Reorganizing Around Web Services

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- **Mission:**
  - *"Encouraging and facilitating the effective use of geospatial information and technology for Utah"*
- **Activities:**
  - State Geographic Information Database (SGID)
  - Geospatial Infrastructure for:
    - Data and Imagery Acquisition, Sharing, Distribution
    - Internet–enabled web and mapping services
    - Map-based web applications
    - GPS base station network
  - Coordination of local government, state & federal agencies geospatial activities and resources for optimal ROI
- **Hybrid Business Model**
  - Cost Recovery & Appropriation

Web & Map Services

- **Definition:**
  - ***Web Service: "a software system designed to support interoperable machine-to-machine interaction over a network." (WC3)***
  - ***Usually: Client – Server (Request – Response)***
  - ***Good terms to know:***
    - ***WSDL – protocol describing how to use WS***
    - ***UDDI – Registry/Catalog of WS***
    - **Formats: SOAP, JSON, WMS, REST, etc**

- **WS/MS Intended Audience – App developers**
  - **Web services run in the background of applications**
  - **Thin (browser) and Thick clients (ArcMap,etc)**
    - **GIS and Non-Spatial Audience**
  - **.NET, java, php, python, ruby, etc**

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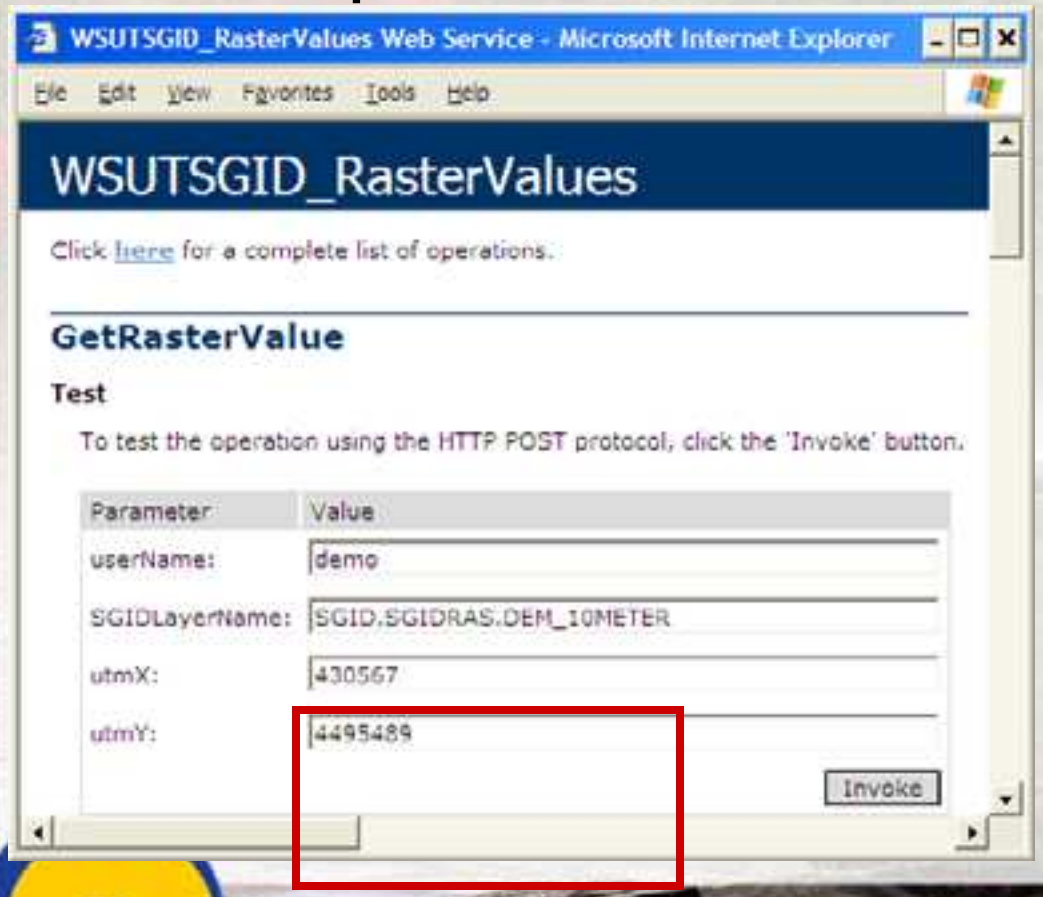
Web & Map Services

- **Example: Elevation lookup**
  - **Request: SGID Dataset Name, x, y**
  - **Response: Elevation**



<?xml version="1.0" encoding="utf-8" ?>
<string xmlns="http://mapserv.utah.gov/WSUTSGID_RasterValues">
1454|meters</string>

