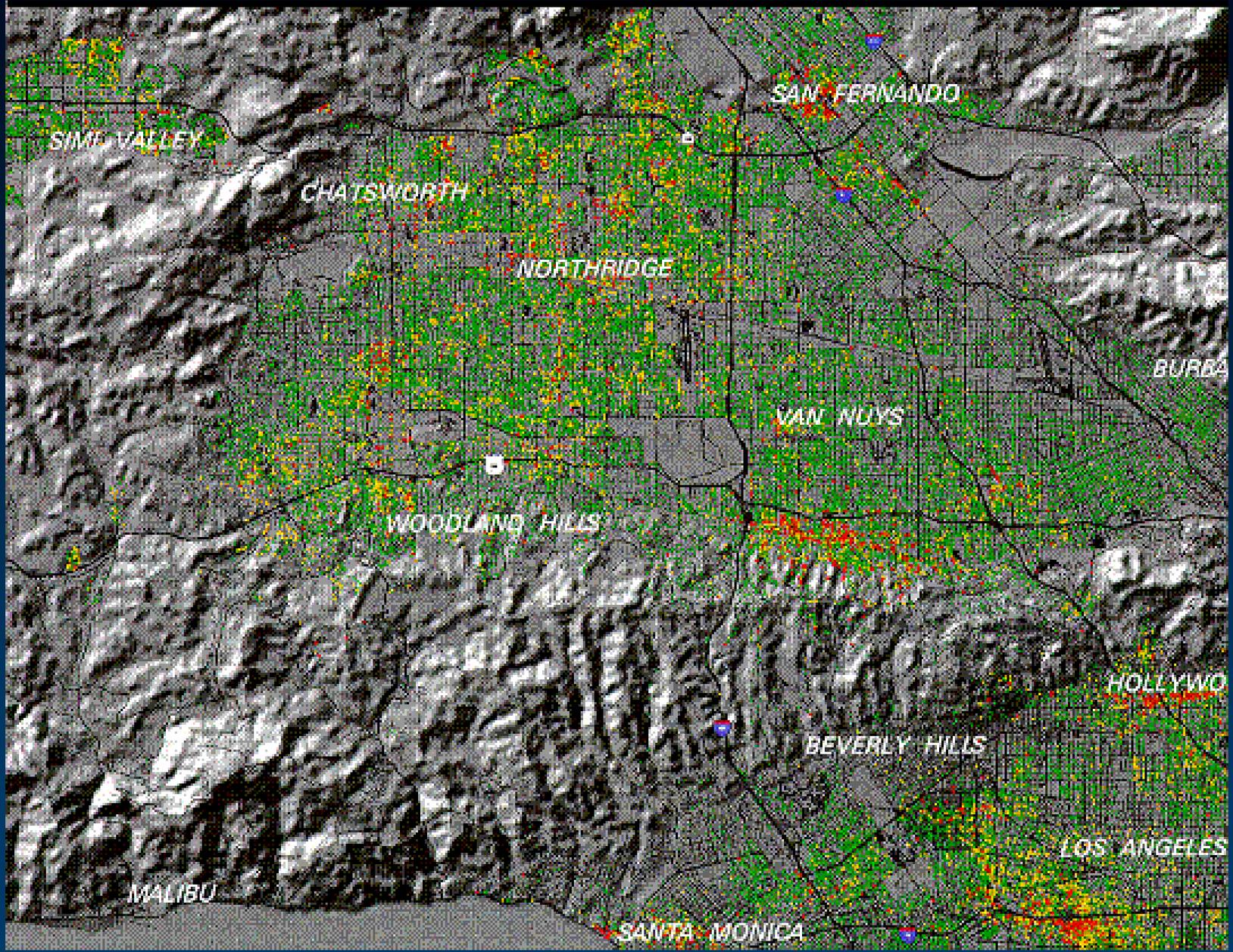




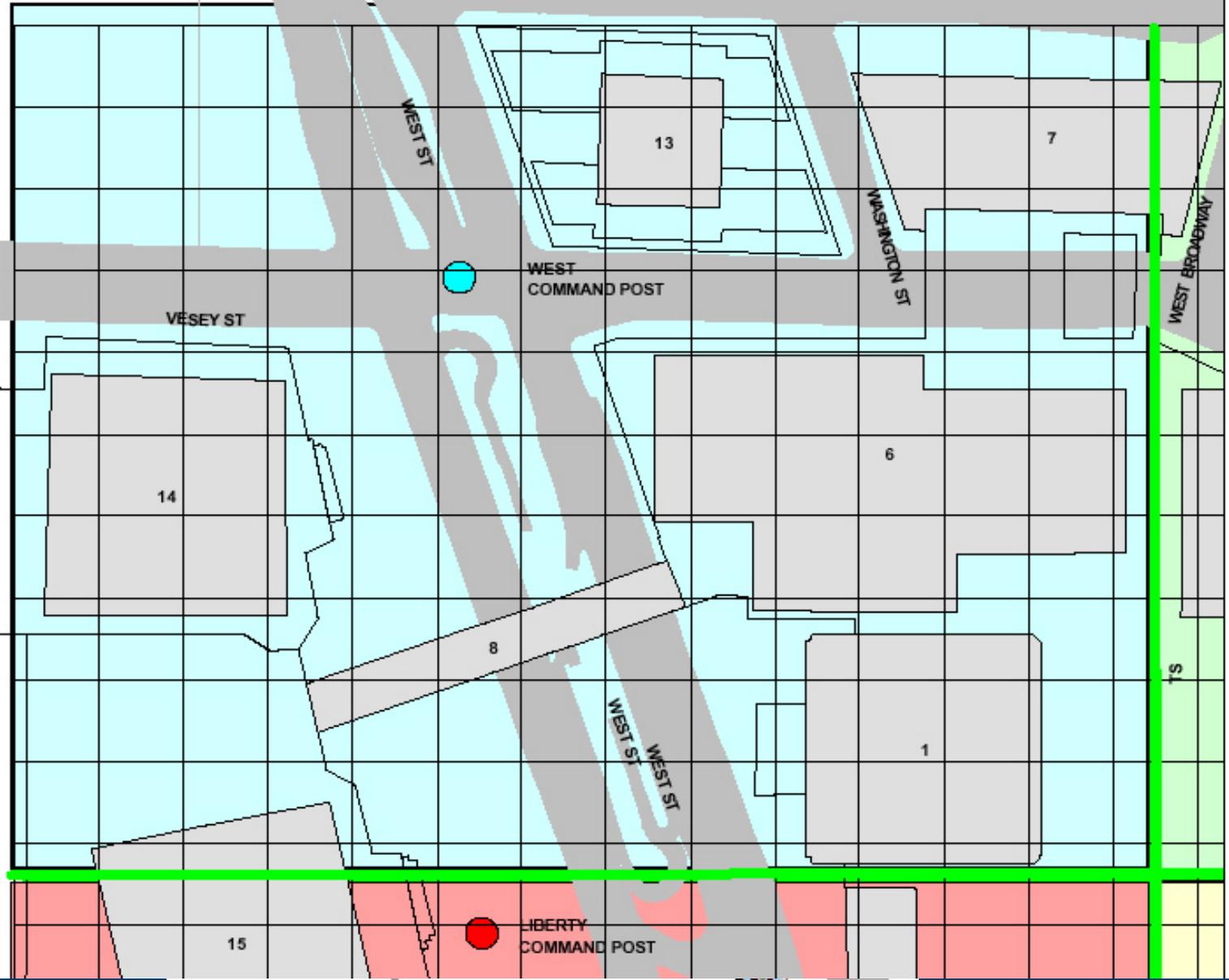
# Issues

- Shared Applications
- CAD-GIS integration
- SDE Server/Personal
- WEB Public Information Requests
- Extents
- Image Server /GlobeServer
- Infrastructure
- Personnel & Training



