



Geographic Information Technologies

April 11, 2002

Geographic Information System (GIS)

- Much more than a map making tool, a GIS...
 - Is a sophisticated database technology
 - Allows data from many sources to be organized using geographic location
 - Provides powerful tools for spatial analysis and visualization.

Geographic Data

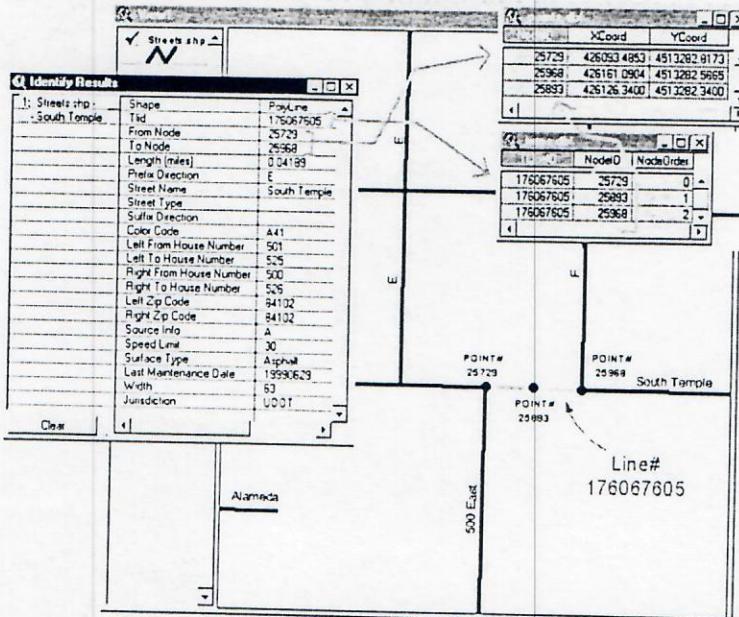
- The foundation and bellwether of a GIS.
- How GIS data works?

– Traditional database records are linked to point, line, or polygons whose geometry is stored in geographic coordinates.

Hwy	Mph	Miles
12	55	17.1
W9	65	3.4
120	45	19.2
14	70	16.8

- **point** feature ($x = -111.235456$, $y = 40.573979$)
- **line** feature (list of points, distinct end points)
- **polygon** features (list of points, common start and end pt)

Geographic Data Example – What's in a GIS Roads Database?



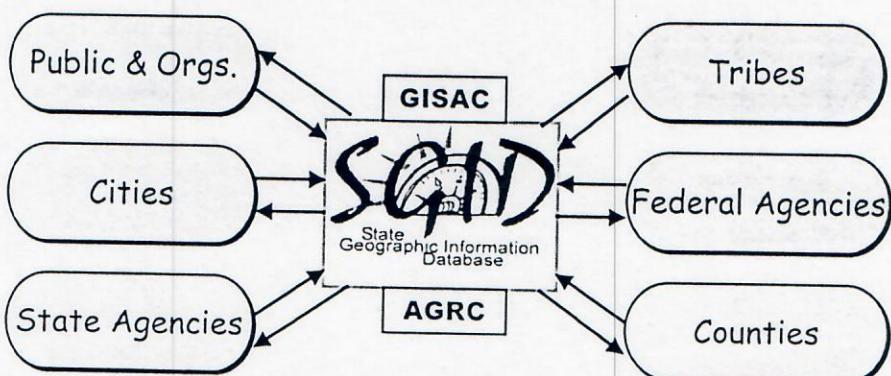
How to Acquire GIS data for Utah?

- Digitize features off of existing maps & photos
- Collect feature geometry / location with Global Positioning Systems (GPS)
- Enter and compute feature boundaries from surveyed descriptions
- *Most-cost effective way:*
Download from Utah's State Geographic Information Database (SGID) www.agrc.utah.gov

(100k+ downloads per annum, more than a terabyte per annum)

Utah's State Geographic Information Database (SGID)

A foundation exists for a statewide approach to develop, maintain, and share geographic data



What categories of GIS data does the Utah SGID contain?

- Aerial Photography
- Climate Data
- Cultural / Historical
- Demographic
- Elevation Contours and Terrain Models
- Environmental / Ecology
- Geology / Soils
- Land Ownership/Use
- Cities & Service Districts
- Place Names
- Political Boundaries
- Satellite Imagery
- Surveyor Reference
- Scanned Maps
- Transportation
- Utilities
- Vegetation
- Water Bodies, Courses, Springs
- Wilderness Areas & Proposals

Who uses GIS?

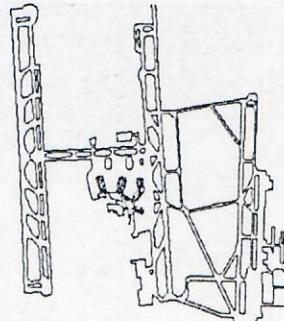
SGID: Vector-Based GIS Dataset Examples

160+ vector-based SGID layers
Available for 1600 common extents
Total vector GIS database size ~ 20Gb

Point-Based Data
Mineral, Coal, and
Geothermal
Occurrences



Line-Based Data
SLC Airport
Infrastructure

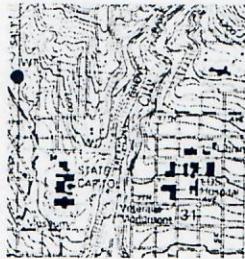


Polygon-Based Data
Incorporated
Municipalities



SGID: Raster-Based GIS Dataset Examples

Scanned
Images
USGS 7.5'
Quads (DRG)
1500 @
7Mb each
(~ 10 Gb)



