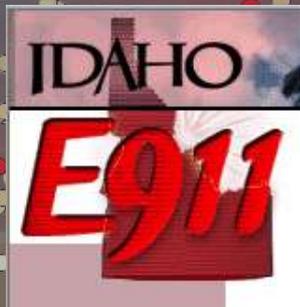


GIS 101



Enhanced 911
Emergency Communications Commission

By
Bryant Ralston
ESRI



Who am I?

- **Strategic Account Executive for Idaho and Montana**
- **Work for Environmental Systems Research Institute (ESRI)**
- **“Live vicariously” through customer’s successes**
- **20 years experience in GIS**
- **Undergraduate and Master’s degree in Geography from Kansas State University**
 - Working presently on MBA at University of Montana
- **Liaison between customers and ESRI in Idaho and Montana**
 - Both existing (account management) and potential (sales)
- **Often work “shoulder-to-shoulder” with industry experts**
- **Work on several special initiatives**
 - Montana Homeland Security Task Force GIS Group Co-founder
 - Western Governors Association
 - Executive awareness
 - Lewis and Clark GIS efforts
 - Rocky Mountain Elk Foundation

Who is ESRI?

- GIS pioneer with 30 years of experience
- Focus is successful users
- Company focused *only* on GIS technology
- Set GIS industry standards
- Conduct Meaningful GIS Application Projects That Push the Technology and Demonstrate the Effective and Innovative Use of GIS
- Privately Owned
- Debt free and financially secure
- Growing at an average of 20% a year
- International and local presence
- World Leader in GIS industry
 - Marketshare, revenue (2008 \$900M), user base, brand

A Special Congratulations....



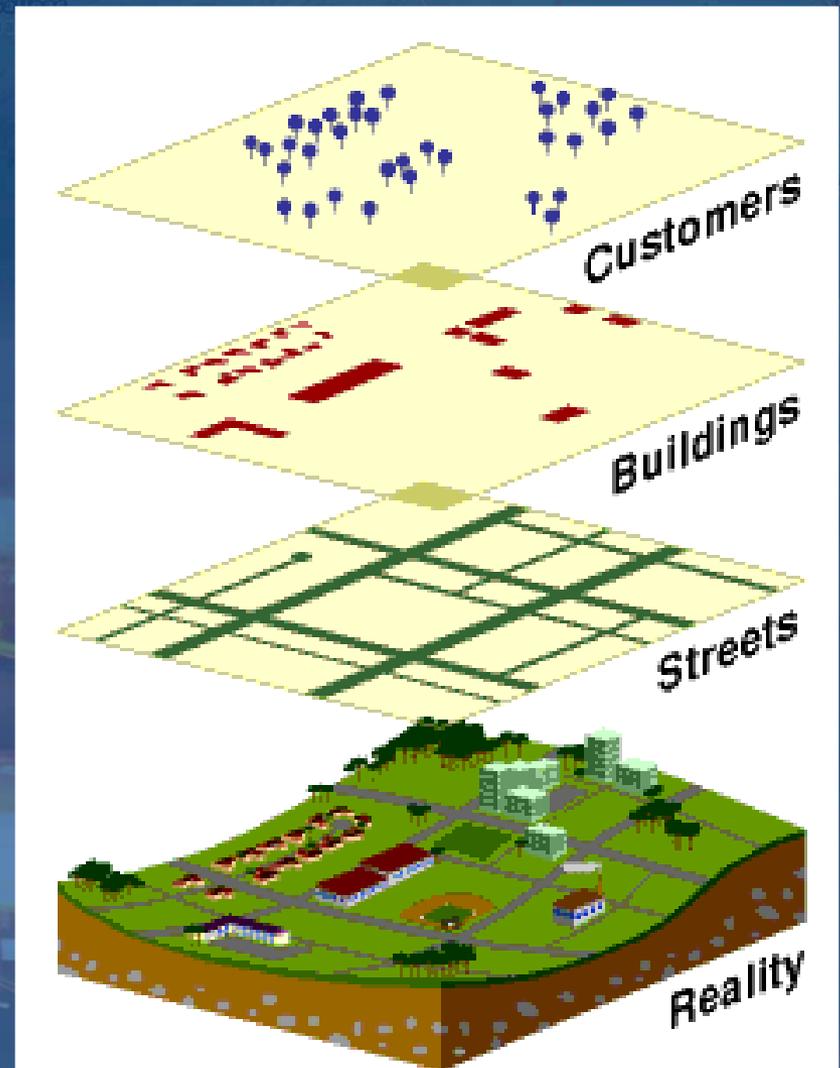
Bonner County GIS Department

Today's Topics

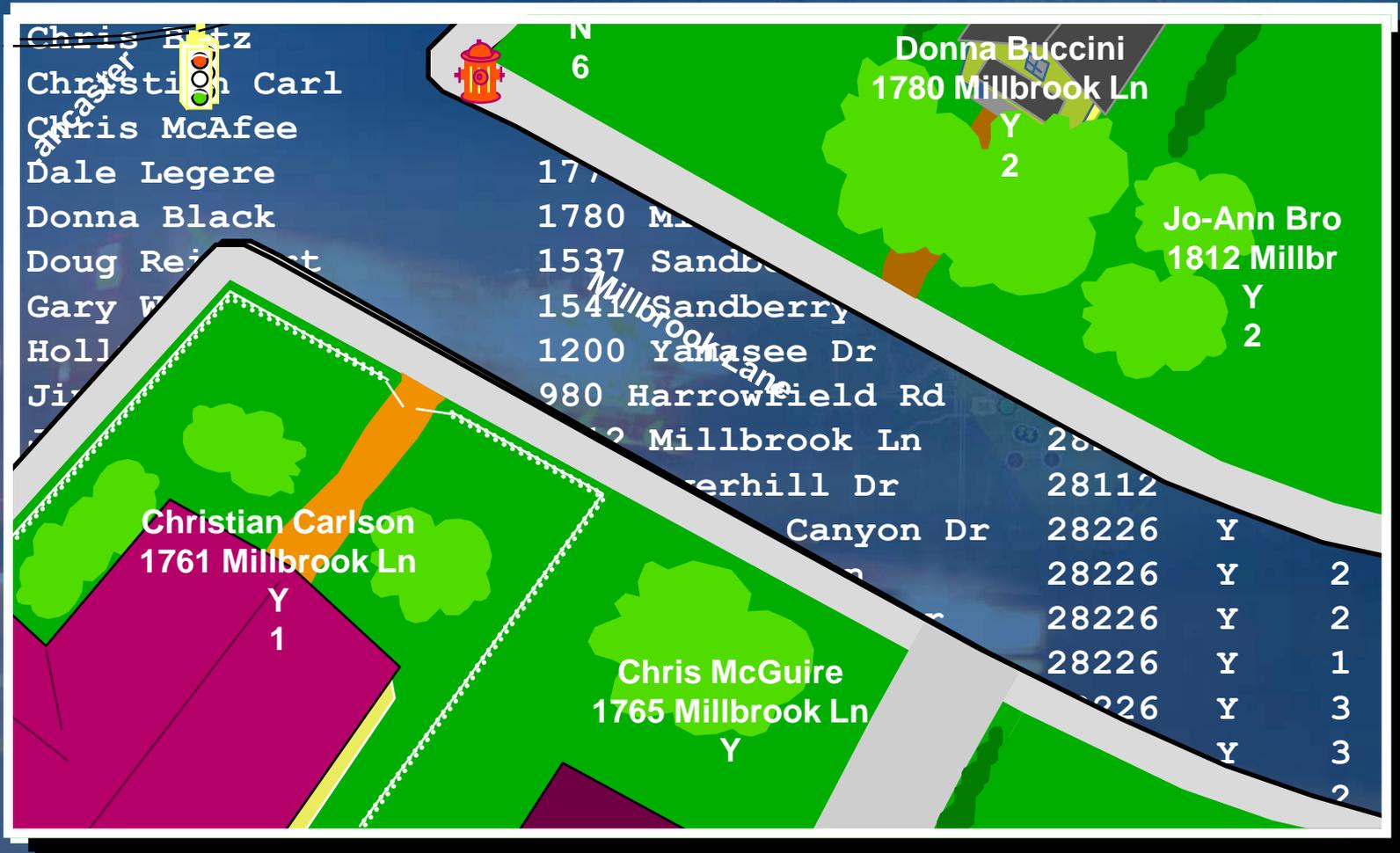
- **Introduction to GIS**
 - What is it?
 - What does GIS do?
 - GIS in Idaho
- **GIS in Public Safety and E-911**
 - Examples
 - Computed Aided Dispatch (CAD) and GIS
 - GIS powered CAD
- **Next Generation E-911 and GIS**
 - Got GIS?
- **Coordination is Critical to Successful and Sustainable GIS**
 - Idaho GIS Office
 - Importance of “Framework” GIS data
- **Conclusions**
- **Question and Answer**

What Is a Geographic Information System?