A B C D E F G H I J K L M N

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**WEST SECTOR**

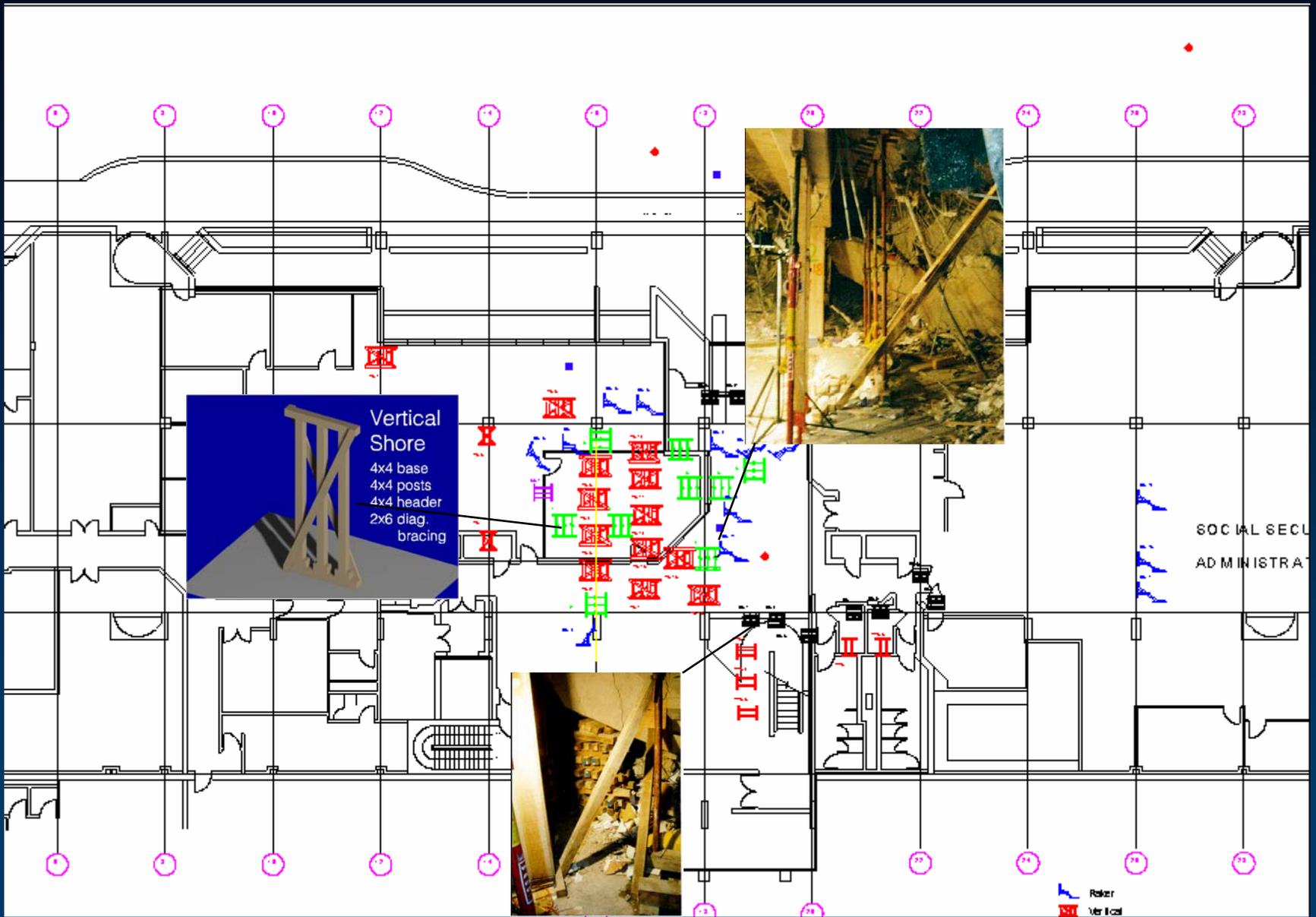


WEST BROADWAY

5-13-2002







**Vertical Shore**

- 4x4 base
- 4x4 posts
- 4x4 header
- 2x6 diag. bracing



SOCIAL SECURITY  
ADMINISTRATION

 Raker  
 Vertical

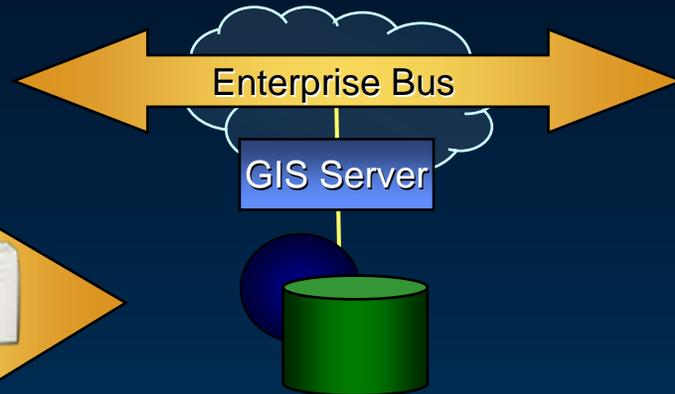
# Enabling Technology

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

**Scalable  
Networked  
Hardware**



## Services-Oriented Architecture



*Open, Flexible, and Standards Based*

# Bay Area Pilot Overview

- Bay Area Regional Homeland Security Data Server (BAR-HSDS) Project
- Each server will be capable of providing critical geospatial information region-wide for the homeland security community, at all levels of government.
  - Redundant servers in several locations in the San Francisco Bay Area.
- Information loaded to the system will also be sent to USGS for incorporation into The National Map using the best method available.
- For this project, the USGS is not expected to perform any additional processing.
- Explore the automation of the ETL (extract, transform, load) process to enable incorporation of local "quilt" data into national seamless "blanket" coverage within The National Map.
- USGS will then forward the data to NGA and other HLS/HLD locations, as the data sharing agreements allow.