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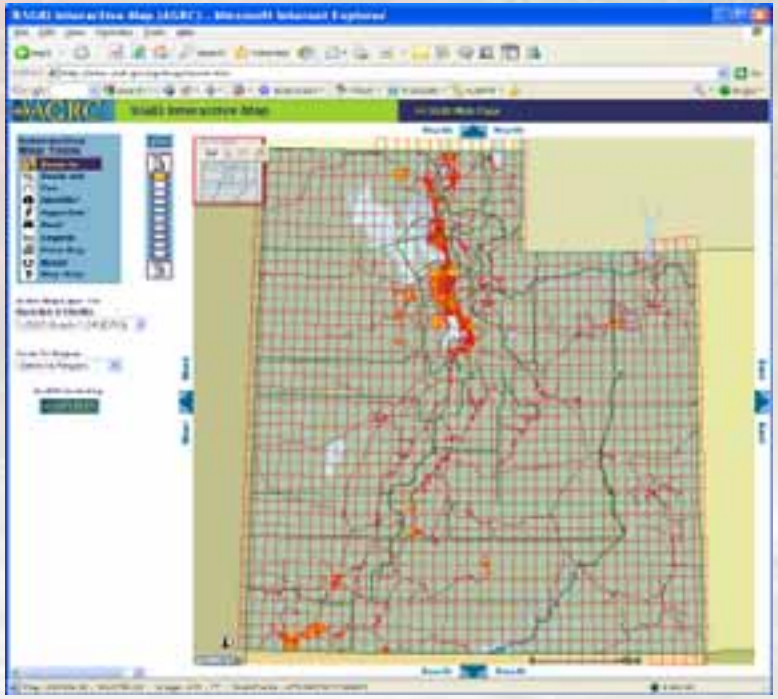
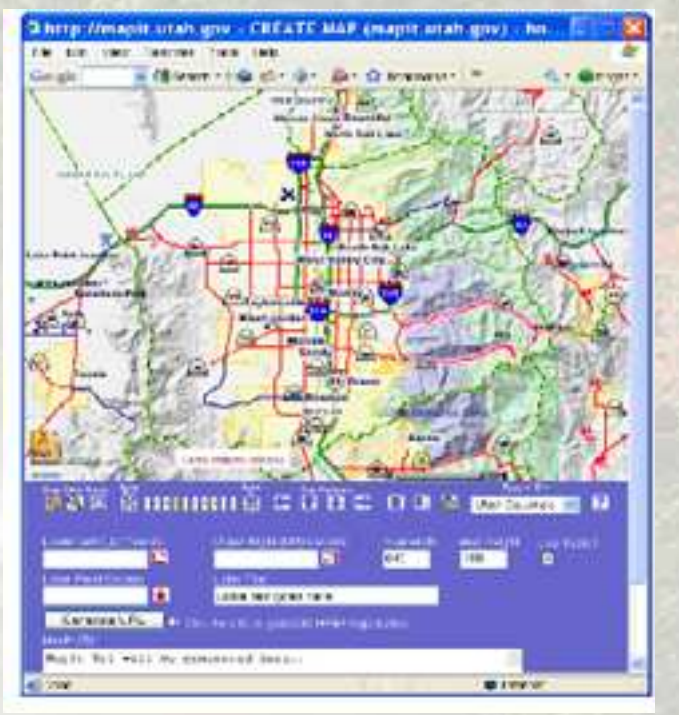
Utah Map and Web Services:

- **From Exploration:** ArcIMS 2000- 2007 (~15 services, ArcAXL)





- **To Business Solutions:** ArcGIS Server, 2008 →

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Utah Geospatial Infrastructure

- **2008 Strategic Plan Addresses Geospatial Services**
  - Goal 4.2: “Services Are Effective, Accessible and Reliable”.
  - Objectives:
    - Create a common infrastructure for delivering geospatial services
    - Create exemplary services
    - Develop services for data integration.
    - Adopt management and control processes

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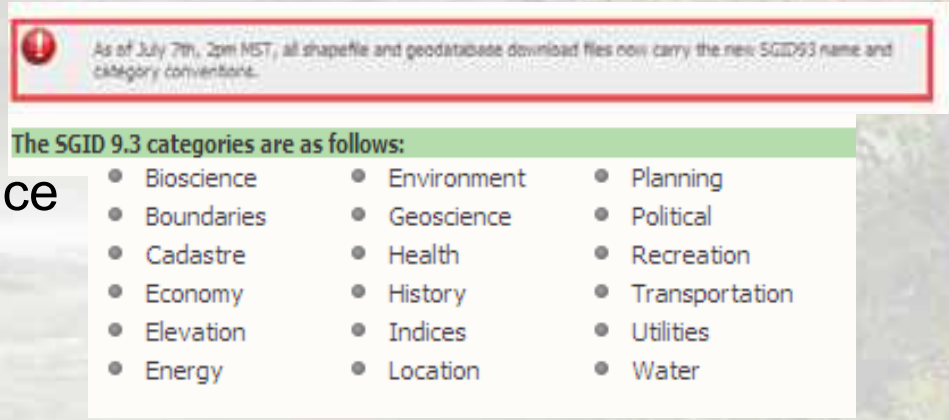
Utah SGID Data Reorganization