GIS is a technology through which geography is learned, communicated, and analyzed



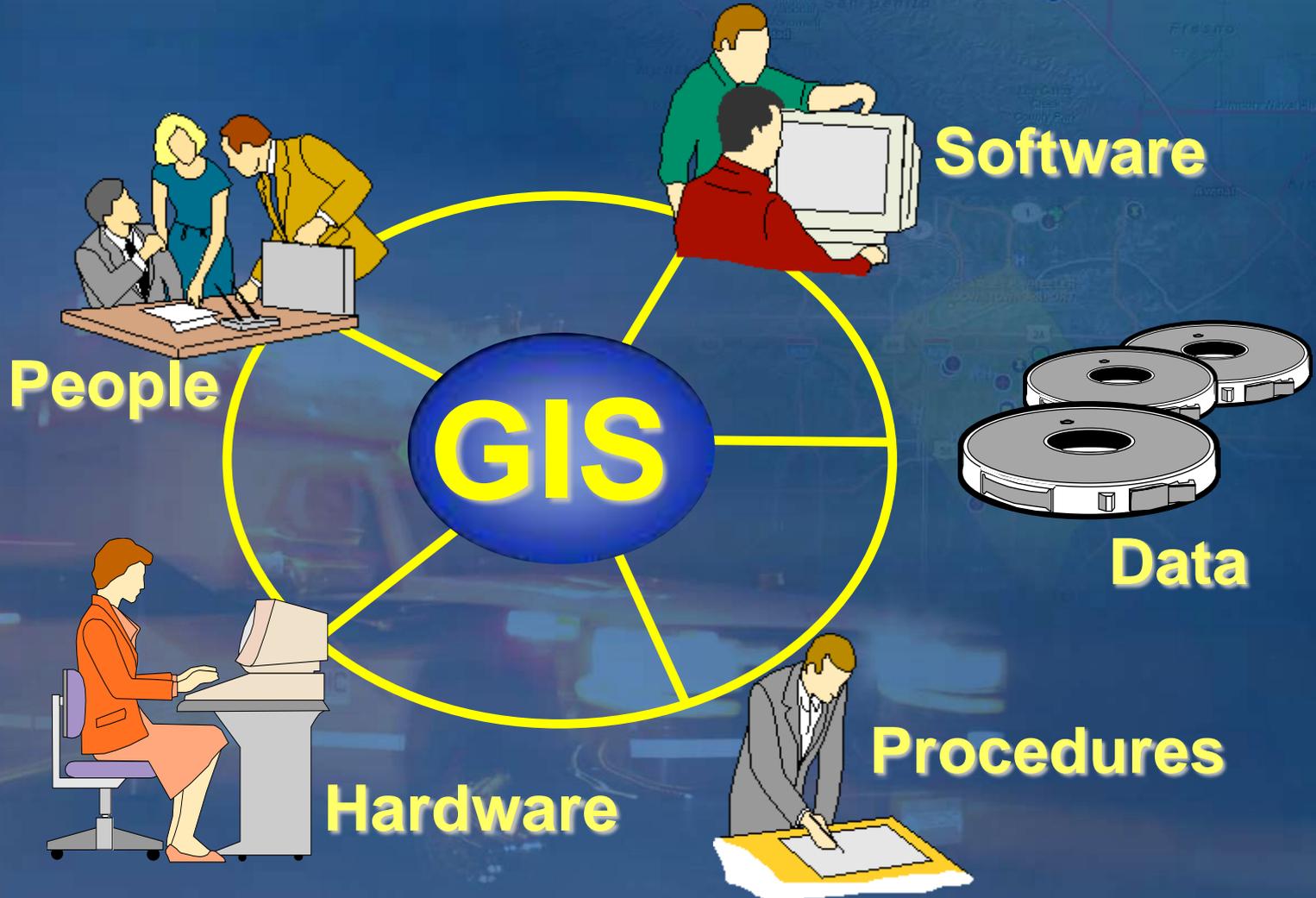
Geographics and related data in one database



What is GIS?

- **Geographic Information System**
 - A horizontal Information Technology
 - Information indexed by location or ‘geography’
- GIS is a ‘system’ comprised of people, methods, data, software, and hardware
 - People are the most important!
- A very application driven technology
- A multidisciplinary technology
 - Geographers, police, firemen, IT manager, teachers, precision farmers, scientists, engineers, surveyors, government officials, realtors, database managers, and more...

GIS is a system of parts...





A few points about geographic data...

Not all created equal

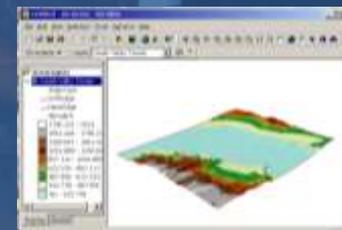
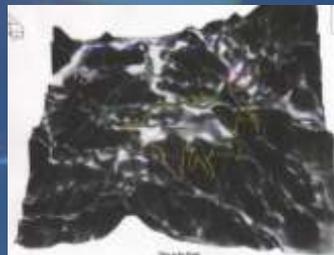
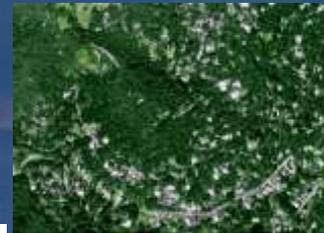
Common GIS data models

- Vector (features)
- Raster (GRIDs or images)
- Surface (Elevation Model)

Points •

Lines 

Polygons 

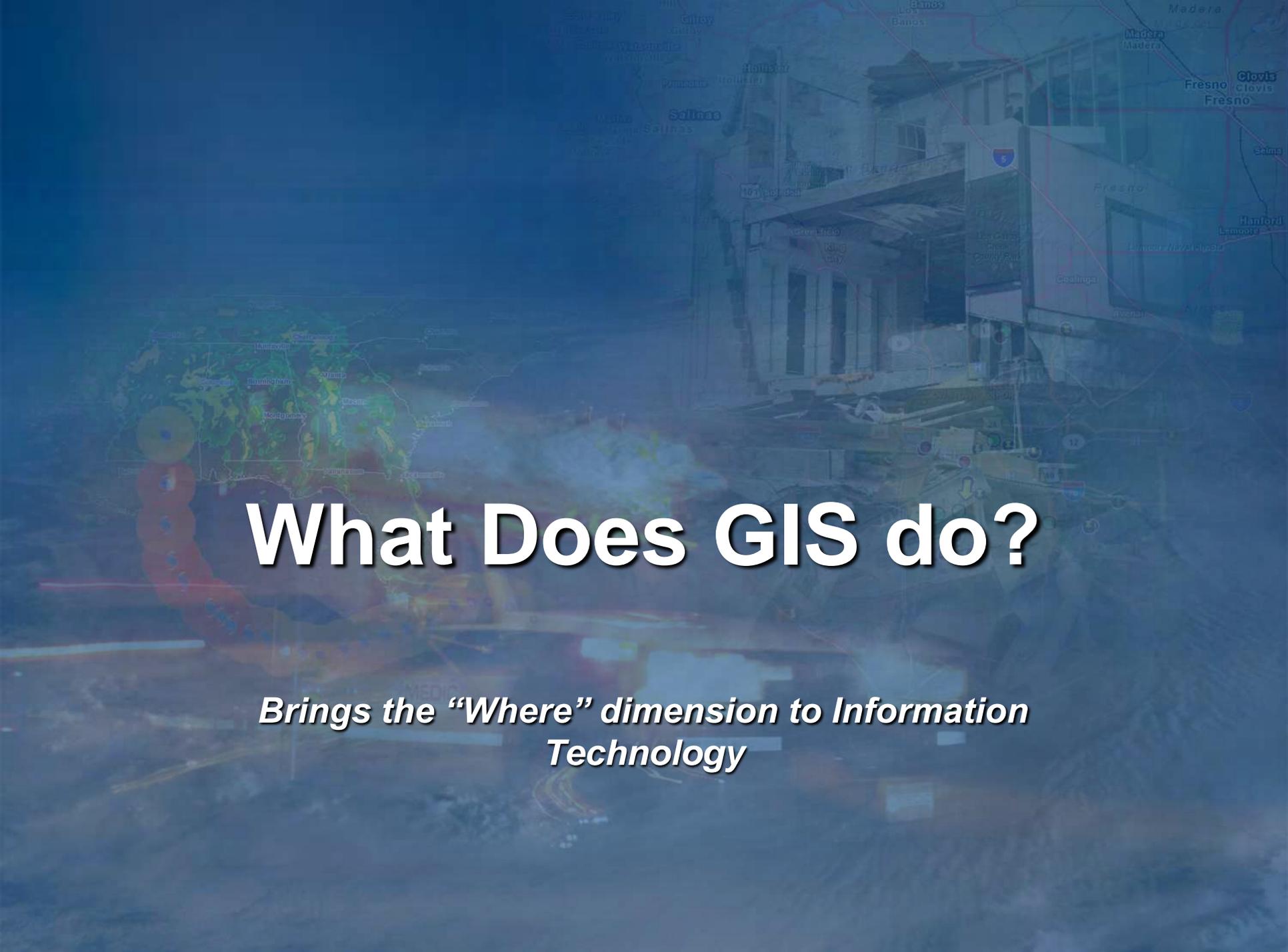


Authoritative Geographic Information

- “Traditional” GIS data
- Often intrinsically tied closely to organizations doing GIS work
 - relates to missions & mandates, business functions and workflows
 - Not necessarily built with external users in mind
 - Organization with the largest need often became the de facto steward and maintenance is linked to day-to-day processes
- May be in high demand now
- Administrative Control over Quality Control and Quality Assurance (QA/QC) procedures
 - How accurate do we have to be? How robust is our QA/QC?
 - What does it “cost” to have inaccurate data?
 - Positional accuracy and metadata important
- Examples are Framework data and County Cadastral data