# BAR-GC Participants

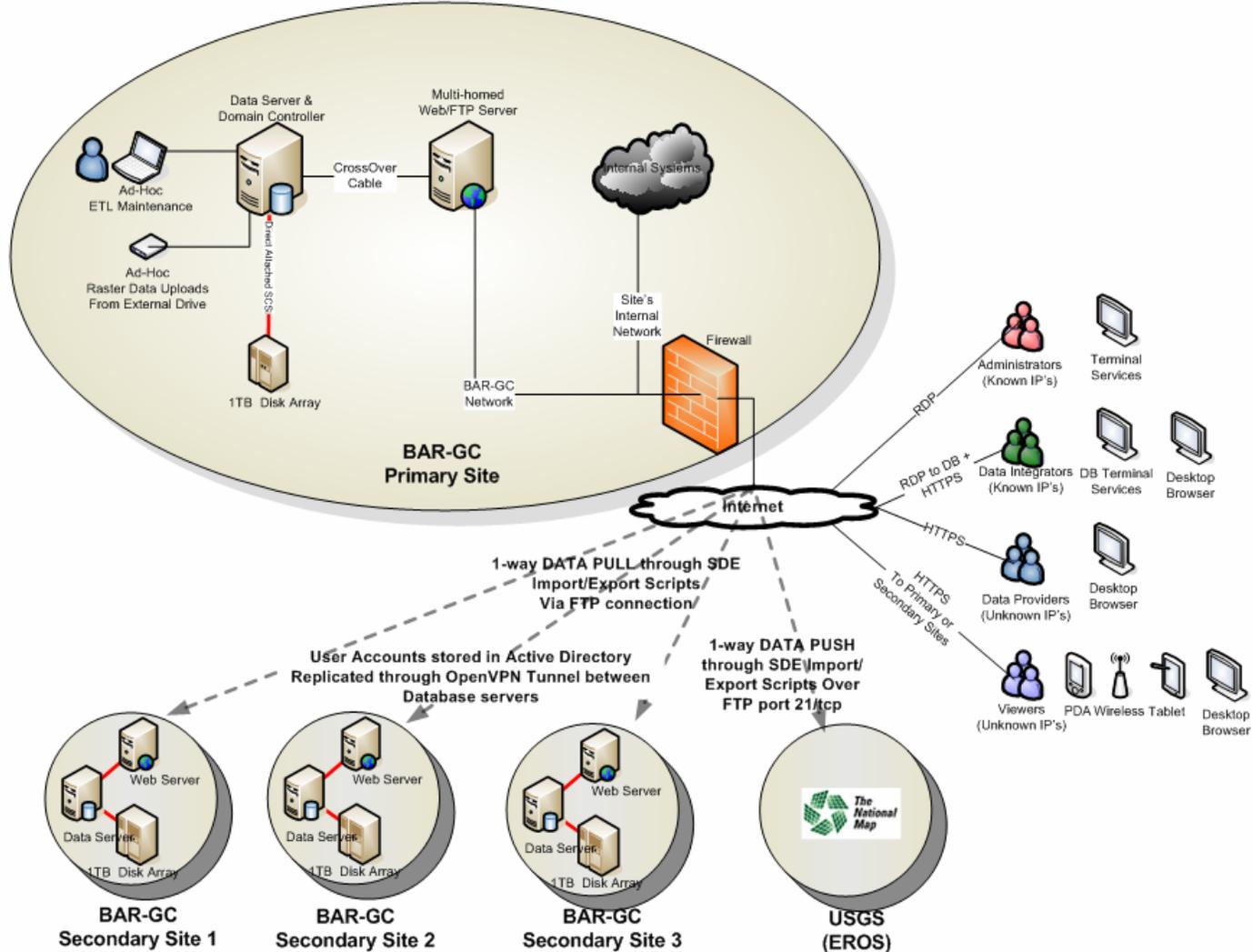
- USGS
- NGA
- USACE
- Bay Area Regional GIS Council (BAR-GC)
- BAR-GC membership includes:
  - Association of Bay Area Governments
  - Bay Area Automated Mapping Association
  - City of Oakland
  - City/County of San Francisco
  - City of San Jose
  - County of Alameda
  - County of Contra Costa
  - CA Office of Emergency Services, Coastal Region
  - CA Regional Water Quality Control Bd, SF Bay
  - City of Berkeley
  - City of Concord
  - City of Santa Rosa
  - County of Marin
  - County of Napa
  - County of San Mateo
  - County of Santa Clara
  - County of Solano
  - County of Sonoma
  - Metropolitan Transportation Commission
  - Union Sanitary District
  - MarinMap
  - San Francisco Estuary Institute
- ESRI - Prime Contractor
- VESTRA Resources (HW/SW Install, Data Loading)
- Art Botterell (Security Assessment)
- Scott Parsons (Outreach)

# The BAR-HSDS included:

- A network of servers
- Data sharing agreements
- Secure login access for first responders.
- The system must demonstrate interoperability
- A Data Model
  - Based on the HLS template with some customization for BAR-GC.
  - Define a simple data structure that accommodates heterogeneous attributes.
- Data - The pilot project will do the following:
  - Build/load as much data as possible
  - So far: 5 counties, Berkeley, CalTrans, Sacramento buildings
- Configure Palantir™ to access this database and other databases and Web map services required by BAR-GC download capability
- Regional exercise
  - Integrate model results (CATS)
- Document lessons learned
- Long-term maintenance and implementation plan

