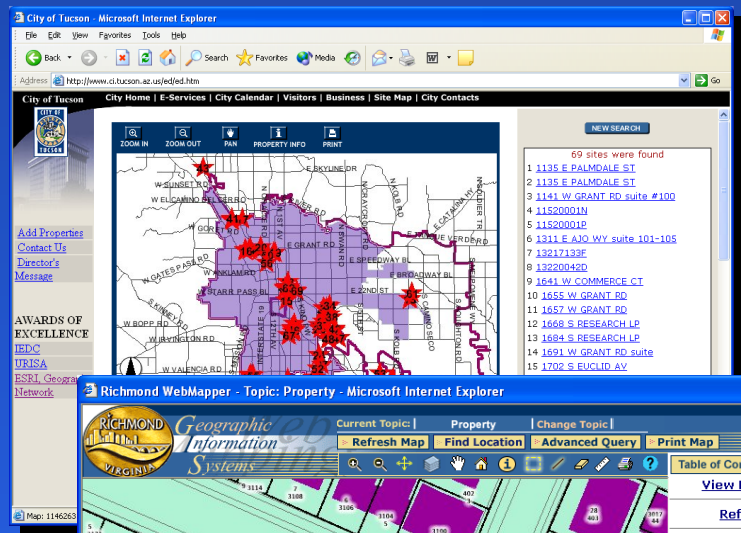


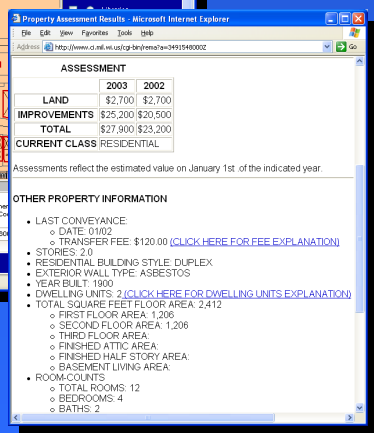