Volunteered Geographic Information (VGI)

- Not thought of as “GIS data” per se
- Popularized by consumer mapping solutions and virtual globes
- Coined by academic GISers like Dr. Michael Goodchild
- Created voluntarily by community minded individuals and citizens
 - Was not intended to be necessarily utilized in GIS
 - Easily uploaded and shared
 - originally was for their own personal use
 - contributors sometimes called “neogeographers”
- Can provide richness to understanding locations
- No administrative control of QA/QC
 - Do you stand by decisions made on it?
- Examples are Wikimapia and “geo-tagged” vacation photos



What Does GIS do?

Brings the “Where” dimension to Information Technology

GIS “Fuses” All Types of Data

Geography is a “key.”



Forming collections of data to create information and knowledge ...

GIS 101: Database “Extended” to Model, Store, and Manage Geographic Data (“geodatabase”) coupled with Application & Logic about how the Geographic Features Behave in the Real World

FID	Shape	AREA	PERIMETER	STATES#	STATES-ID	STATE_FIPS	STATE_NAME
39	Polygon	106689454080	1567963.5	39	65	39	Ohio
40	Polygon	45634968	96674.375	40	74	36	New York
41	Polygon	145811619840	1970646.5	41	58	17	Illinois
42	Polygon	124803984	47813.61328125	42	75	36	New York
43	Polygon	2100314.75	2100314.75	44	73	8	Colorado
44	Polygon	5321170432	416392.46875	46	79	10	Delaware
45	Polygon	25075441664	1939772.25	47	80	24	Maryland
46	Polygon	101617467392	2642379.75	48	81	51	Virginia
47	Polygon	180863795200	2265698.5	49	77	29	Missouri
48	Polygon	90529232	74416.53125	50	83	24	Maryland
49	Polygon	171103440	62127.85546875	51	84	11	District of Columbia
50	Polygon	13768660	30899.318359375	52	85	24	Maryland
51	Polygon	212886044672	1974101.125	53	78	20	Kansas
52	Polygon	46207640	74608.515625	54	86	24	Maryland
53	Polygon	32923928	49524.03125	55	87	51	Virginia
54	Polygon	1481258368	297999.28125	56	88	51	Virginia
55	Polygon	104374943744	1981348.75	57	82	21	Kentucky
56	Polygon	294512689152	2334570	58	89	4	Arizona
57	Polygon	151248928	187685.828125	59	96	37	North Carolina
58	Polygon	51385748	33564.06640625	60	95	37	North Carolina
59	Polygon	126605541376	2834039.25	61	93	37	North Carolina
60	Polygon	315349893120	2378423.75	62	91	35	New Mexico
61	Polygon	127223360	161930.3125	63	99	37	North Carolina
62	Polygon	109016195072	1997050.875	64	92	47	Tennessee
63	Polygon	181306081280	2483096.25	65	90	40	Oklahoma
64	Polygon	41684852	54528.21875	66	101	37	North Carolina
65	Polygon	50621884	26955.25	67	94	21	Kentucky
66	Polygon	684003622912	5968369	68	97	48	Texas

Feature

Shape
Column

- Feature class is a table
- Features are held as rows
- Attributes are recorded in columns
- A shape column holds the geometry

Basic Functions of GIS

On Geographic Data

- **Input**
 - GPS, imagery, digitizing, surveys, etc
- **Manipulation**
 - Editing, data maintenance, coordinate systems
- **Management**
 - How geographic data is represented, stored, and distributed
- **Query and analysis**
 - Asking questions – getting answers
 - Spatial analysis and modeling
 - Visualization – maps, reports, summaries

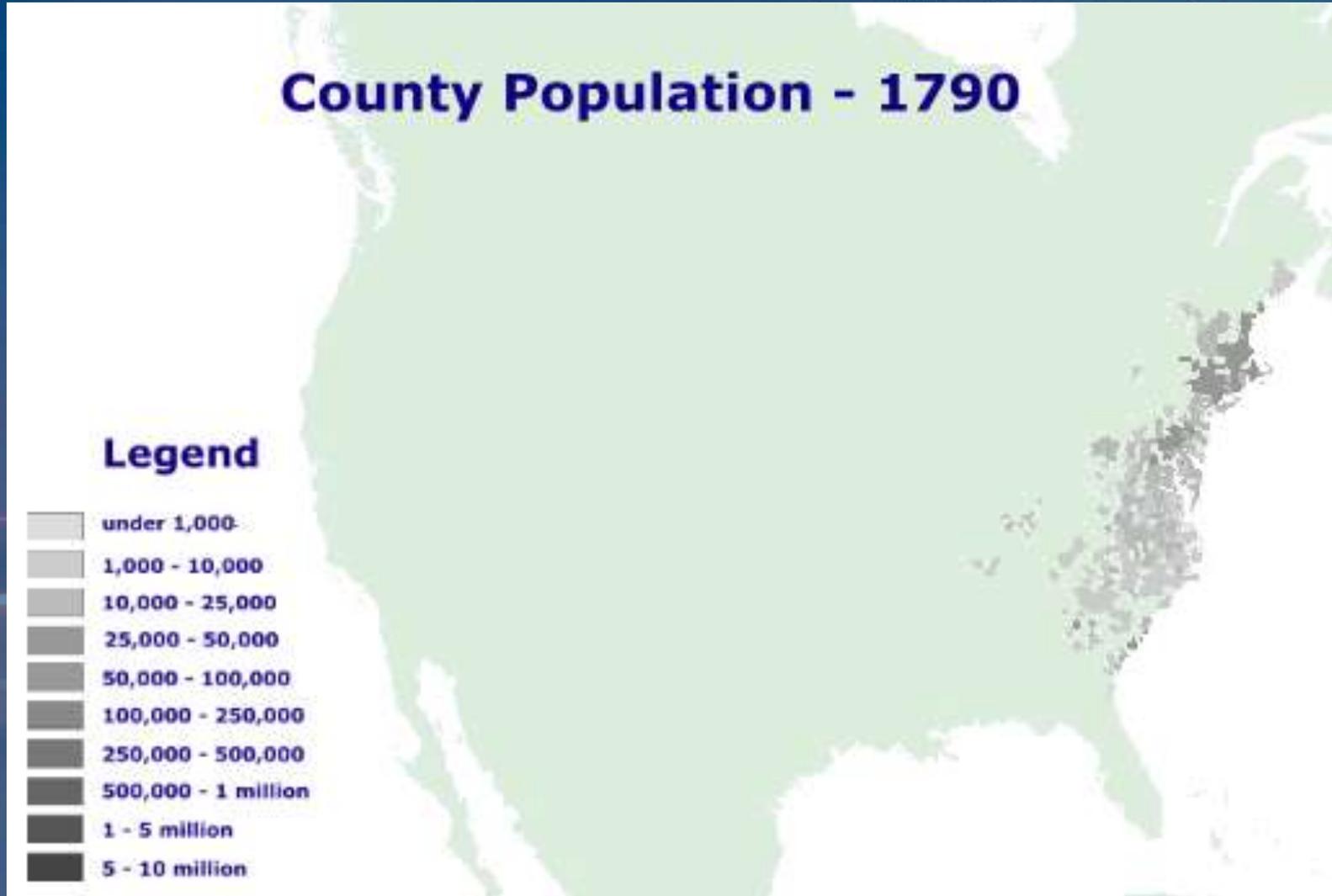
GIS enables....