10 Meter
Digital
Elevation
Model (DEM)
1500 @
2Mb each
(total ~ 3 Gb)

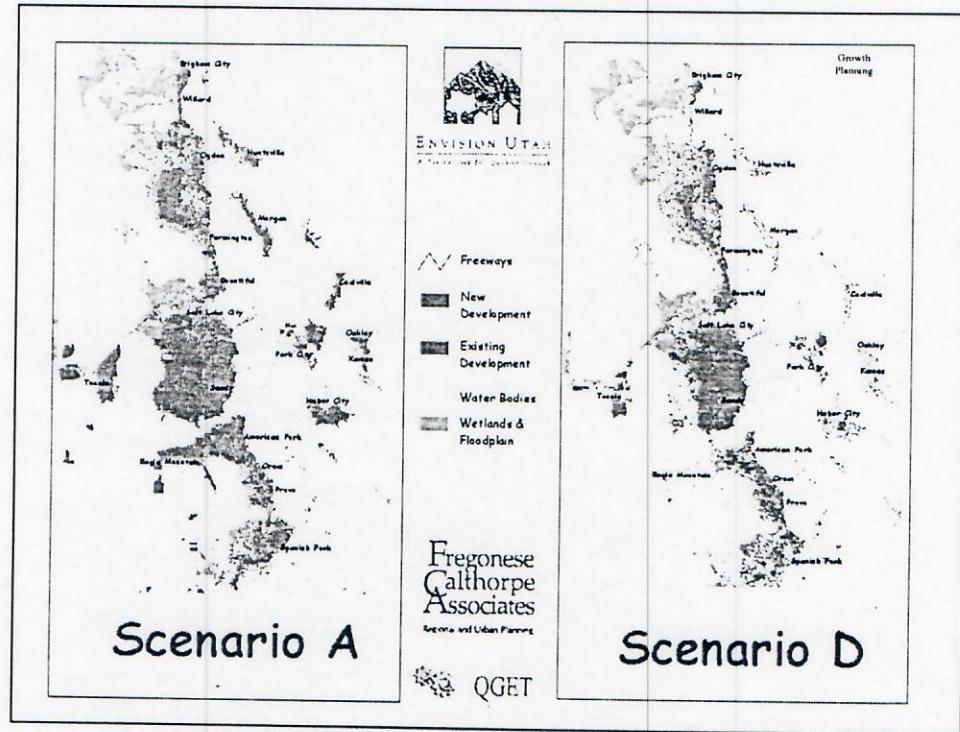
Aerial
Photography:
Digital
Orthophoto
Quads (DOQ)
1536 @
30Mb each*
(total ~ 45 Gb)



* = compressed format

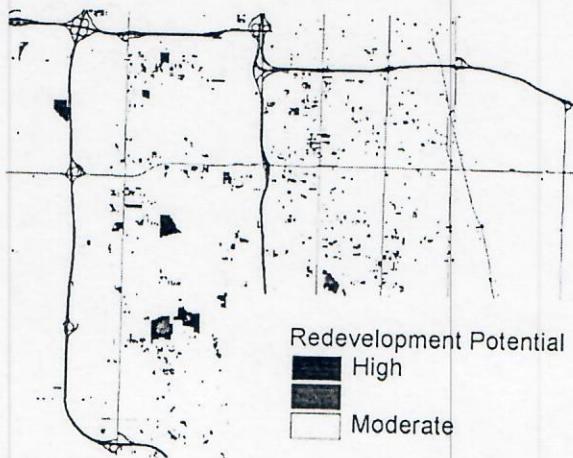
Why GIS?? Organization, Integration, Analysis, & Communication of Information