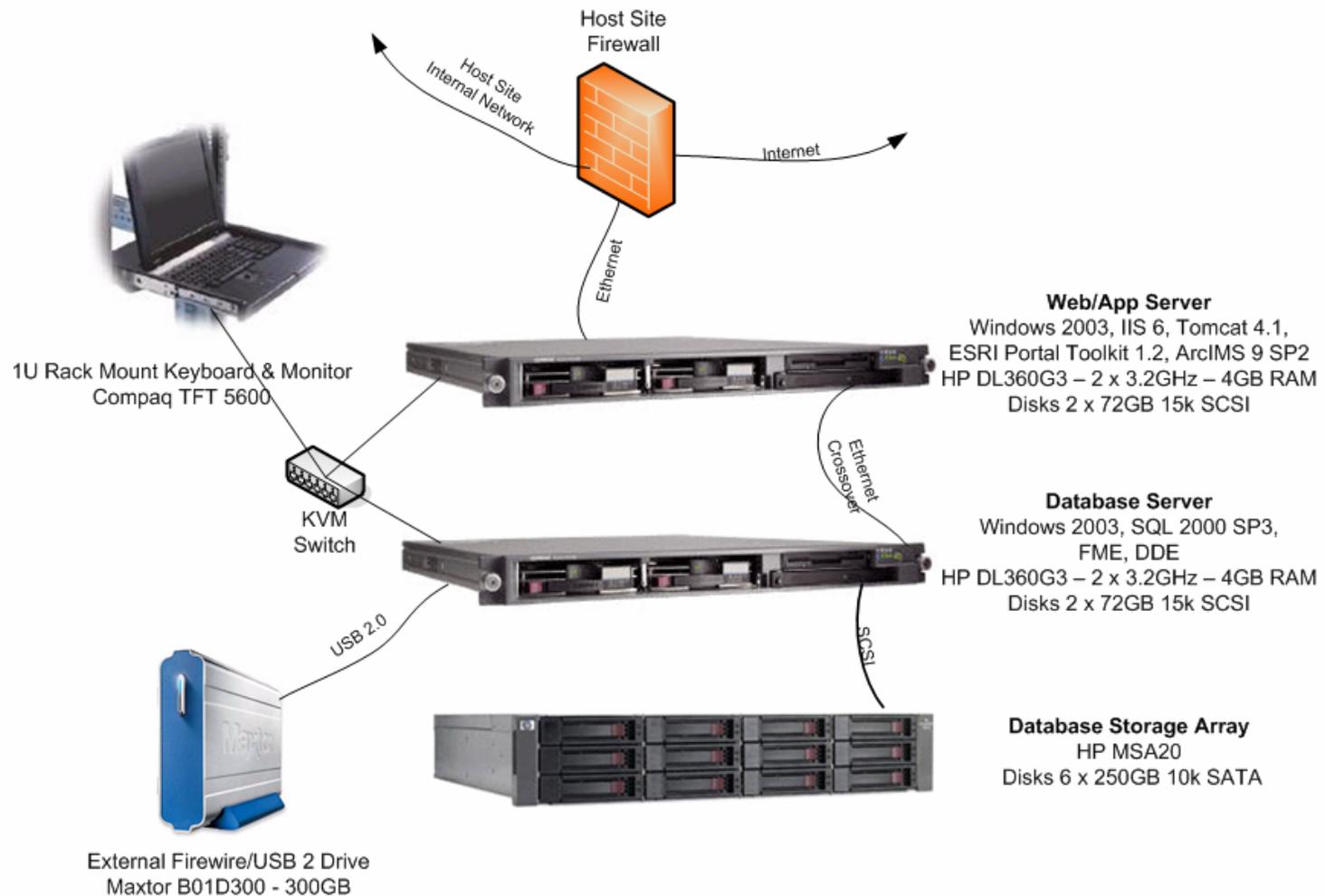
# Architecture

## BAR-GC HSDS Architecture Overview



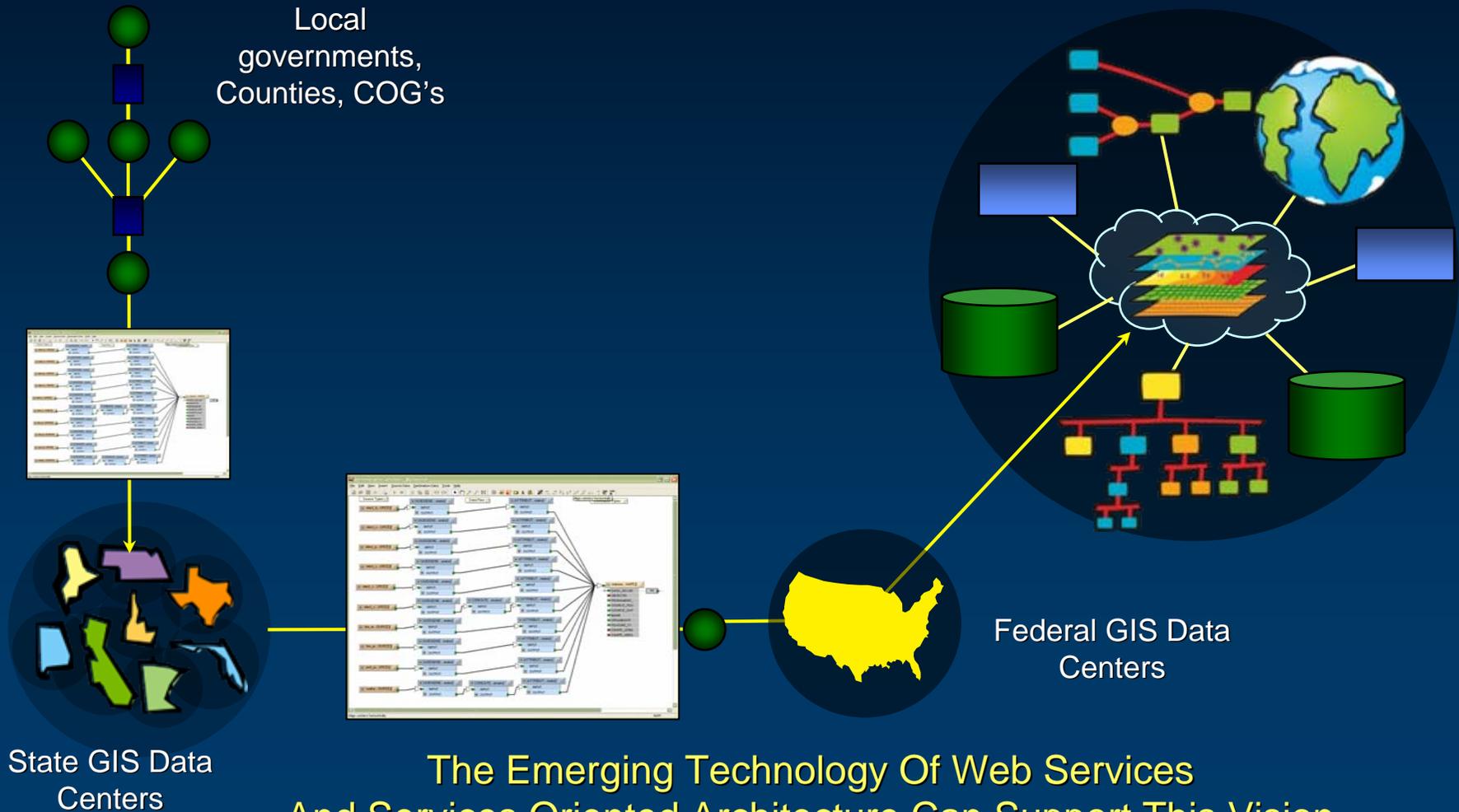
# Equipment

## Equipment for a Single Host Site



# Katrina GIS Experience Can Be Considered A Model For A National GIS System

*Integrating Multi Participant Data*



# Our Individual Systems Will Be Connected into a System of Systems

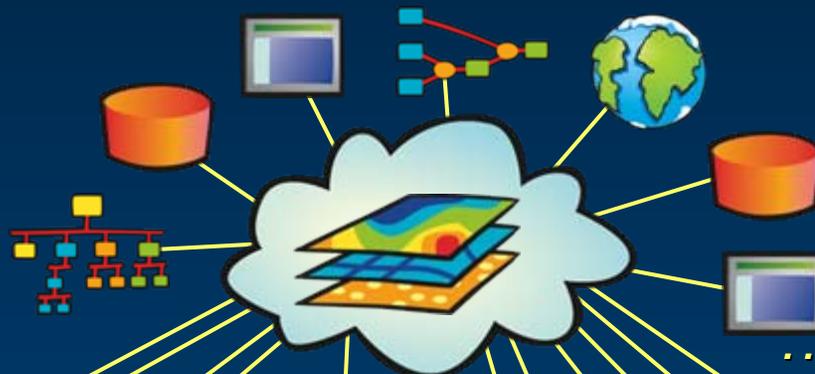


## Facilitated by . . .

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

*.....And You*

## GeoWeb



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

*... Helping Better Manage Our World*

# Collaborative data sharing for emergency management and operations

Current situation		Vision
Hundreds of individual databases	→	Integrated fusion and replication of information
Ad hoc list of information	→	Well-defined data requirements and collection strategy
No plan for data sharing	→	Assigned data stewards and GIS data centers
No framework for data sharing	→	Data fusion workflows and methodologies
Data copies not geographically distributed	→	Periodic replication of data across organizations

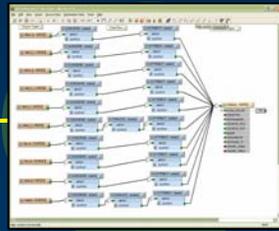
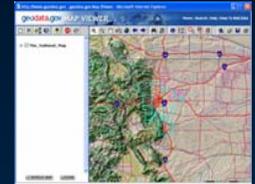
# ETL Interoperability Process

*Integrating And Disseminating Existing Local, State And Federal Data*

## National Data Model



- Emergency Operations
- Structures/Critical Infrastructure
- Governmental Units
- Utilities
- Addresses
- Transportation
- Ownership Parcels
- Hydrography
- Environmental
- Land Use/Land Cover
- Base Map
- Geodetic Control
- Elevation
- Imagery
- Geodetic Control



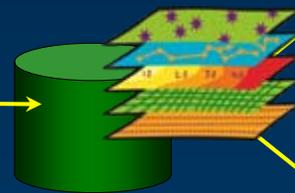
## Data Sets

- Local Gov
- State Gov
- Federal Gov
- Commercial

## Spatial ETL

- Transformation
- Conversion
- Integration

## Database And Server



Data and Services



Data Bricks



DVD Data Sets

*...Creating A Successful Multi Agency System*

# Federated GIS for the Nation

## National Mapping Agencies

- Provides a framework and process for distributed data building
- Organized by data layers
  - Propose core strategies for each data theme
  - Integrated by the “power of GIS”
- Application-driven design