- **GeoVisualization**
 - Often called “Common Operating Picture” or “Situational Awareness” or “Data Fusion”
- **Data Management**
 - This is the “I – for Information” which is GIS’s Middle Name
- **Spatial Analysis**
 - Analytical power of place
 - Modeling

Query and Analysis

- **Ability to utilize geographic nature of data in answering questions**
 - Range from simple to complex
 - Simple identify to complex temporal modeling
- ***Spatial Analysis*** – studying the locations and shapes of geographic features and the *relationships* between them
- ***Modeling*** – set of rules and procedures for representing a phenomenon or predicting an outcome (even over time – temporal)

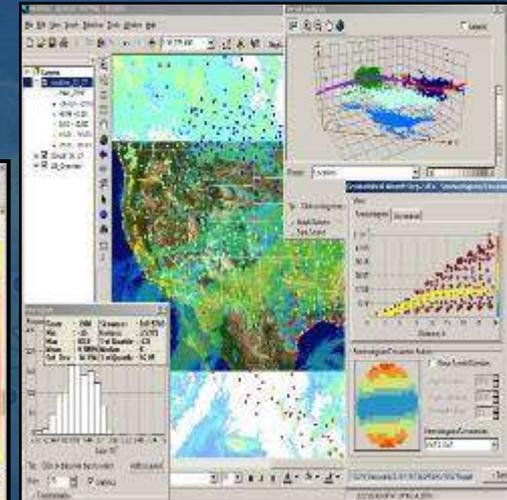
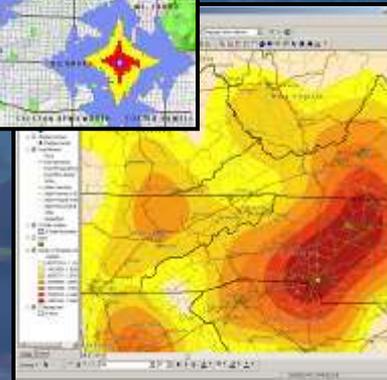
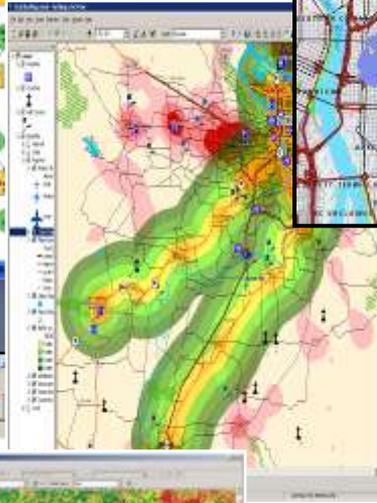
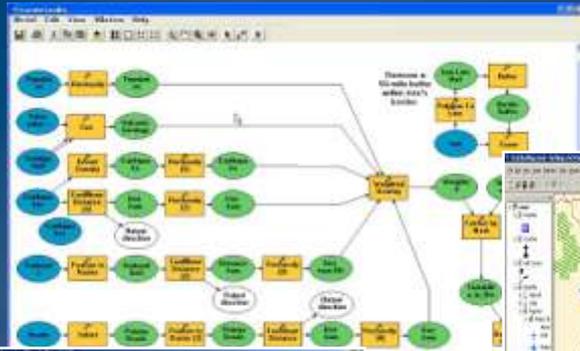
Temporal Animation Example



Spatial Analysis and Modeling

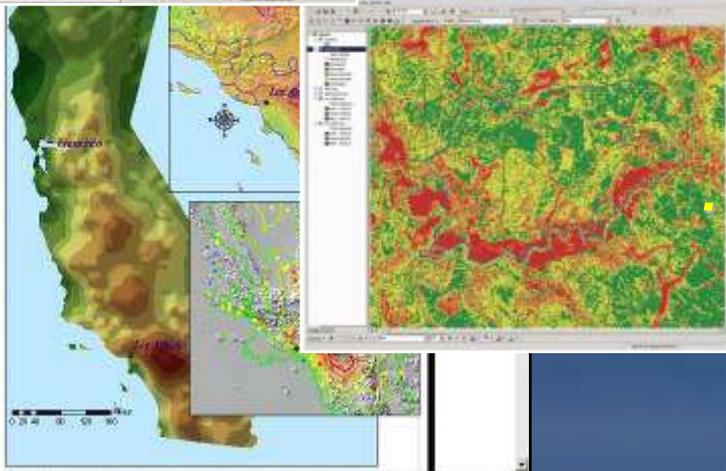
Much More Than Just Making Maps...

Analyzing Relationships, Patterns, Processes



Interpreting Situations . . .

*. . . Helping Understand Complex Situations
. . . And Support Making Decisions*



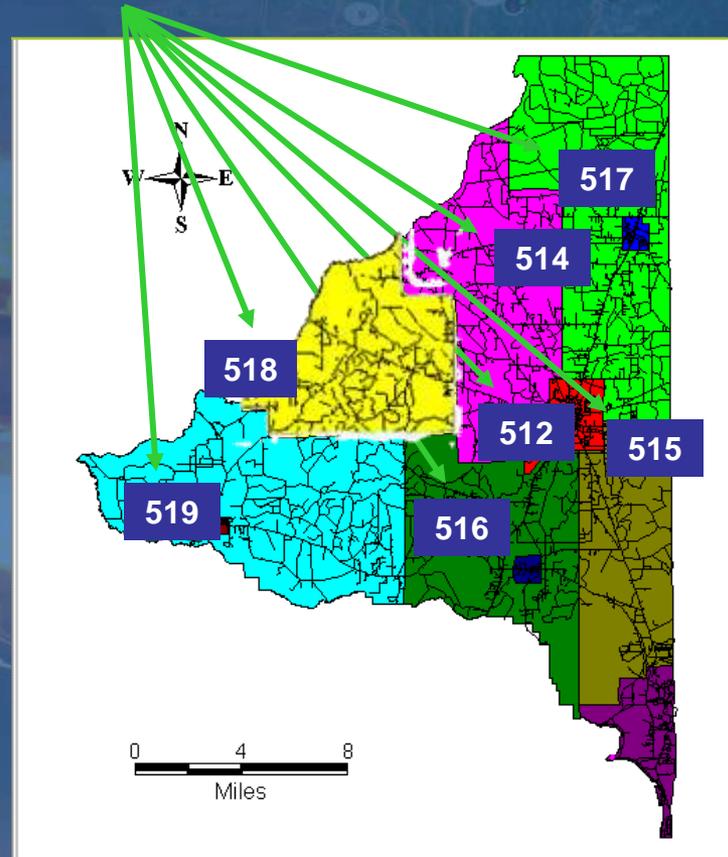
Spatial Analysis Example

“Point-in-Polygon”

911 call – in - ESZ

Emergency Service Zones (ESZ)