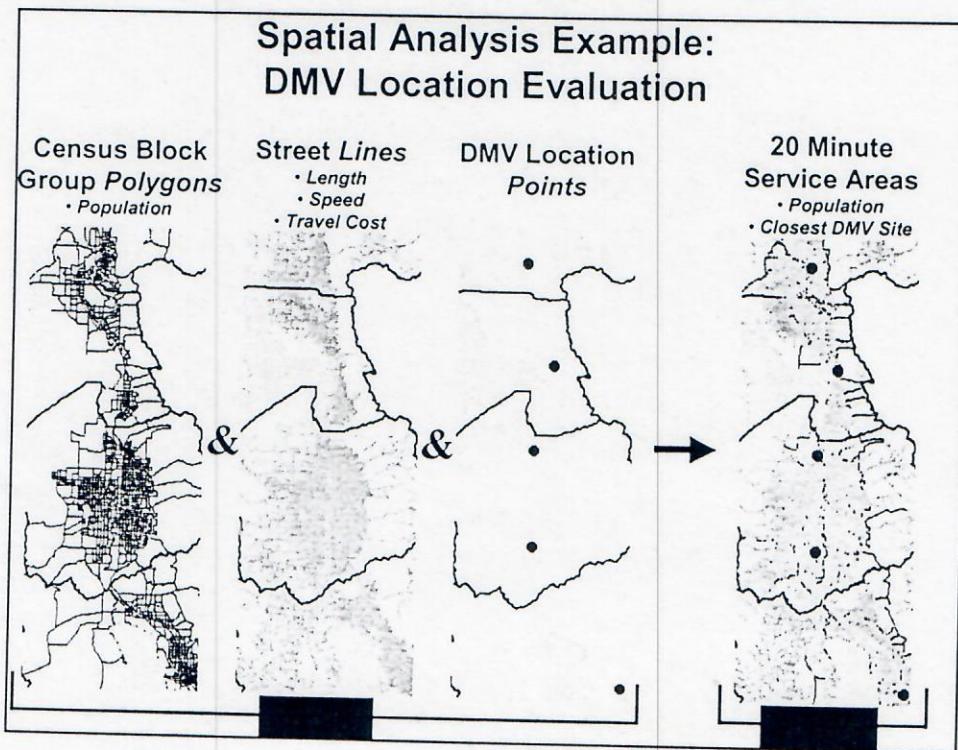
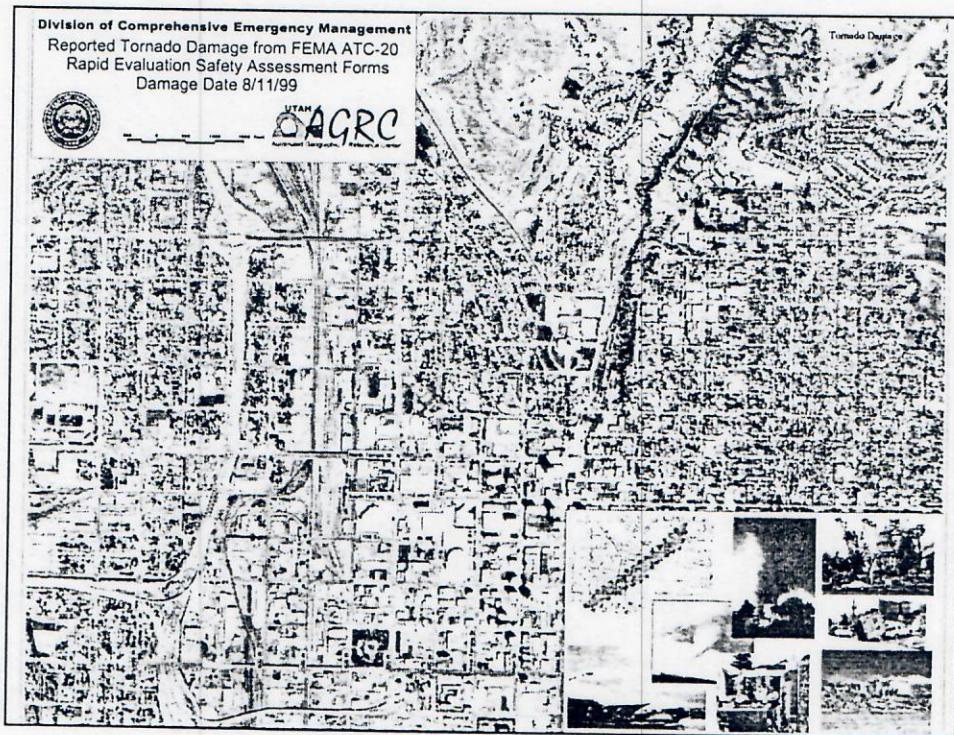
- Most information that government agencies collect can be tied to geographic locations or areas.
- Location can be used as a *common organizing strategy* for integrating and sharing information.
- GIS tools provide powerful *spatial analysis* tools.
- Maps provide effective *visual communication* of information.

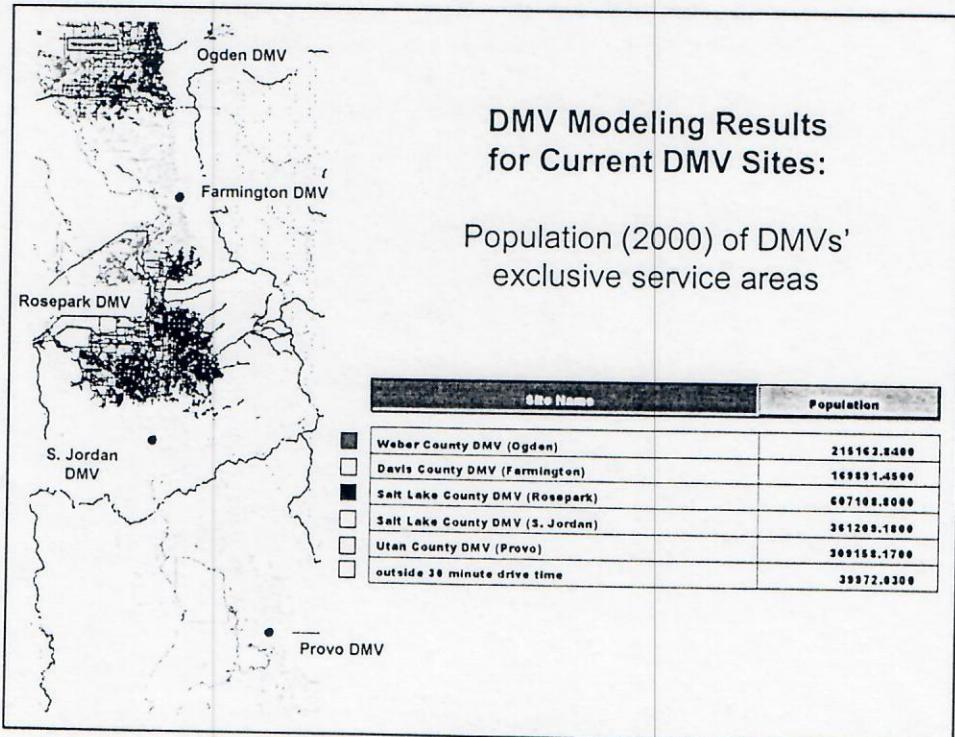
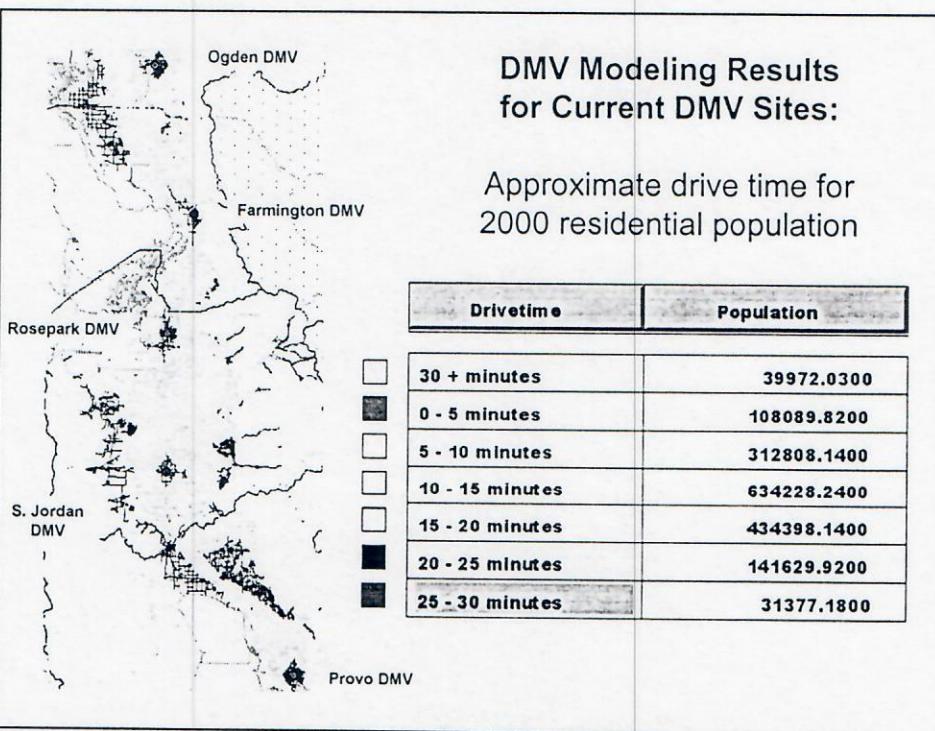