Participation across State, Local, and Federal Governments

# Geodatabase Replication

- Allows you to distribute copies of data across 2 or more geodatabases
- You can edit the databases independently and synchronize them as needed.
- Many options available to users to support different workflows

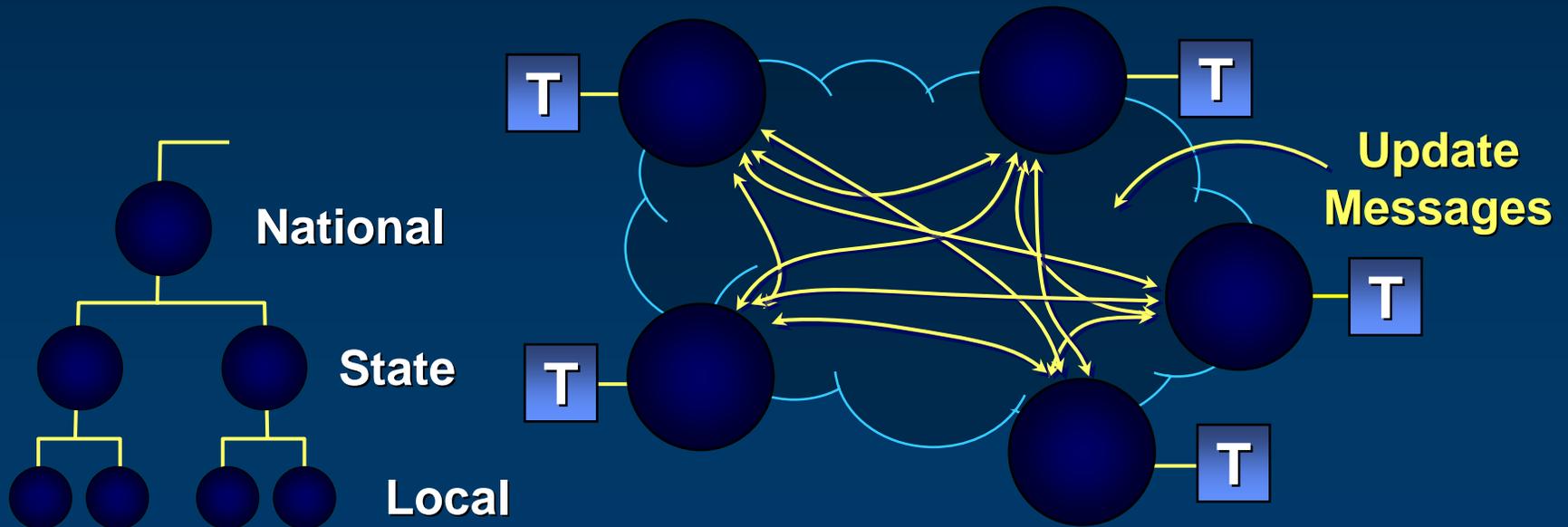
# GIS Data Replication

- Participants share their data with others
  - Updates vs. data copies
  - Periodic synchronization
  - Sharing and use agreements

# Distributed Geodatabase Management

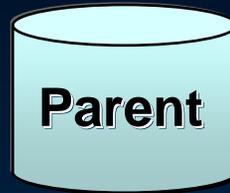
- Replicated geodatabases
- Periodically updated and synchronized
- Change only updates

**T** = Transactions



# Replication Types

Checkout-Checkin



*Once Only*



Two Way



*Multiple Times*



One Way



*Multiple Times*



“ETL” Replication

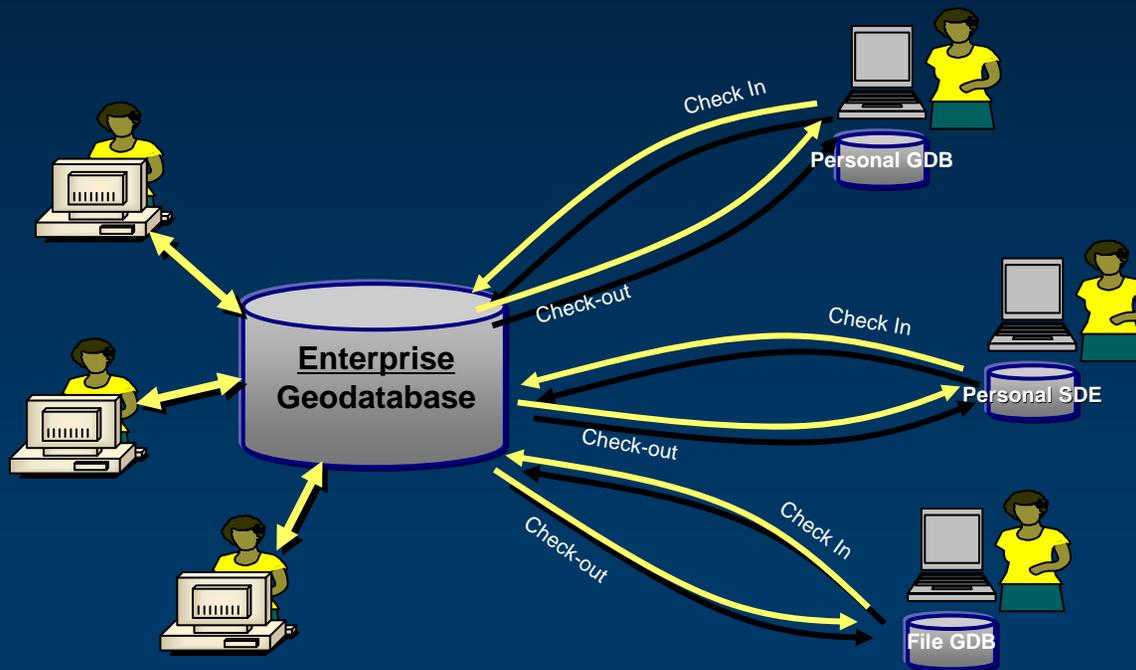


*ETL Script*



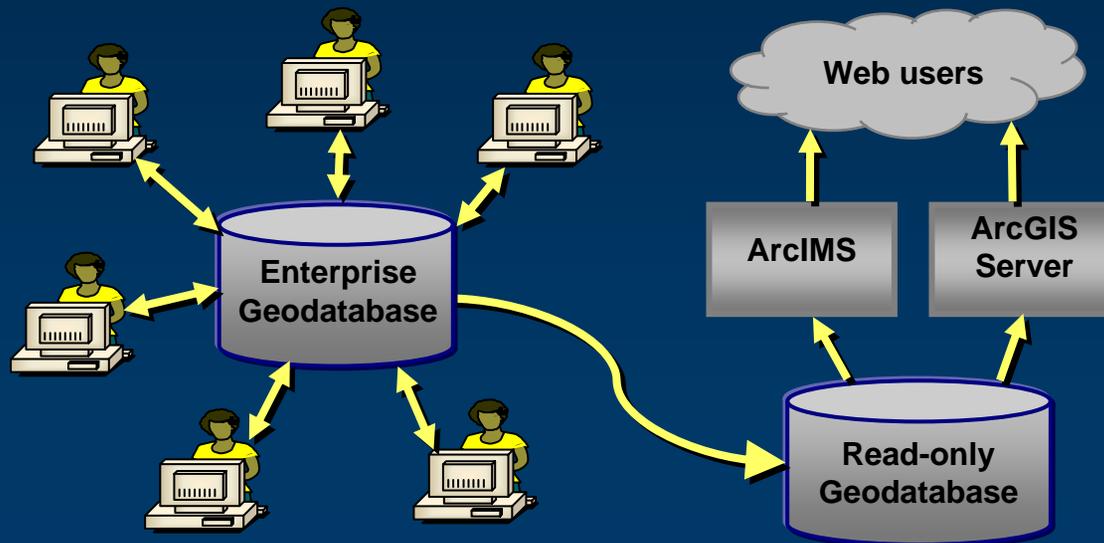
# Checkout Checkin

- Disconnected editing - ArcGIS 8.3 to 9.1
- Child replica can be hosted in a Personal Geodatabase, File Geodatabase or ArcSDE Geodatabase (only ArcSDE can host the Parent)