- **State Geographic Information Database**
  - SDE: 450+ Vector Layers
  - ImageServer: 20+ Raster Layers

- Services Focus and Geospatial Archiving Needs Drive Reorganization
  - ISO Topic Categories
  - Easy of update/maintenance
  - Attributes for map & web services
    - Ease of use
    - Cartography
  - Performance



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AGRC Office Reorganization

- **Organizational**
  - Preexisting Model
    - Horizontal
    - Project Focus
    - 1 Supervisor
  - New Model
    - Operational Groups, 4 Section Managers
      - **Administration**
      - **SGID Data**
      - **Cadastral**
      - **Tech/App Development** (Web/Map Services)
- Physical
  - Designed for collaboration:
    - by group
    - shared spaces
    - low walls

Core Web Services:

- Address Location
  - Address/Zip
  - Address/Placename
  - Milepost/Route
- Features At/Near Point
- Get Feature Attributes
- Elevation Lookup
- Keyword lists
  - Cities, placenames, GNIS
- Base Map Services

About:

- mapserv.utah.gov
- SOAP, JSON, Map services info
- User accounts
  - Track usage
  - Communicate with users

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Componentizing Strategy:

- 1st Gen: Design web service to specific use
  - District Lookup
    - Address → legislators, tax districts, etc.
    - Easy for application developers

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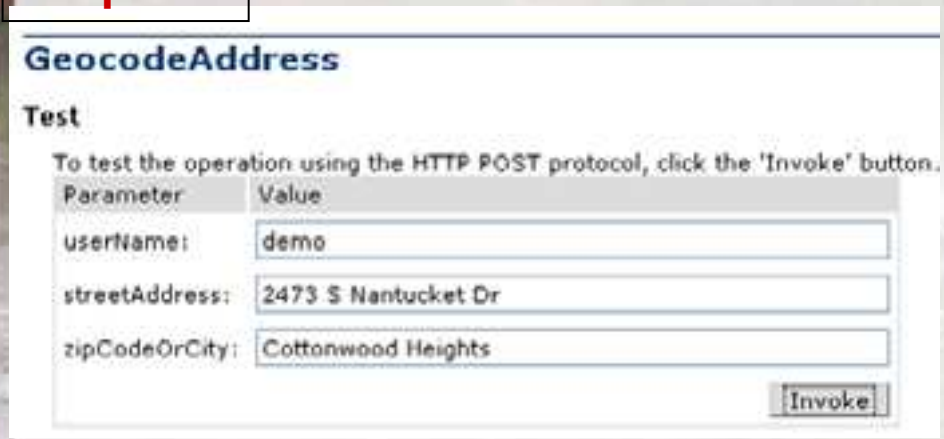
District Lookup Web Service:

Request:



Response:

```
- <ArrayOfResults>
  - <Results>
      <MatchAddress>2473 E Nantucket Dr, 84121</MatchAddress>
      <Geocoder>U024.GC_StatewideStreets</Geocoder>
      <GeocodeScore>100</GeocodeScore>
      <UTM_X>430567.08</UTM_X>
      <UTM_Y>4495488.76</UTM_Y>
      <LONG_X>-111.8207283</LONG_X>
      <LAT_Y>40.6072995</LAT_Y>
    </Results>
  - <Results>
      <DistrictLayer>SGID.U024.AdjustedUSHouseDistricts2002</DistrictLayer>
      <DistrictValue>2</DistrictValue>
    </Results>
  - <Results>
      <DistrictLayer>SGID.U024.Municipalities</DistrictLayer>
      <DistrictValue>Cottonwood Heights</DistrictValue>
    </Results>
  - <Results>
      <DistrictLayer>SGID.U024.SalesTaxAreas</DistrictLayer>
      <TaxDistrict>18020</TaxDistrict>
      <MetroName>Cottonwood Heights</MetroName>
      <FIPS>16270</FIPS>
      <CurrRate>0.0685</CurrRate>
      <RateDate>JAN09</RateDate>
    </Results>
  - <Results>
      <DistrictLayer>SGID.U024.SchoolDistricts</DistrictLayer>
      <DistrictValue>JORDAN SCHOOL DISTRICT</DistrictValue>
    </Results>
  - <Results>
      <DistrictLayer>SGID.U024.AdjustedUtahHouseDistricts2002</DistrictLay
      <DistrictValue>49</DistrictValue>
      <EMail>jseegmiller@utah.gov</EMail>
      <Name>F. Jay Seegmiller</Name>
      <Party>D</Party>
    </Results>
  - <Results>
      <DistrictLayer>SGID.U024.VotingPrecincts</DistrictLayer>
      <DistrictValue>4946</DistrictValue>
    </Results>
```