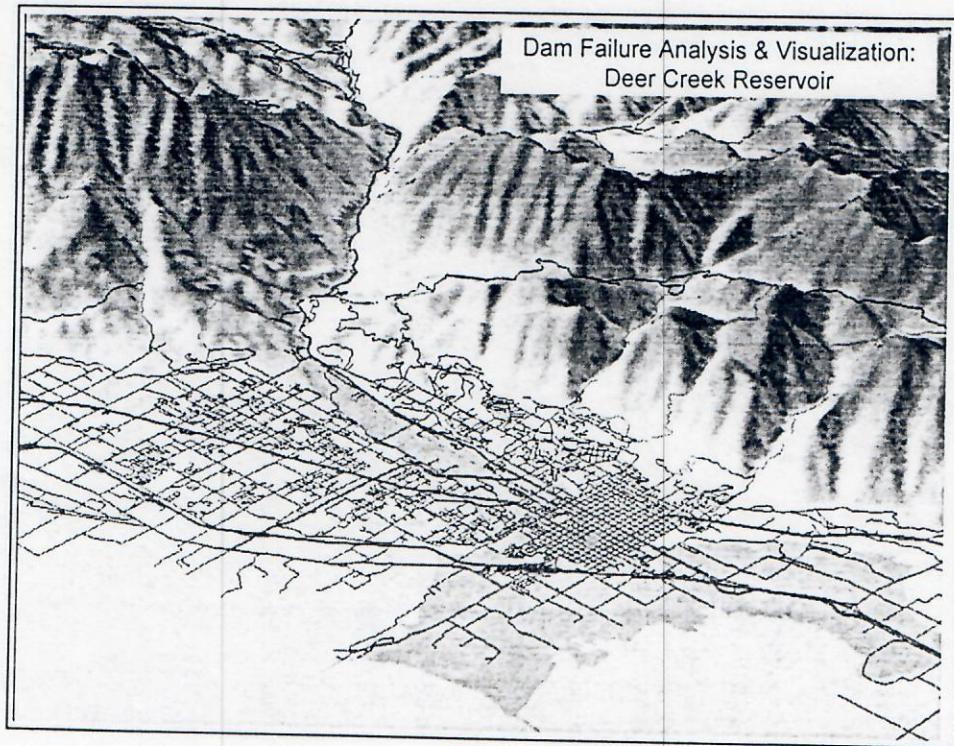
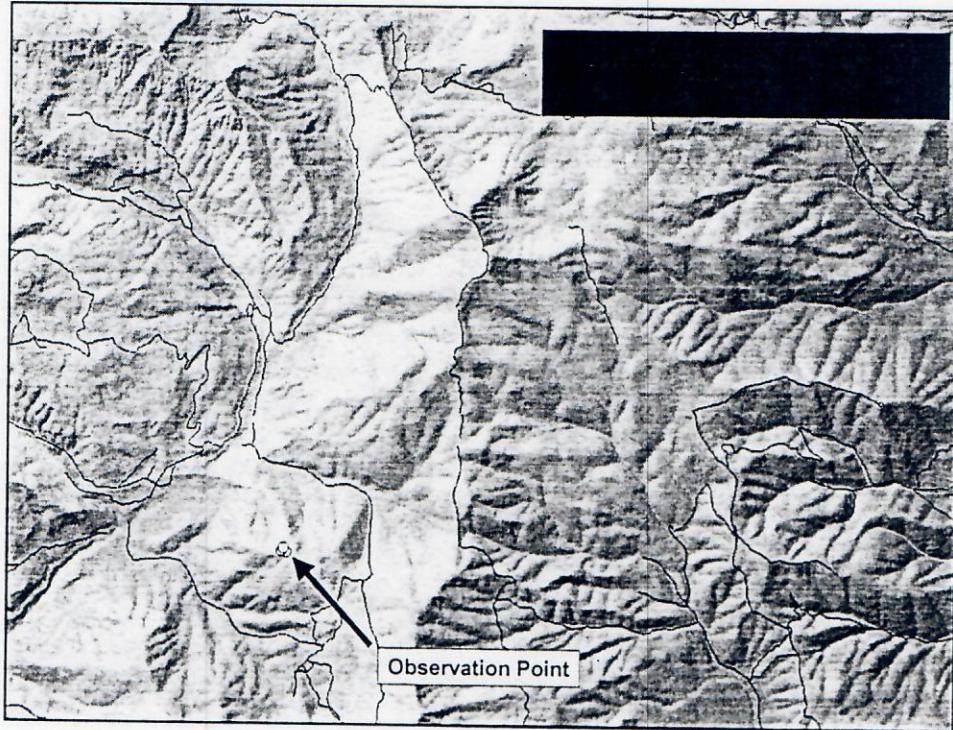
Economic Development Analysis