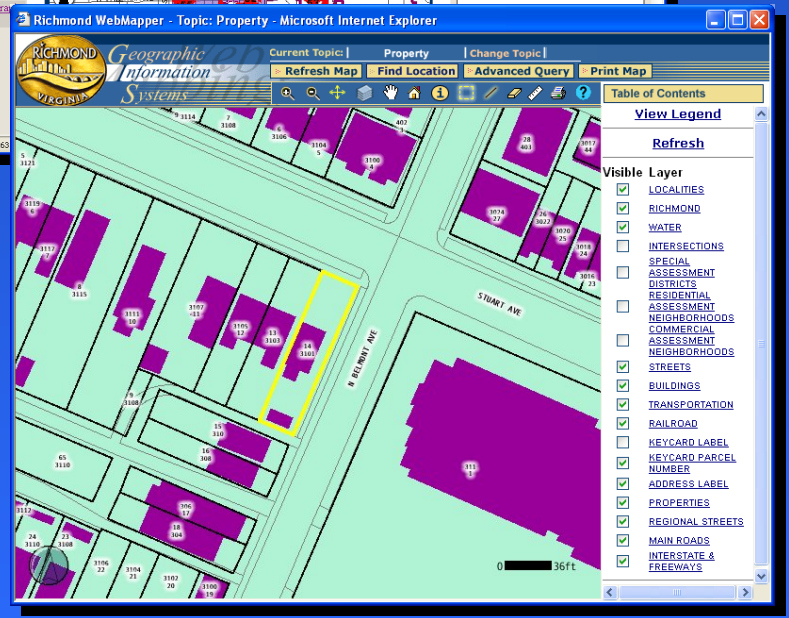
Many Local Government Agencies

Milwaukee, Minneapolis, Richmond, Tucson