• **Help!**



ESZ with a 911 Call

GIS and Action



The Real World

Abstraction

Representation

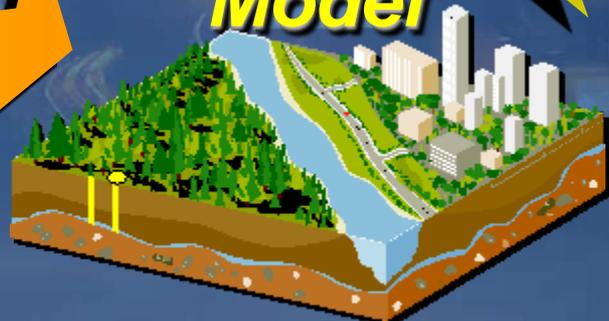


Maps

Digital Model

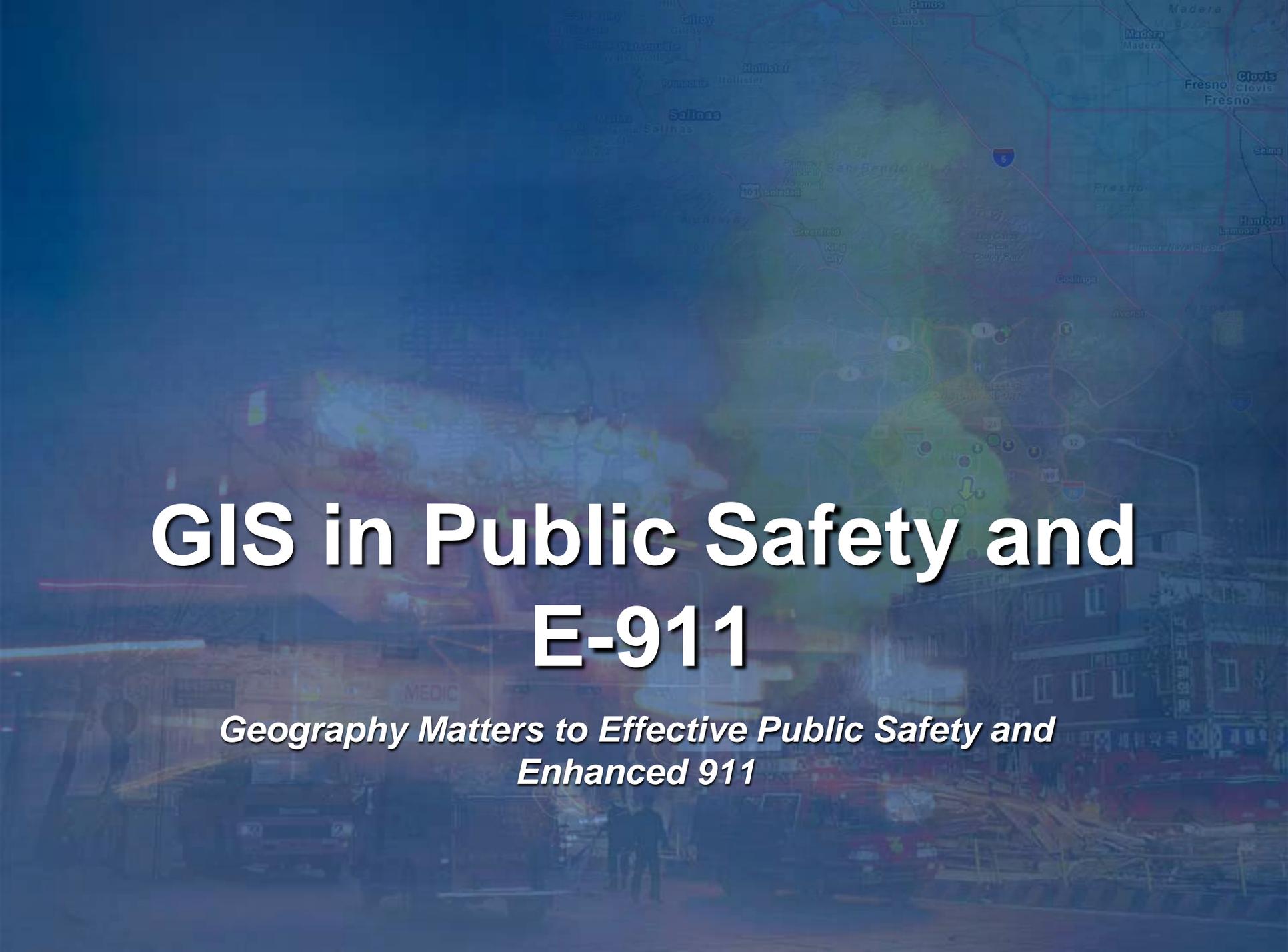
Conversion

Presentation



Analysis

Action



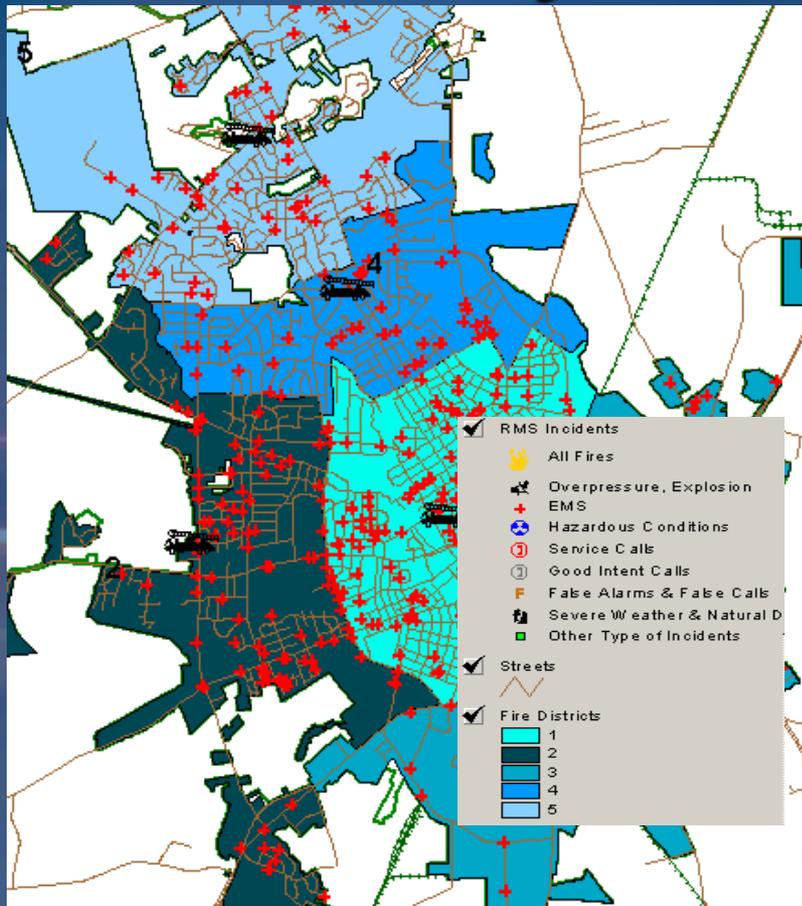
GIS in Public Safety and E-911

*Geography Matters to Effective Public Safety and
Enhanced 911*

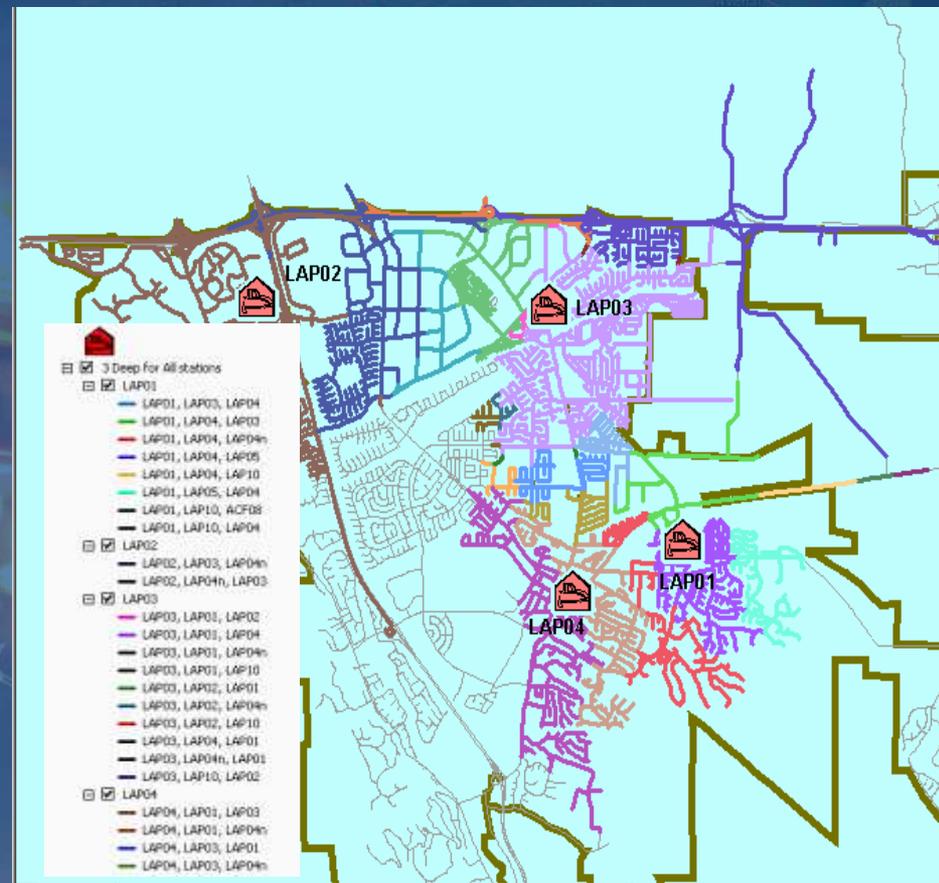
Public Safety Work Flow

Planning and Preparedness

Incident Analysis

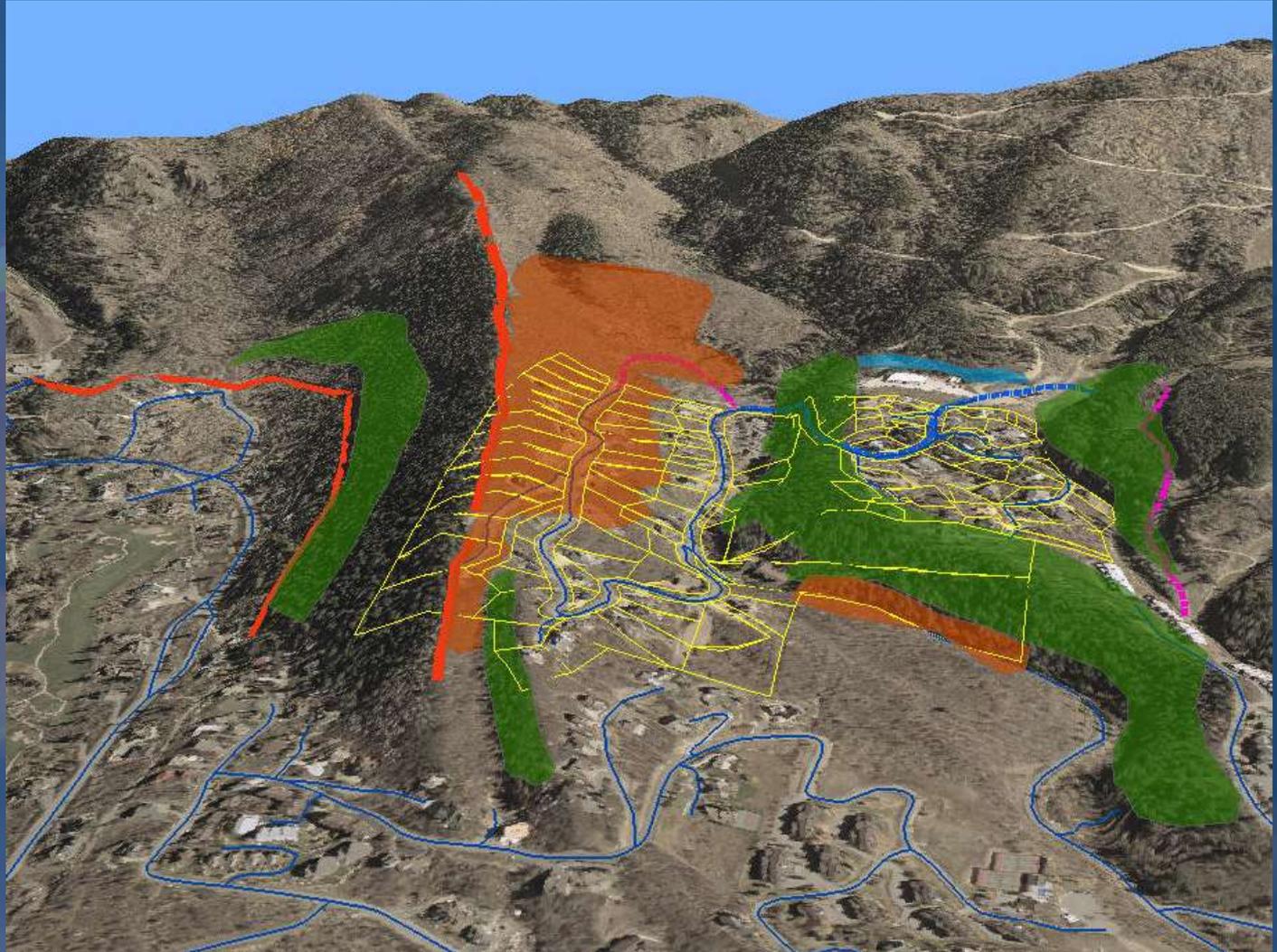


Response Analysis



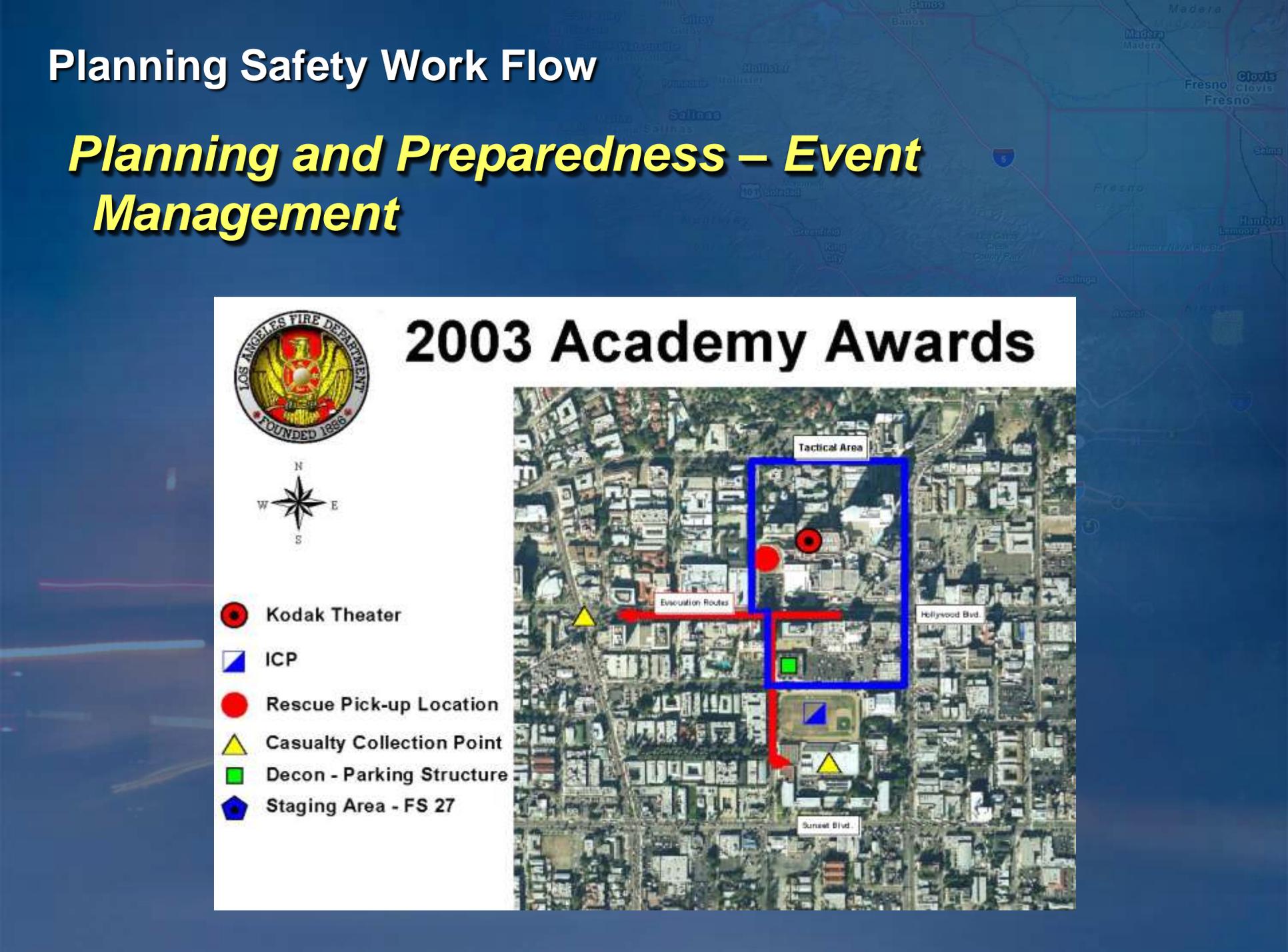
Planning Safety Work Flow

Planning and Preparedness – Wildland Fire



Planning Safety Work Flow

Planning and Preparedness – Event Management