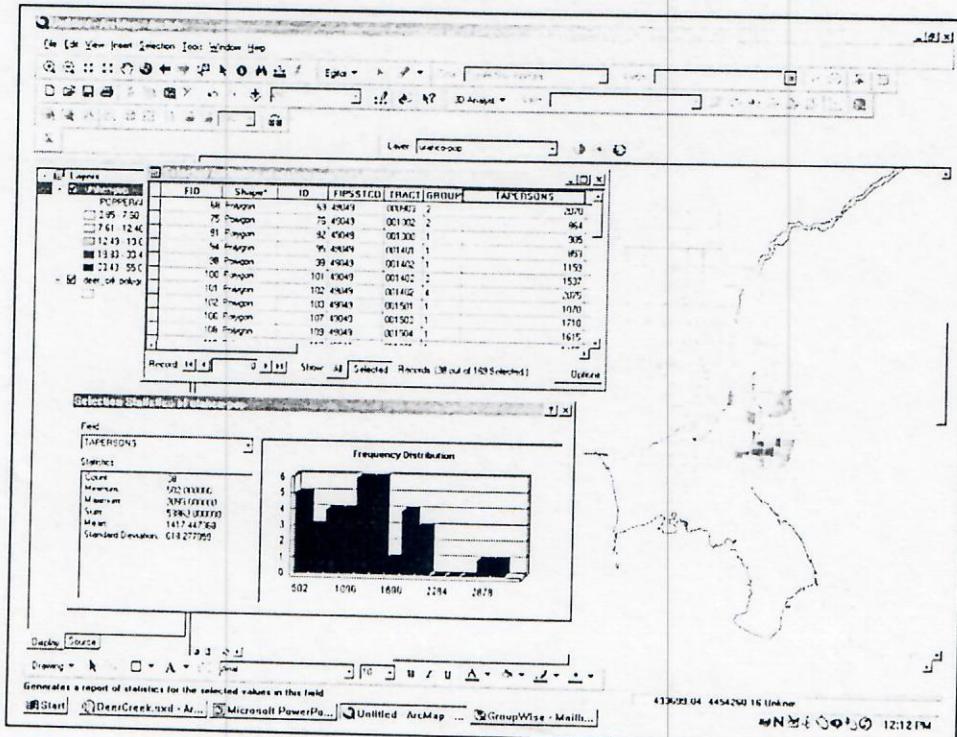
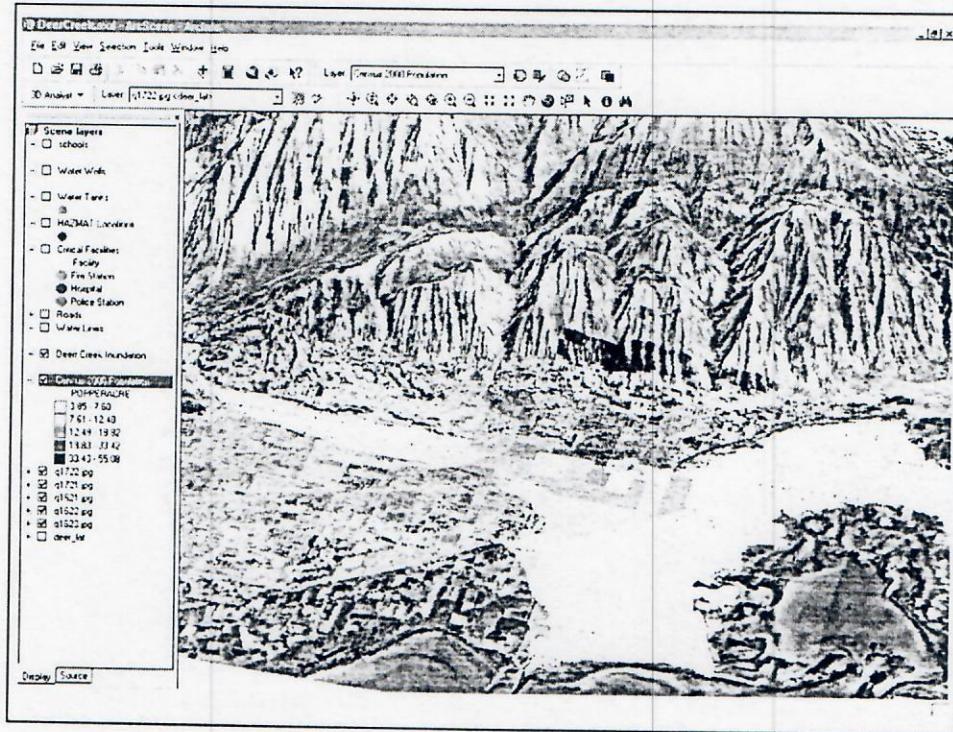
Estimate of re-development potential using a ratio of assessed value per acre to mean surrounding assessed value per acre.