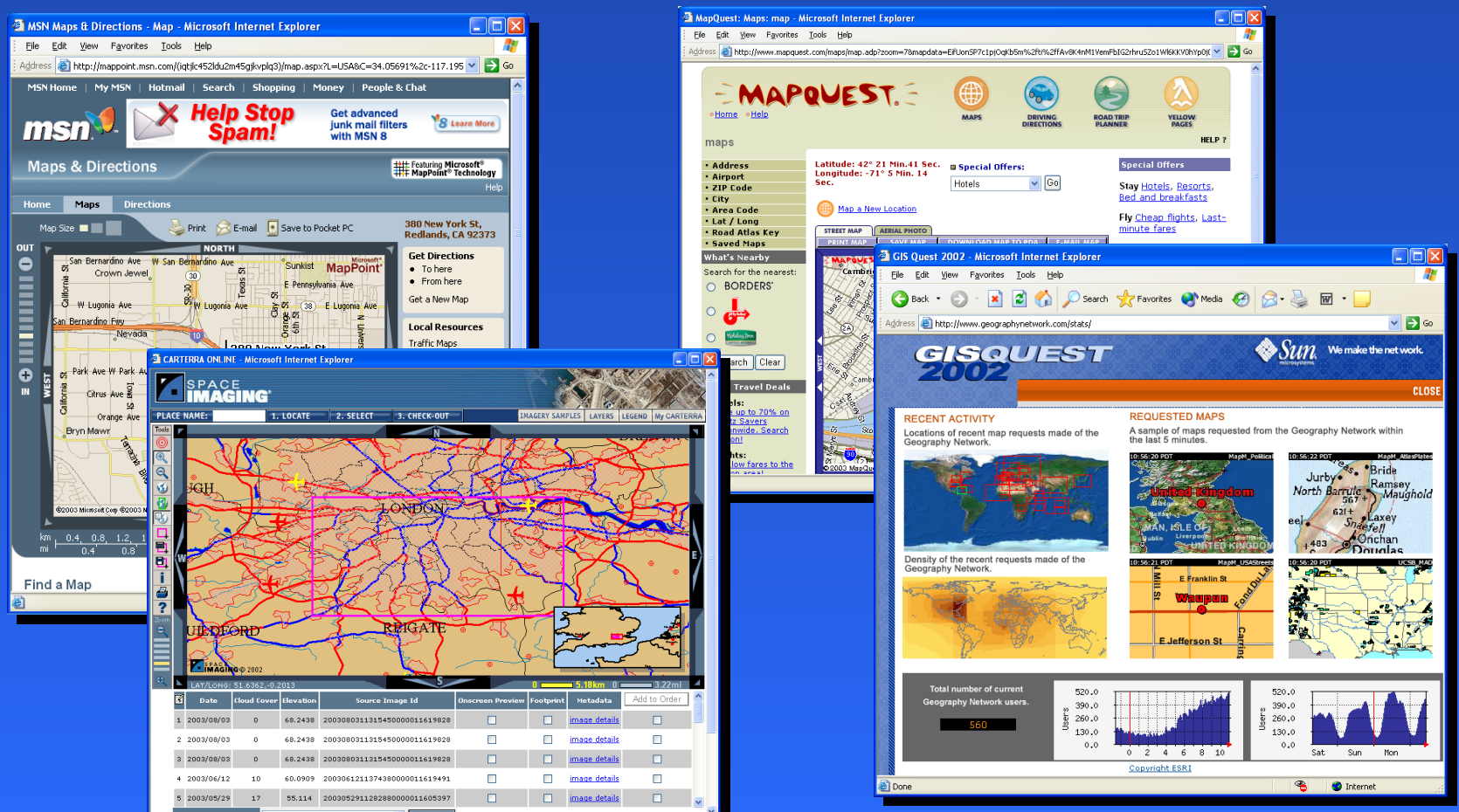




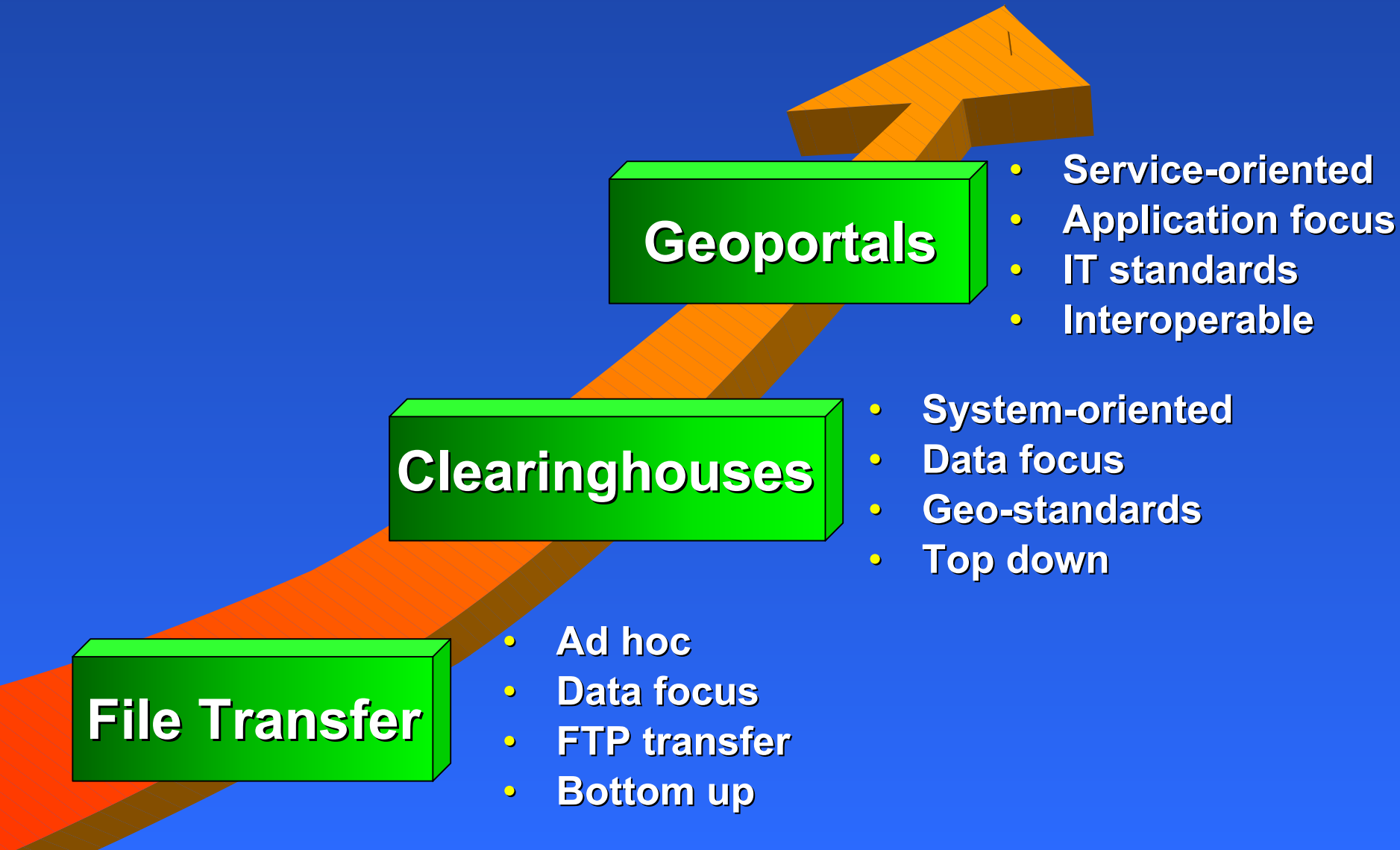


Many Private Initiatives