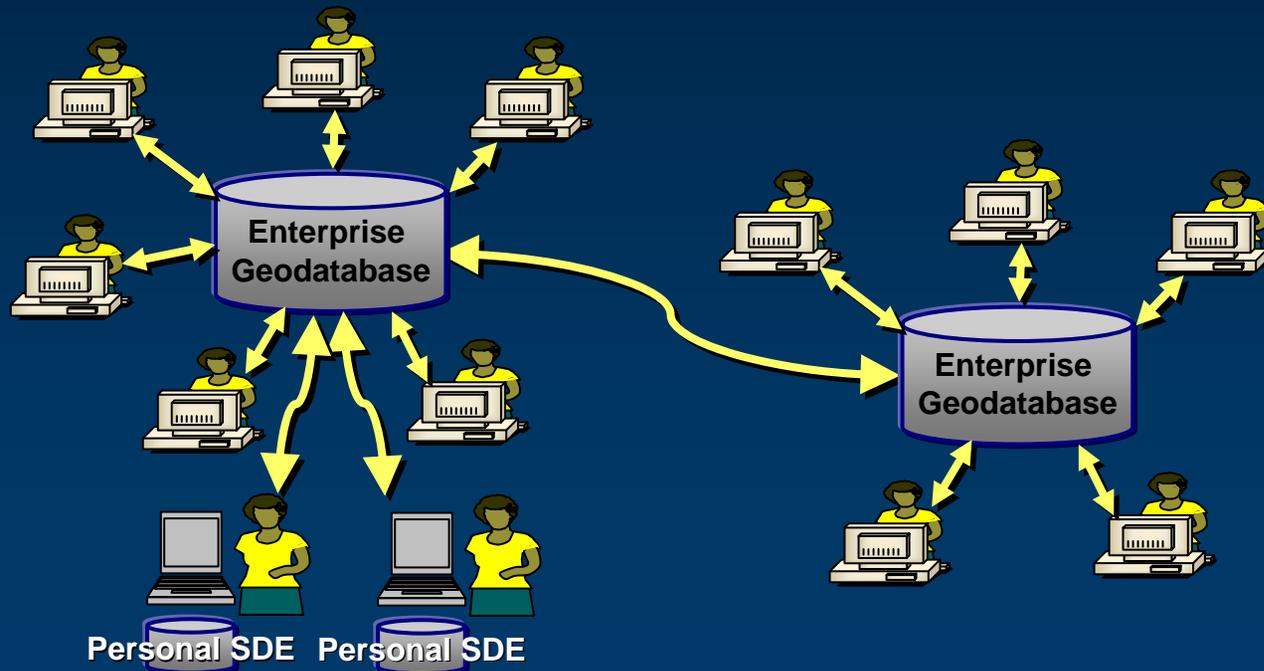
# One Way Replication

- Child replica is considered read-only
- No system versions on the child replica
- Choose between 2 model types:
  - Full – Supports complex types (Geometric Networks and Topologies) and requires the child replicas data to be versioned
  - Simple – Child replica's data is simple and does not need to be versioned



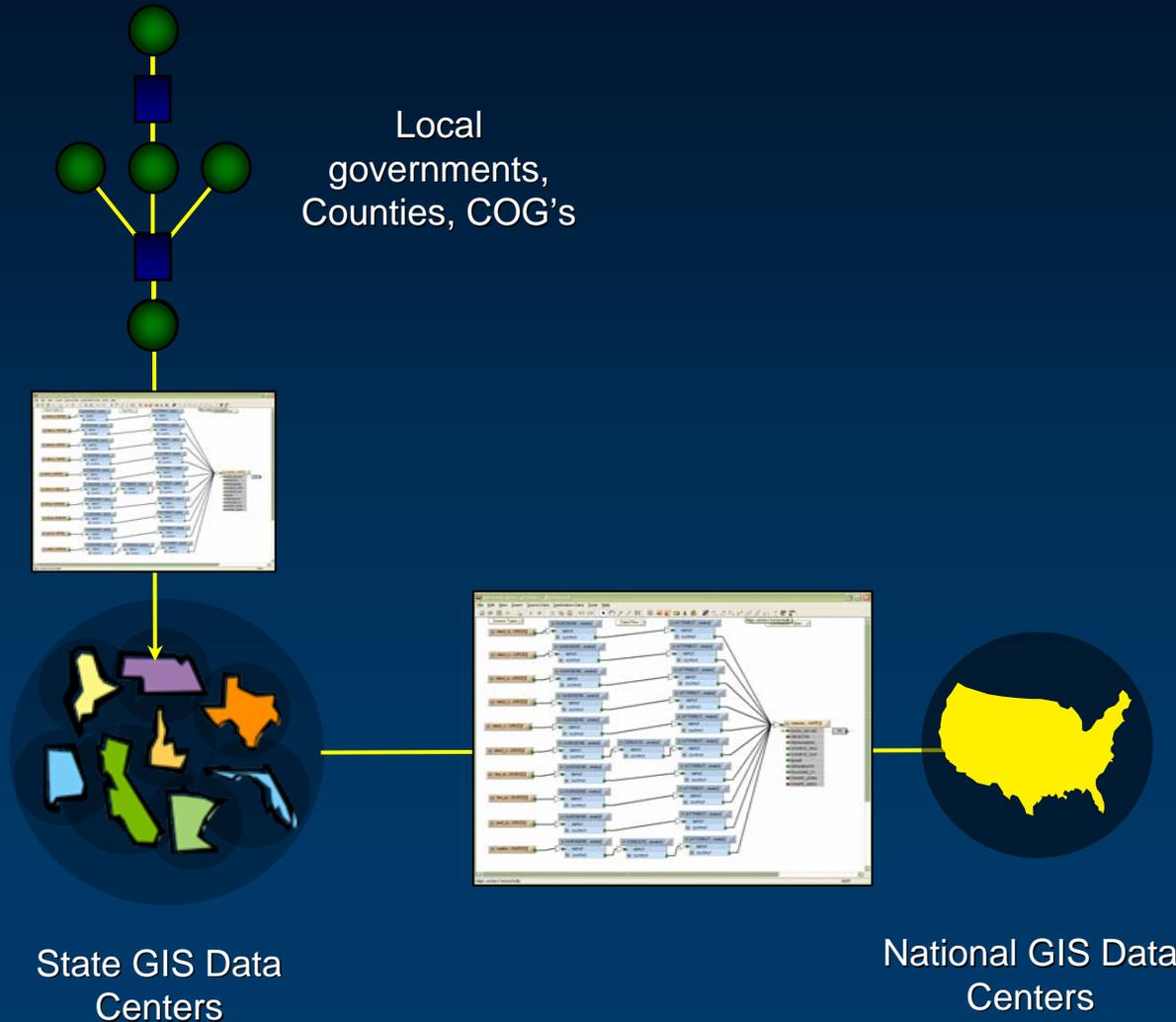
# Two Way Replication

- Requires ArcSDE geodatabases and versioned data
- Can use 2 way replication with personal ArcSDE instead of check out/check in replication