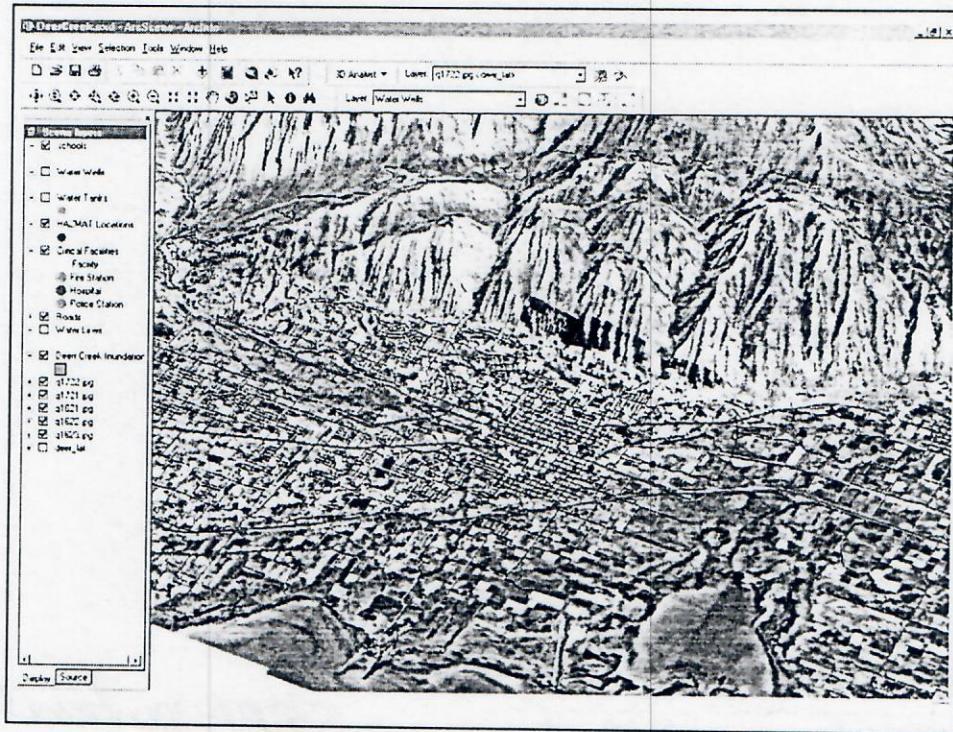












GIS @ AGRC

- Demonstrations...
 - RS2477 Roads GIS Database
 - SGID GIS Data Download Index
 - ArcIMS: Web-Based Interactive Maps
 - maps.utah.gov



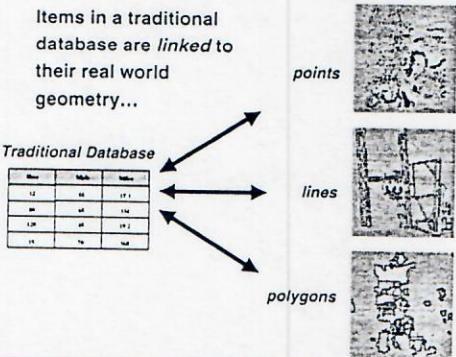
Geographic Information Systems Implementation in Utah

May 20, 2002

Geographic Information Systems (GIS)

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- Is a sophisticated database technology
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How a GIS database works...



GIS data within the Utah's State Geographic Information System (SGID)

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Legislative Mandate for Statewide GIS Coordination

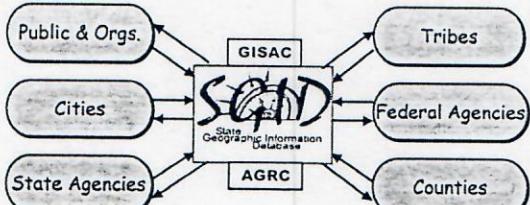
- SGID, U.C.A.63A-6-203.(1)
 - "There is created a State Geographic Information Database to be managed by AGRC."
 - Purpose is to provide geographic data to state agencies and subdivisions.
 - The data is to be maintained in a standardized format to insure consistent, accurate, credible, and reliable information on which to base decisions and perform government activities.

Executive Mandate for Statewide GIS Coordination

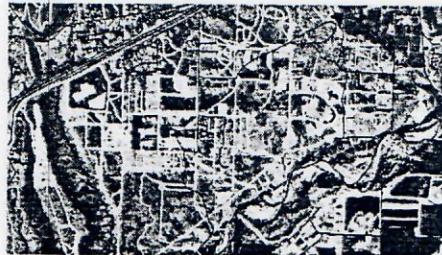
- Coordination of Data Sharing and Integration of the SGID.
 - Governor's Memorandum of Understanding in October of 1997.
 - Indicates that AGRC will "coordinate data collection and standards dealing with attributes, accuracy, currentness, completeness, and other data elements".