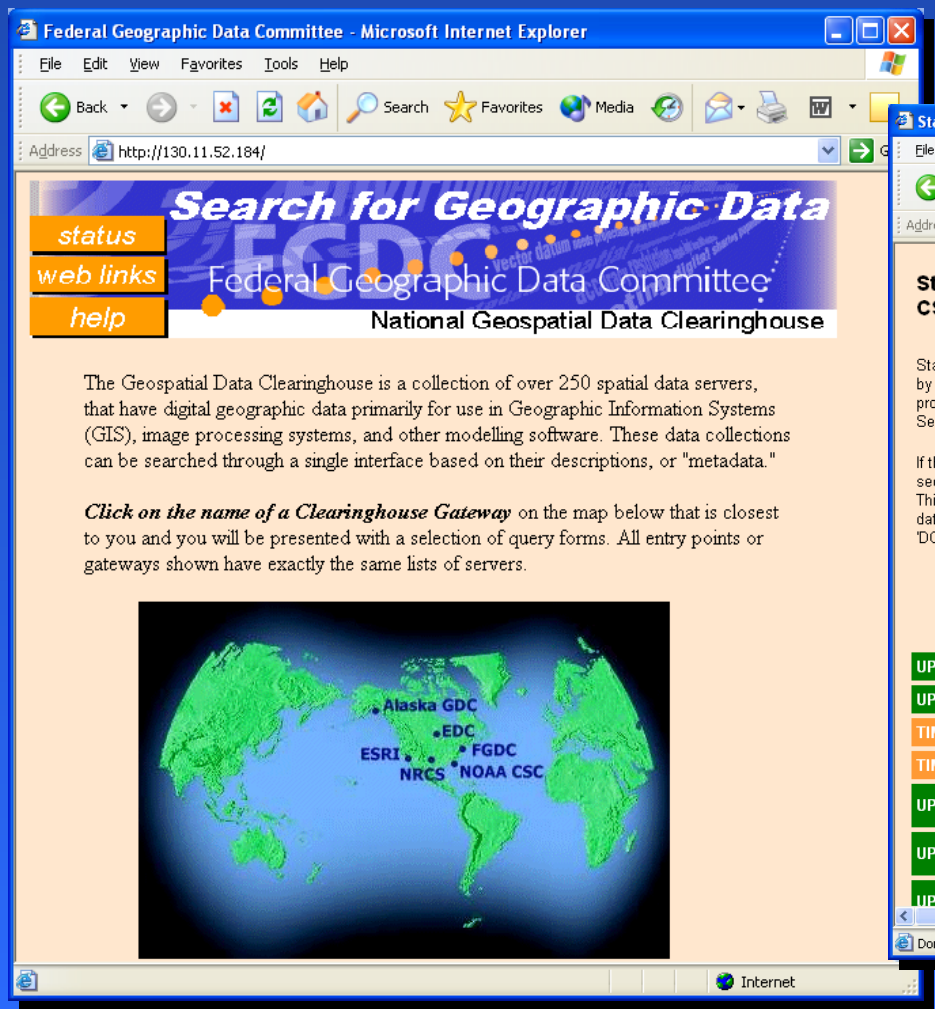
ESRI, Microsoft, Mapquest, Space Imaging, Digital Globe