2003 Academy Awards



-  Kodak Theater
-  ICP
-  Rescue Pick-up Location
-  Casualty Collection Point
-  Decon - Parking Structure
-  Staging Area - FS 27



GIS for Supporting complex Incident Management Support



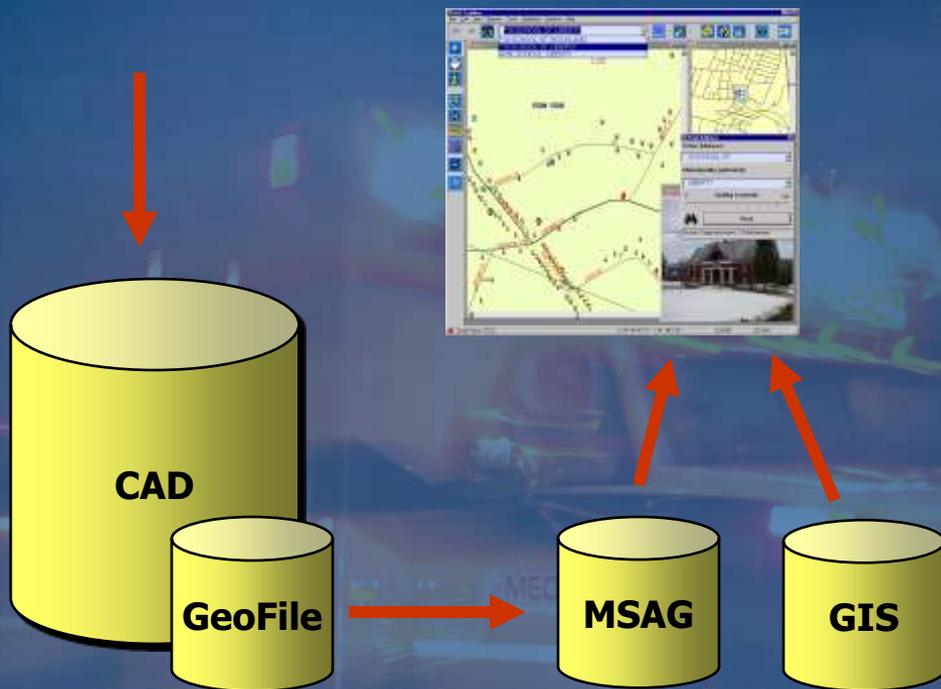


Computer Aided Dispatch and GIS

- **GIS should play a central role in Computer Aided Dispatch Systems**
- **GIS centric Computer Aided Dispatch Systems are faster, efficient and more flexible than traditional CAD's.**
- **Addressing update transactions can be quickly without delay.**
- **GIS centric CAD's can be extended into and better support the public safety mission**
- **GIS is a common format for sharing geographic data**
- **GIS based ALL-databases are the future**