State Geographic Information Database

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Ongoing SGID Data Acquisition & Maintenance



RETURN ON INVESTMENT OF SGID COORDINATION

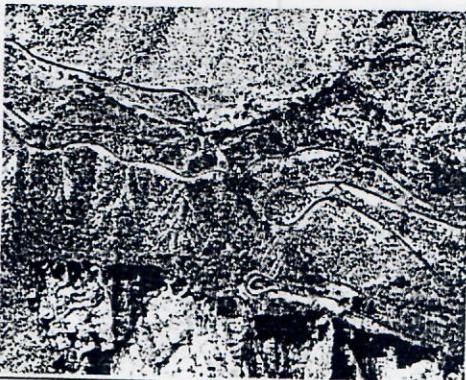
- 3 Year Delivery of Aerial Imagery
 - 3312 Digital Orthophoto Quarter Quads
 - \$2,650,000 vs. \$330,000
- 3 Year Delivery of Transportation & Hydrology datasets
 - 930 Quad-based files
 - \$1,676,800 vs. \$480,000 (plus staff)

GIS BENEFITS TO THE STATE

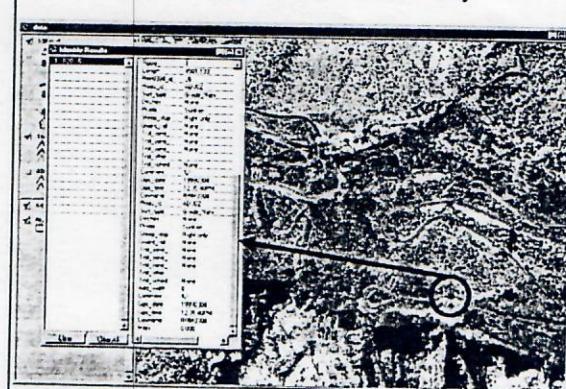
Better Services, Products, & Decisions

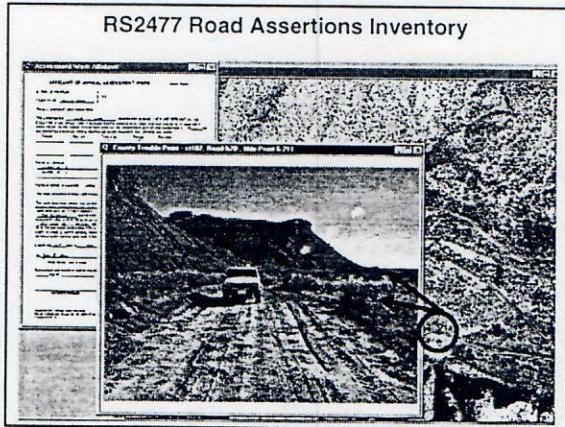
- Improved Information Organization (RS2477)
- Cost Savings (DEQ – DERR)
- Income Generation (Land Swap)
- Better Service to Public (DMV)
- Homeland Security & Public Safety
- Internet Access to Data (digital maps)

RS2477 Road Assertions Inventory



RS2477 Road Assertions Inventory

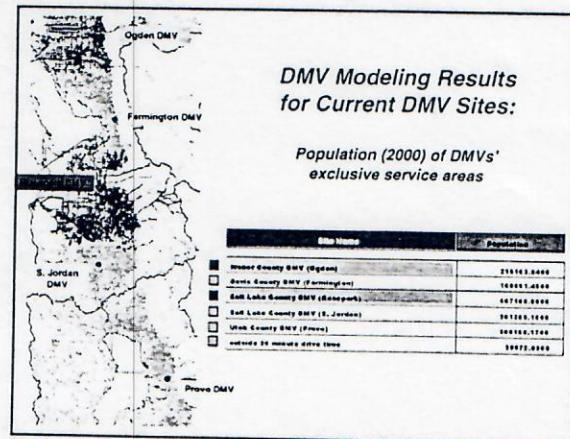
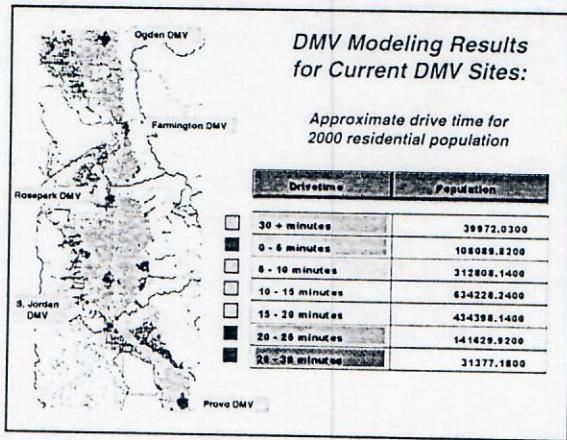
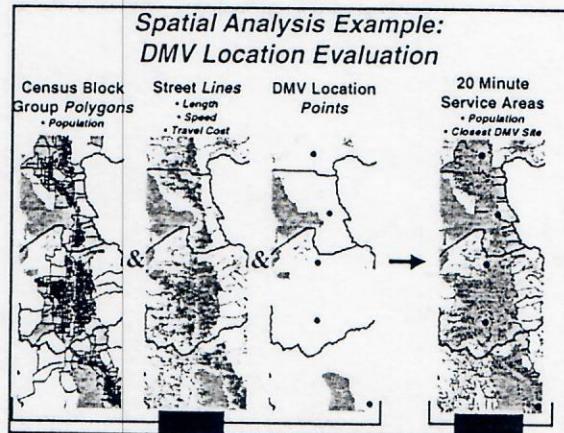
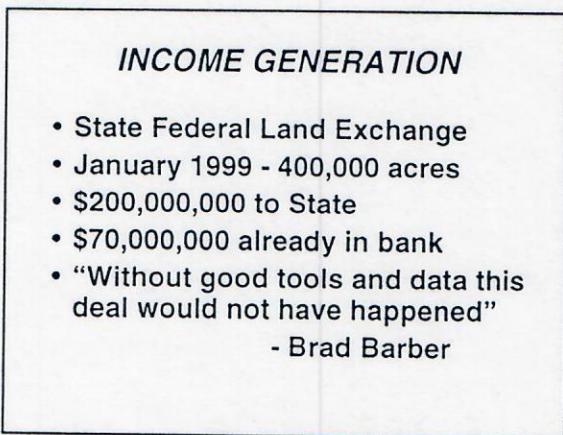