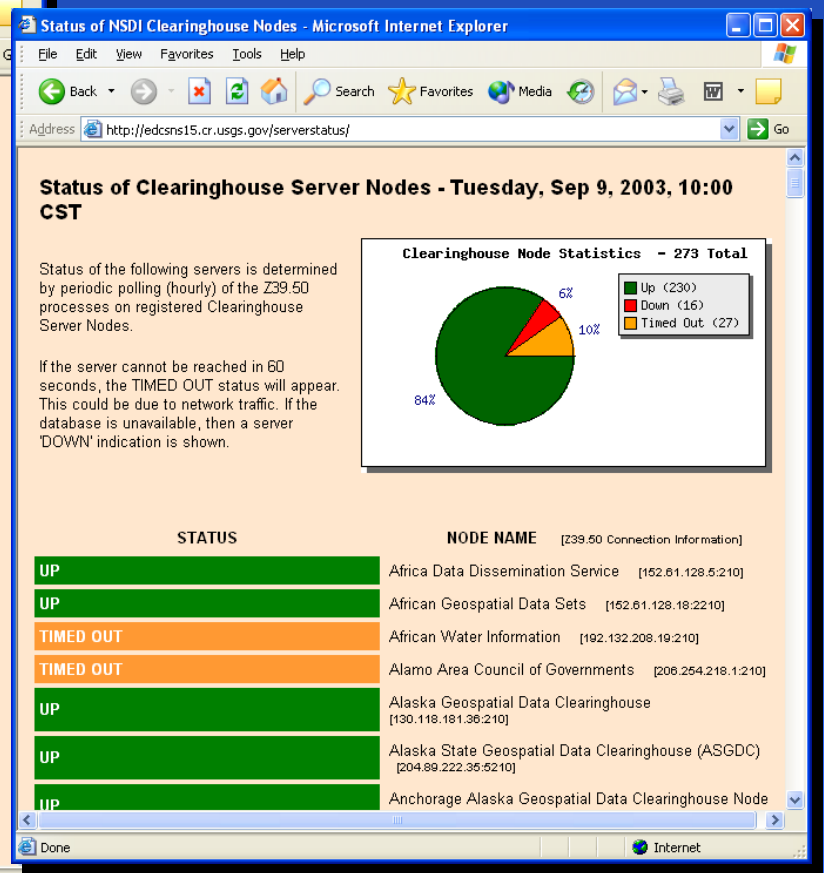


Evolution of SDI Technology



National Geospatial Data Clearinghouse





www.geodata.gov

Geospatial One-Stop

Stages of E-Government

1. **Static** information – govt. on-line
2. **Dynamic** information – many sites
3. **Interactive** – download forms
4. **Transaction** – users pay for services on-line
5. **Seamless** – full integration of services across admin. boundaries

E-Gov Web Sites v Portals

Feature	Web site	Portal
Organizing principle	Structure of government	Citizen needs and interests
Home page	List of Agencies / Departments	List of Citizen tasks
Content	Static information	Interaction and transactions
Look and feel / Navigation	Varies from dept – dept	Common across government

The Case for GIS

- **Save money**
  - Decrease facility replacement costs
  - Reduce fertilizer levels
  - Alleviate traffic congestion
  - On-line services (elections, billing, planning applications..)
- **Make money**
  - Economic development – inward investment
  - Increase property taxes
  - Sell maps, data and services
- **Improve services**
  - Reduce pollution
  - Improve water supply
  - Communicate plans

Strategic Goals
Next Steps

- **Phase 1 – Infrastructure Initiation**
- Develop vision
- Create GIS Center
- Establish GIS Council
- Begin forging partnerships
- Establish interim system architecture
- Assemble current data resources

Strategic Goals
Next Steps

- **Phase 2 – Countrywide System Architecture**
- System design and planning
- Develop standards
- Build “framework” data layers
- Early wins from key example applications

Strategic Goals
Next Steps

- **Phase 3 – Expand Geographic Infrastructure**
- Improve based on “business” needs
- Continue “build-out” of system architecture
- Seek permanent, flexible funding sources

Critical Success Factors

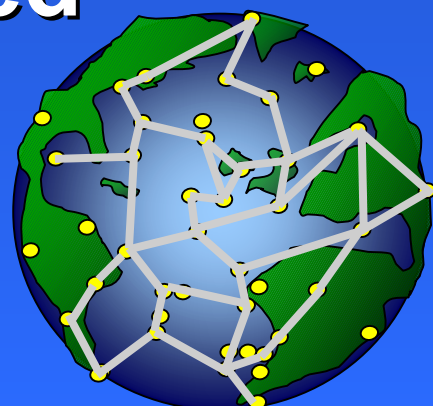
- Vision
- Funding
- Organization
- Leadership
- Management

Why SDI?

- Foundation stone for good governance
  - Transparent government
  - Increase participation in democratic process
  - Empower government workers and citizens
  - Improve service effectiveness / efficiency
  - Improve decision making

Why NSDI?

- Collect data once, use it many times
- Avoid development of duplicate data sets
- Reduce data management / service costs
- Generate revenue from data/service sales

Conclusions

- SDI's are gathering momentum at all scales
- The business case is compelling
- Technology is mature
- Strong leadership is required