Computer Aided Dispatch

Traditional CAD

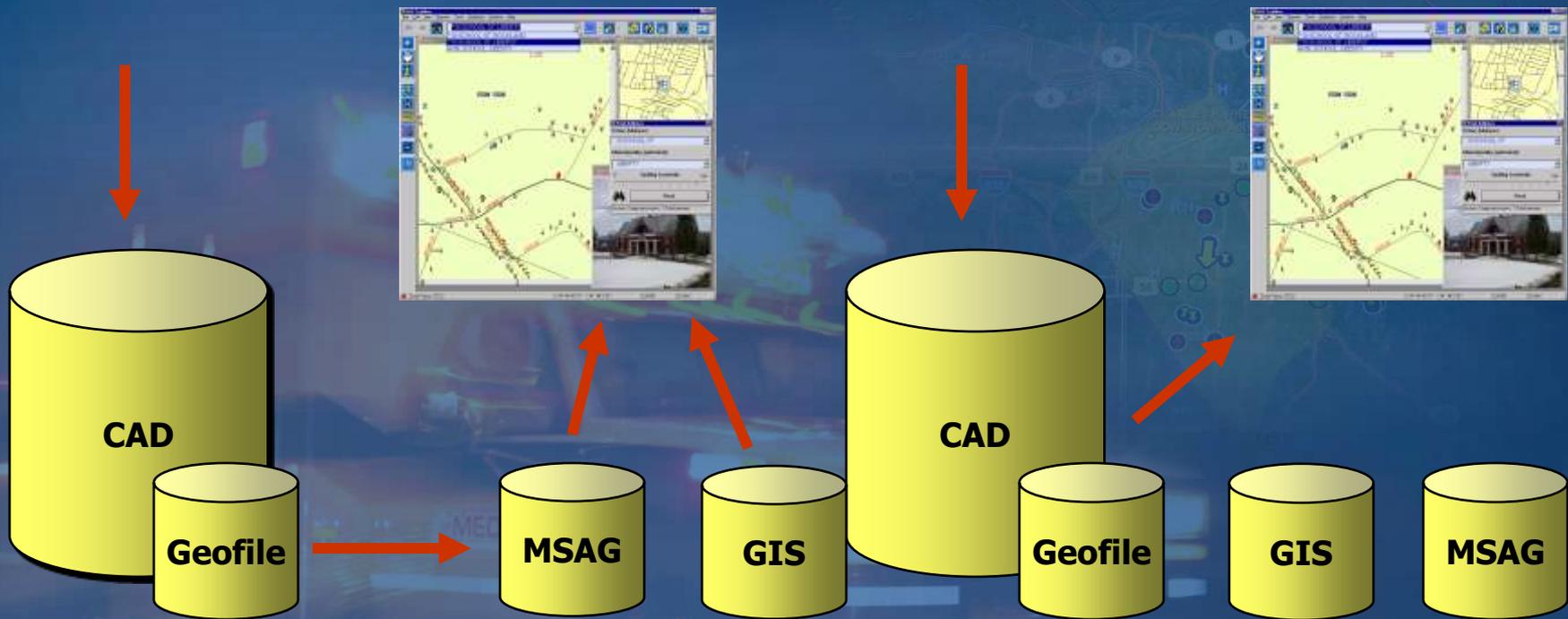


Traditional CAD's use GIS as an added feature, requiring the MSAG to Match the Geo-File

Computer Aided Dispatch

Traditional CAD

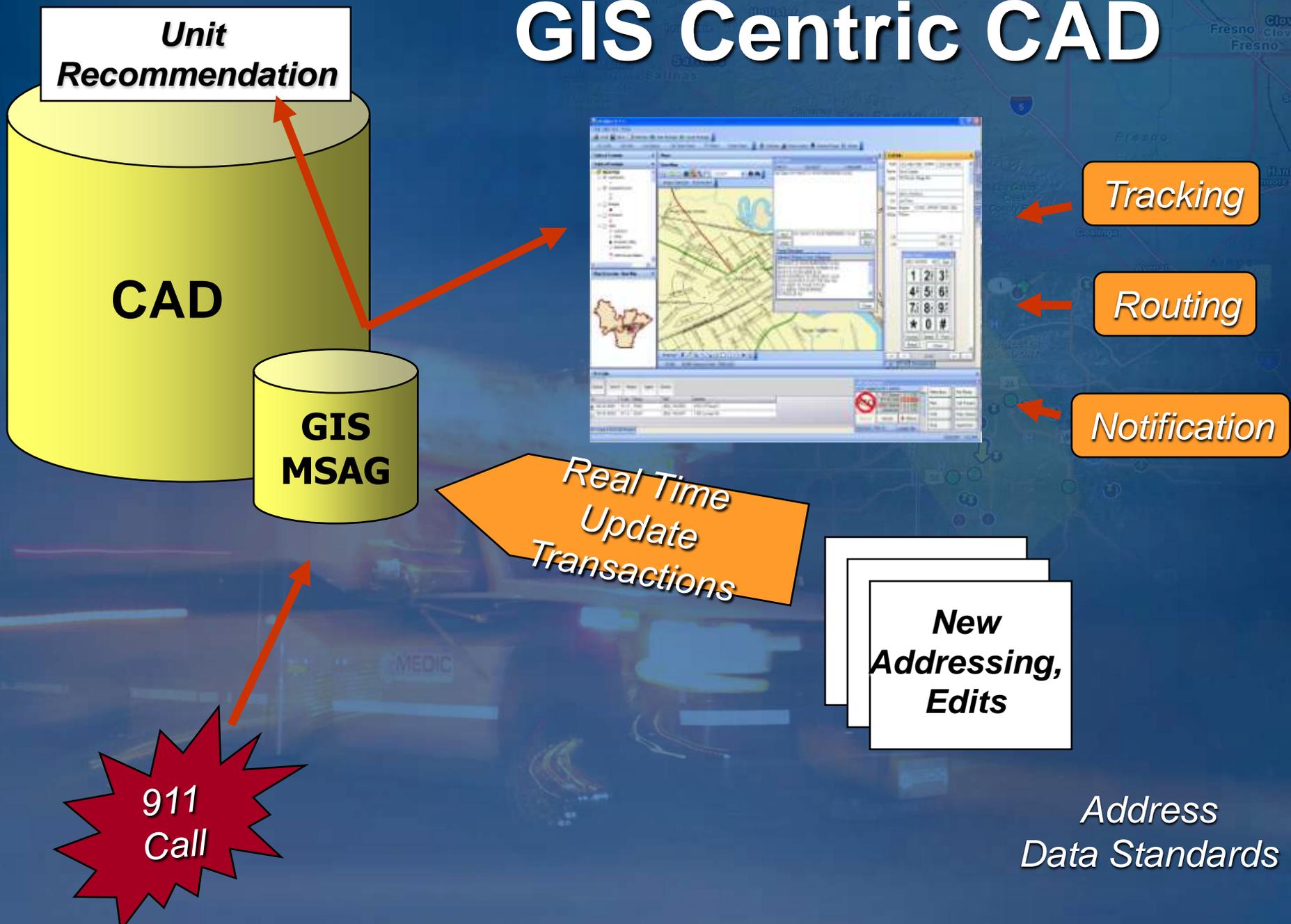
GIS Centric CAD



Traditional CAD's use GIS as an added feature, requiring the MSAG to Match the Geo-File

GIS Centric CAD's are designed Around a GIS

GIS Centric CAD





Next Generation E-911 and GIS

Everything happens somewhere

From the NENA website....

- A system comprised of Emergency Services IP networks (ESInets), IP-based **Software Services and Applications, Databases and Data Management processes** that are interconnected to Public Safety Answering Point premise equipment. The system provides **location-based** routing to the appropriate emergency entity. The system uses additionally available data elements and business policies to augment PSAP routing. The system delivers **geodetic and/or civic location information** and the call back number.