COST SAVINGS

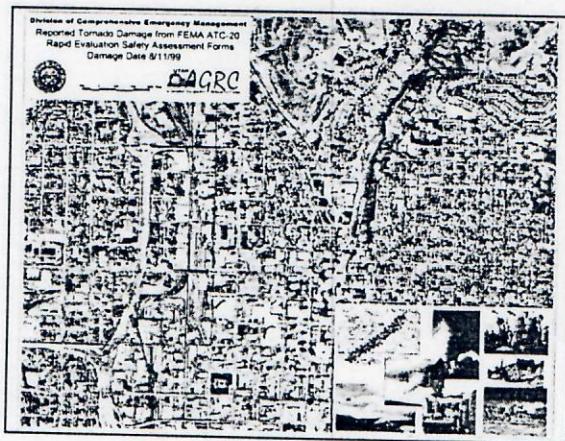
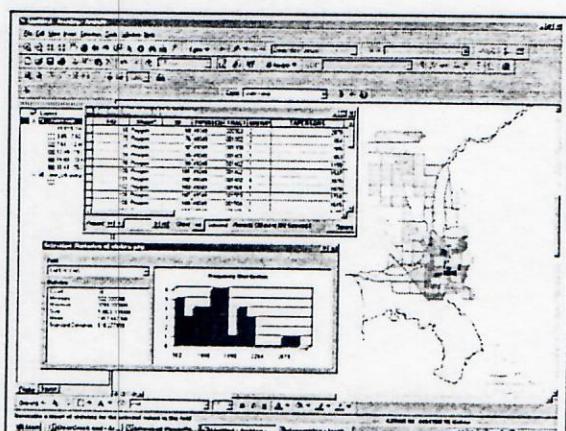
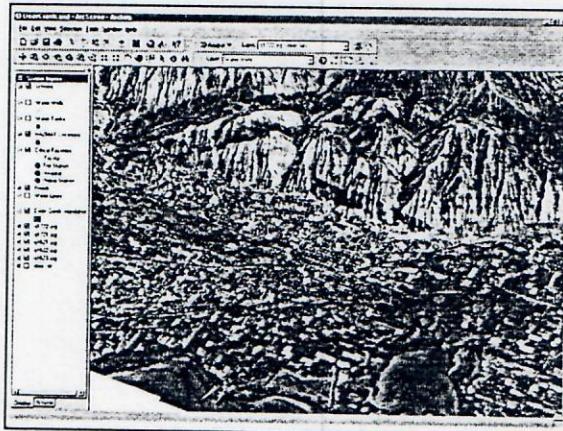
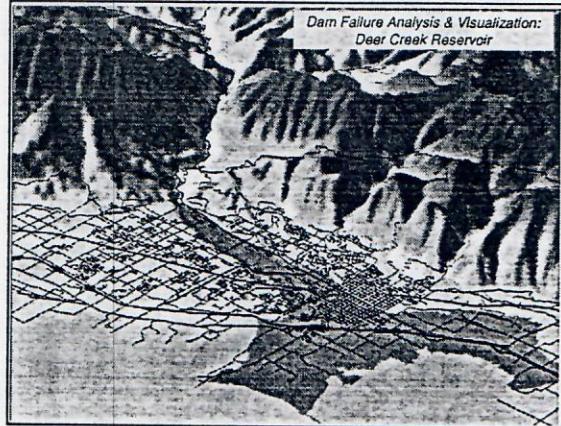
- DEQ, Division of Environmental Response and Remediation, Assessment Maps

Task	pre GIS	with GIS
Pop. Density	5-10 hrs	5-25 min
Drinking water	10-20 hrs	5-25 min
Reg. Site map	2 hrs	5-15 min
Site map	4-12 hrs	15-30 min
15 mile influence	2-3 hrs	15-30 min
AVERAGE	35 HRS	85 MIN



Governor Leavitt Addresses Homeland Security

"I have asked local law enforcement to inventory, assess and enhance protection of our vital infrastructure, including freeways, bridges, railroads, major public utilities, water storage and delivery, chemical plants and schools."



AGRC Internet-Based GIS Products

Interactive Maps Location Maps

Access to SGID On-line Map Index

Four screenshots of AGRC's internet-based GIS products: Interactive Maps, Location Maps, Access to SGID, and On-line Map Index.

AGRC Products & Services

- State Geographic Information Database (SGID)
- GIS Technology Transfer
- GIS Solution Services
 - GIS database development
 - GIS applications
 - Digital Cartography
 - Spatial Analysis
- Internet Mapping Services



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