# ETL Replication

Extract – Transform – Load

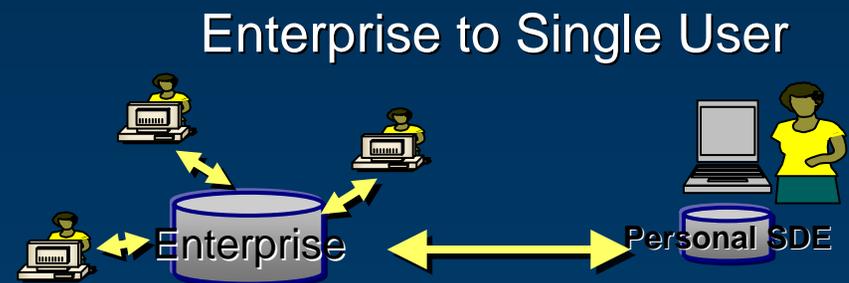
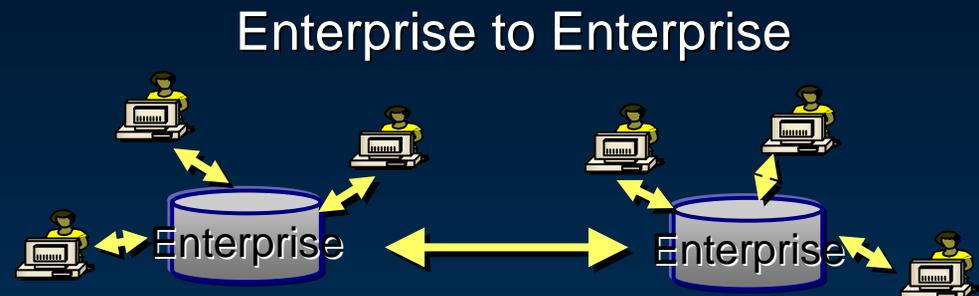


# Replication Workflows

- Workflows can involve enterprise geodatabases and single user geodatabases

- Enterprise geodatabase – Multi-user ArcSDE geodatabase accessed locally or remotely through ArcGIS server

- Single user geodatabase – Personal ArcSDE, file geodatabase or personal geodatabase on a local machine



# Geodatabase Replication – Use Cases

- Mobile Users and Field Crews who need to be disconnected from the network.
- Users who need to maintain copies of data at different organizational levels (city, county, state)
- Users who want to maintain copies of data at different geographic facilities.
- Users who need to distribute work to contractors.

# Geodatabase Replication – User Requirements

- Users should understand versioning and be comfortable with applying versioning concepts
  - Reconcile and post
  - Compressing a versioned geodatabase
- Well defined data model
- Understand editing concepts for the data types in the data model
  - Geometric networks, topologies, relationship classes etc.

# Maintaining Object Identity

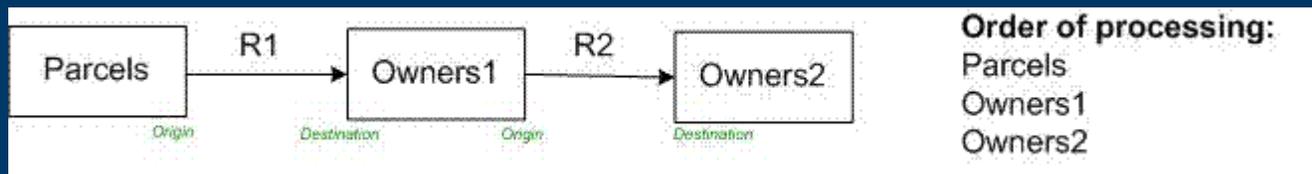
- A replicated object has both local and global identity
  - ObjectID - Local identity is unique within a database
  - GlobalID - Global identity is unique across databases
- GlobalID columns
  - Based on GUIDs / UUID technology
    - {9DFACA0A-982F-4175-80E7-B553378D9E6D}
  - Introduced in ArcGIS 9.0
  - GlobalIDs are system maintained (like ObjectIDs)
  - Add Globalid command in ArcCatalog (9.2) adds the columns at the feature dataset and standalone feature class/table level
    - Can be added to versioned data
    - File Geodatabase and Personal Geodatabase require schema only
  - Sample provided to delete a globalid column
  - Differs from columns of type GUID

# Tools for Replica Creation

- Create replica wizard
  - On the distributed geodatabase toolbar in ArcMap
  - Provides the most options and is tightly integrated with ArcMap
- The Create Replica and Create Replica from Server geoprocessing tools
  - Available from the Distributed Geodatabase toolset
  - Build models to create replicas on a regular basis
- ArcObjects API
  - Can apply complex criteria and extend replica creation
  - White paper will be provided to describe how to extend replica creation

# Replica Creation – Defining data to replicate

- Filters and Relationship classes are used to define the data to replicate
- Filters are applied first
  - Spatial – A geometry used to define the area to replicate
  - Selections – Selection sets on feature classes and tables
  - QueryDef – Definition queries applied to individual feature classes and tables
- Additional rows are then added if they are related to the rows in the filter
  - Relationship classes are applied in a single direction and in an optimal order



# Replica Synchronization - Message Exchange

- Synchronizations are performed using message exchange
- Messages types:
  - Data Change messages
    - Includes the data changes to synchronize
    - By default all changes since the last acknowledgement are included
  - Acknowledgement messages
    - Acknowledges that previously sent changes have been received by the relative replica

# Manual and Automated Systems

- Manual

- Replication supports manual operations through wizards and geoprocessing tools in ArcCatalog and ArcMap
- Example: A field worker connecting his lap top to a LAN or WAN and clicking synchronize.

- Automated

- Operations such as synchronizations and check-out replica creation are set up to happen on a regular basis
- Example: A geoprocessing model exported to python and set to run in the windows scheduler
- Recommended

# Working through errors

- System is designed to stay consistent
- If the system fails during a synchronization, it is rolled back to it's previous state
- If a data changes message is lost in a disconnected system, the next message will contain changes from the lost message and any new changes
- Replica log can be used to get error information about a synchronization

# Working with Schema Changes

- Fault tolerant
  - In most cases synchronization will still execute successfully even if each replica makes schema changes
  - Example: If a field has been dropped, synchronization skips that field
- Apply schema changes
- Replica Manager - Command to remove data from a replica