GIS Technology is part of the Next Generation 911 Architecture



Coordination and Collaboration are **Critical**

Without it, We're Collectively Wasting Resources



Idaho GIS Office

www.gis.idaho.gov



Idaho Geospatial Office

Strategic and Business Planning

- [Strategic and Business Planning](#)
- [ITRMC - Idaho Geospatial Committee](#)
- [Standards, Policies and Guidelines](#)
- [Framework](#)
- [Reports](#)
- [Map of the Month](#)

Resources

- [Inside Idaho](#)
- [Idaho GeoData Portal](#)
- [Idaho State University](#)
- [Idaho GIS Data Links](#)
- [USGS PNW-RGIC](#)
- [GISleuth](#)
- [IGC Survey](#)

Interactive Maps

- [Idaho Tax Commission](#)
- [Google Campgrounds](#)
- [Idaho Recreation](#)

Welcome

Our mission is to provide leadership and coordination for the creation and maintenance of statewide base geospatial data (Framework) and overall support to the GIS community. We facilitate the use, development, access, sharing, and management of geospatial data and assist with communicating the value of geospatial information to citizens and decision-makers in the state of Idaho.

The goals of the Idaho Geospatial Office are to:

1. Promote sustainable multi-organization partnerships
2. Coordinate deployment of GIS technology and use of geographic information among state agencies.
3. Enhance geospatial capabilities throughout Idaho.

**** [Framework Standards Development Policy - Draft](#) ****
**** [Subscribe to the Idaho Geotech List Server](#) ****

For more information:

Contact Gail Ewart (Geospatial Information Officer)
gail.ewart@cio.idaho.gov



Informative Links

- [National States Geographic Information Council](#)
- [Urban and Regional Systems Association](#)
- [Association of American Geographers](#)
- [American Society for Photogrammetry & Remote Sensing](#)
- [Geospatial Information & Technology Association](#)
- [Federal Geographic Data Committee](#)
- [U.S. Geological Survey](#)
- [U.S. Environmental Protection Agency](#)
- [U.S. Census Bureau](#)
- [Natural Resource Conservation Service](#)

Idaho GIS Groups

- [Southwest Idaho GIS Users Group](#)
- [Women in GIS](#)
- [Regional GIS Groups](#)

Idaho Spatial Data Infrastructure (SDI)

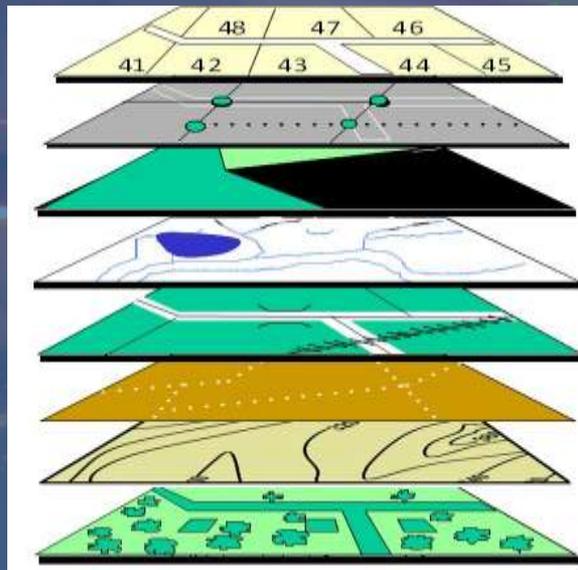
The technology, policies, standards, **human resources**, and related activities necessary to acquire, process, distribute, use, maintain, and preserve spatial data.

OMB Circular A-16

GIS is often the platform for deploying an individual node within an SDI. To achieve these objectives, **good coordination** between all the actors is necessary and the definition of standards is very important.

“Framework” GIS Data

Our commonly needed base data, statewide in extent, perpetually maintained, documented, and accessible



Existing Idaho Framework Themes	Cadastral
	Geodetic Control
	Orthoimagery
	Hydrography
	Transportation
	Elevation
	Governmental Units
Proposed Framework Themes	Land use/Land cover
	Bioscience
	Climate/Meteorological
	Geoscience
	Natural Hazards
	Public Safety/Preparedness
Utility-Pipelines	

Types of Interoperability

■ Technical

- Machine to machine connections
- Software module interaction
- APIs
- Formats...



■ Semantic

- Common understanding concepts, terms
- inter-disciplinary special vocabularies...



■ Human

- Cooperation
- Training



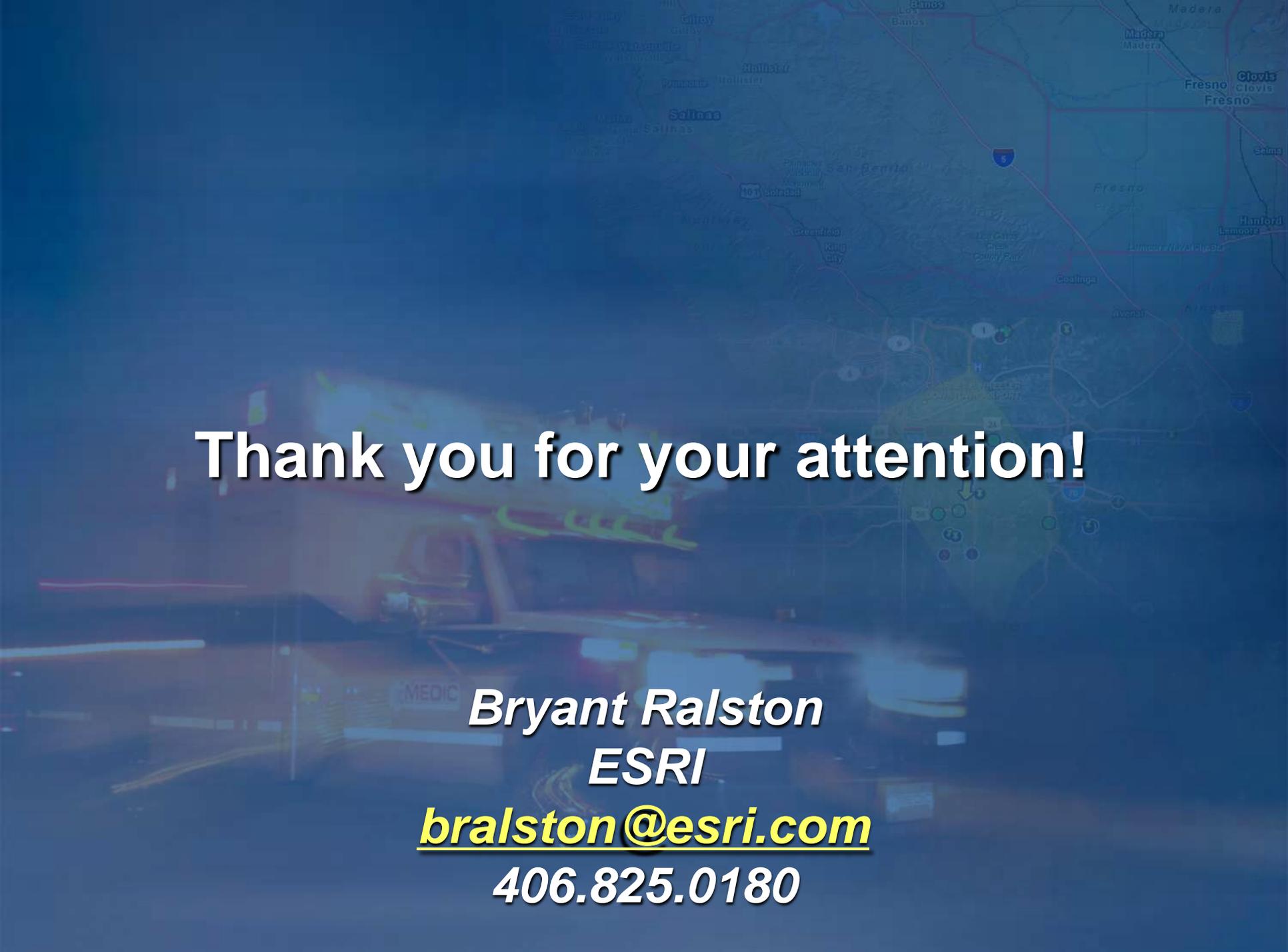
■ Legal/Policy

- Digital rights, ownership
- Lack of designated responsibility, ...



Conclusions

- **GIS is a widely used, horizontally applied IT compliant technology**
- **Applications of GIS are very diverse**
- **GIS fuses diverse data sets**
- **Much good GIS activity in Idaho**
- **GIS helps public safety mission in many ways**
- **GIS enhances CAD systems**
- **Coordination and Collaboration are key to our collective future success**
- **Framework data efforts relevant to yours**



Thank you for your attention!

Bryant Ralston

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406.825.0180

Questions? Discussion?