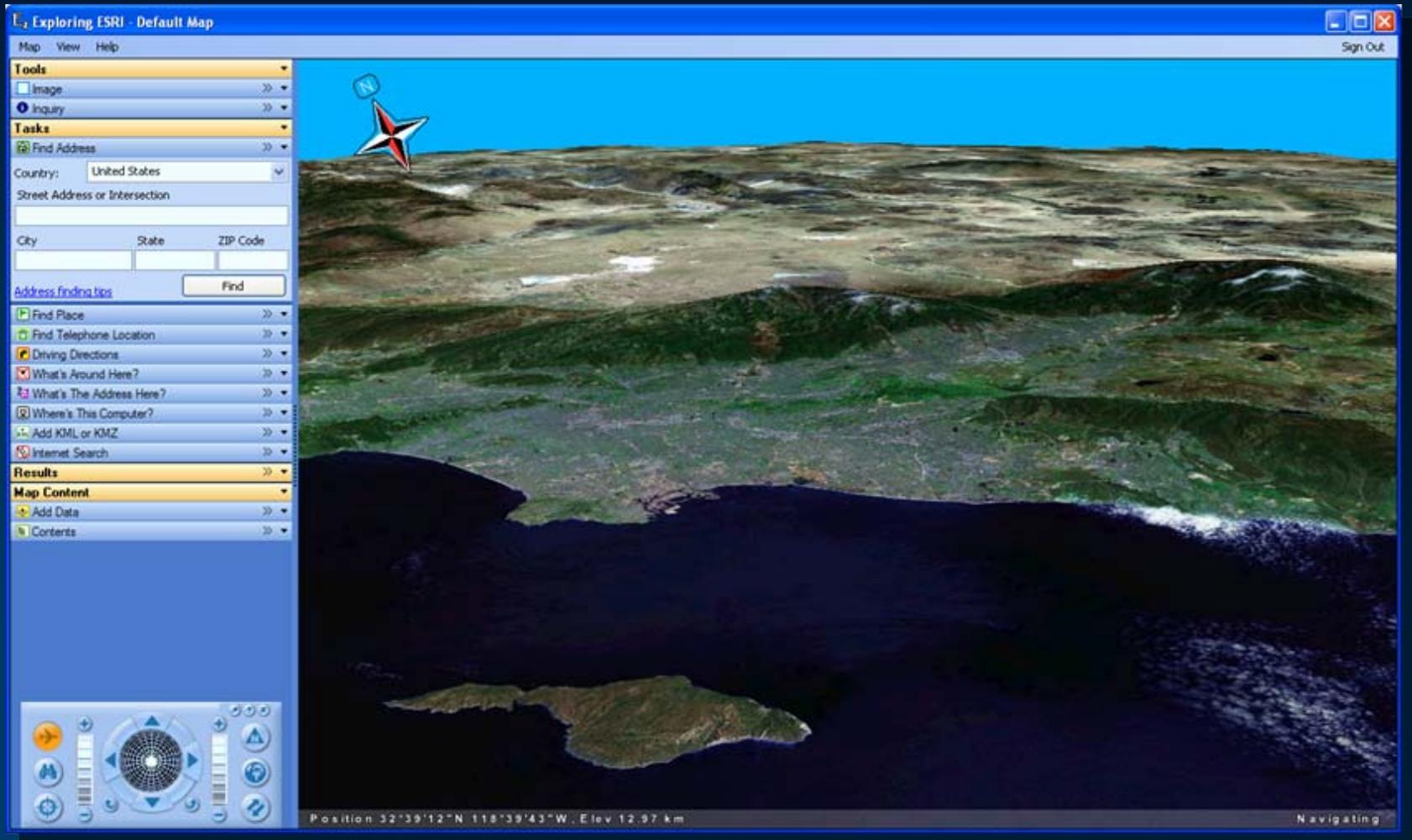
# Geodatabase Replication - LAN and WAN

- LAN - Use connections to your local geodatabases
- WAN - Use ArcGIS Server and geodata web services to access remote geodatabases
- All geodatabase replication workflows are supported in both environments

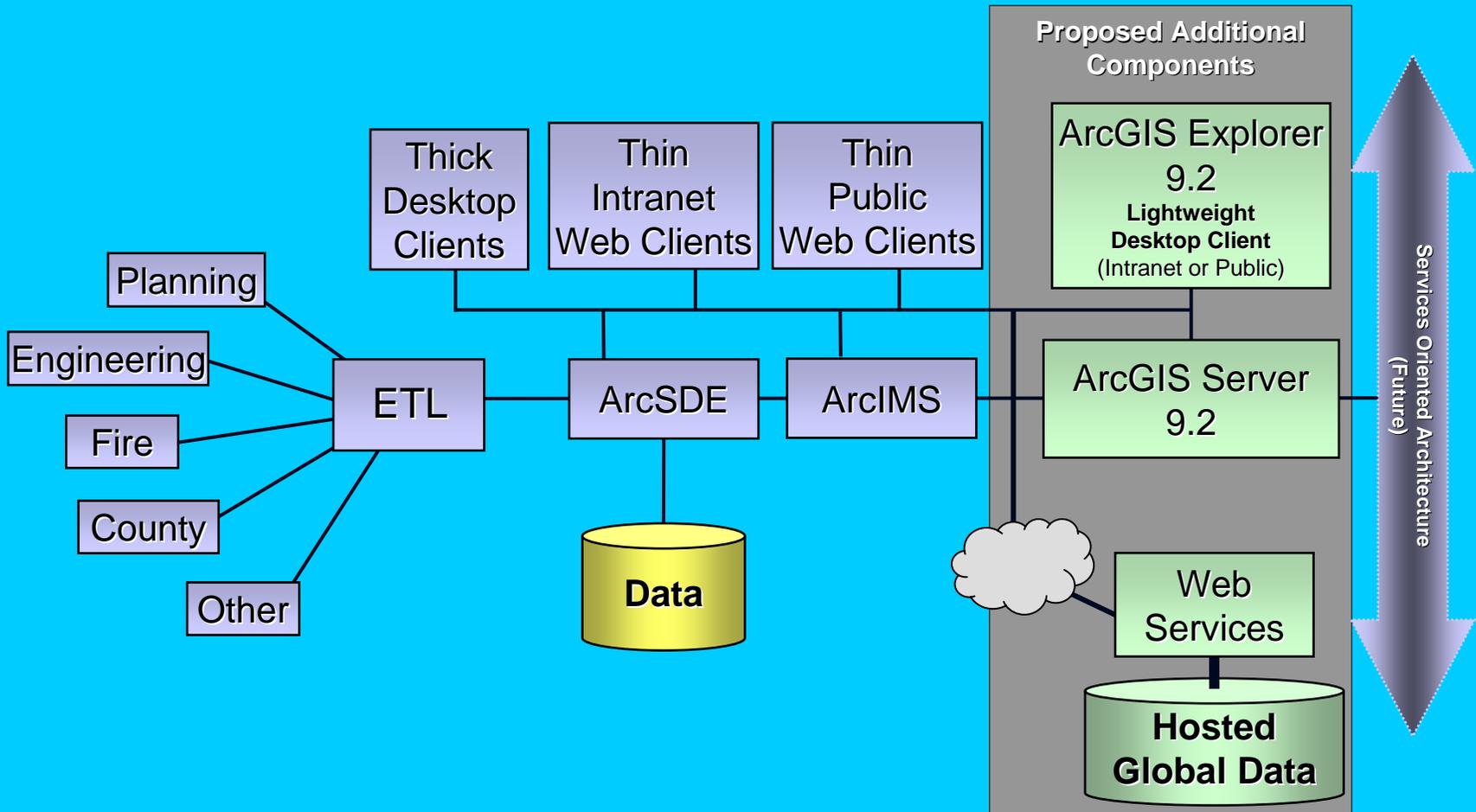
# CAD Support

- CAD Support
  - Georeferencing toolbar that allows users to move, rotate, and scale CAD files using the mouse; create control points; and so forth
  - Full support for TrueType fonts
  - Improved CAD text and symbology
  - Improved Desktop Help on CAD
- Double Precision

# GIS Common Web Viewing Environment



# Proposed GIS Environment



Thank You