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Componentizing Strategy:

- 2nd Gen: Design services as building blocks
  - ~~District Lookup~~
  - Address Locator + Feature At Point
    - Application develops have to chain services ☹
      - First find address location
      - Then find districts at address location
    - Faster, easier to maintain, more flexible ☺

Web Service Advantages

- Get more from investment, reach wider audience
- Application Developers don't need to maintain own geospatial infrastructure, licenses, & data
- Contract with end user defined by request and response definitions
  - Frontend Input/Output parameters must stay the same
  - Backend methodology & data can be changed without breaking contract
- Custom handling of tasks
- Example: Address Locator

Ex. Address Locator Web Service

- Seamless updates: no files, data, parameters, software to be managed by application developers
- Customized Location Methods:
  - Backend is all zipcode-based geocoding
  - But place name input is also allowed
    - Place name to zipcode alias table
  - Three levels of street name aliasing
  - Milepost/Route handled by same service
  - Next? NENA DB direct GC

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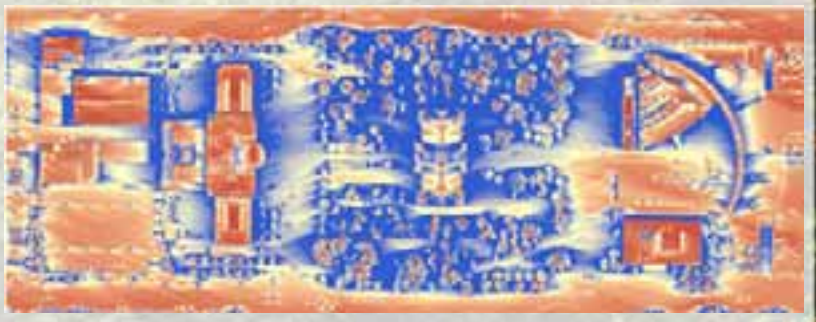
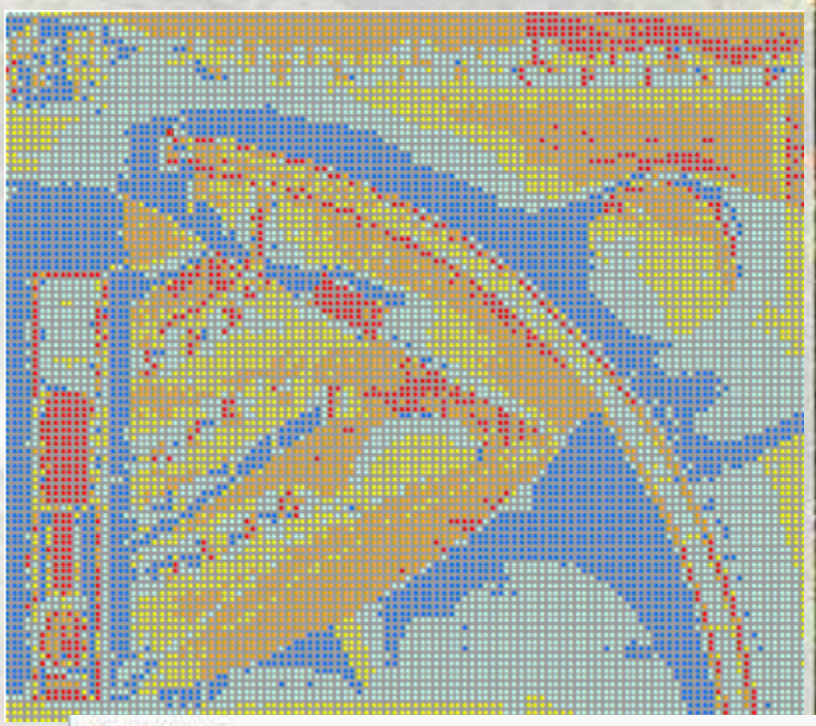
Ex. Solar Energy Web Service

- Input: Polygon (list of coordinate pairs)
- Returns Monthly Averages
  - Solar Energy (watts)
  - Sunlit Hours
- 400 million points each w/ 24 preprocessed attributes derived from LIDAR data w/ ESRI solar tools & custom scripts
  - 1 meter resolution, extent = Salt Lake City
  - Custom python, VBA scripts:
    - Tiled solar tools processing
    - Aggregating tiles & layers





Solar Results

SolarValues

Direct Duration: 264,264,333,362,425,402,417,388,324,317,260,217
Direct Radiation: 70787.83095,124962.160385,192270,170092,158290,134406.85667,60947
Direct Area: 11295
Time: 24.148

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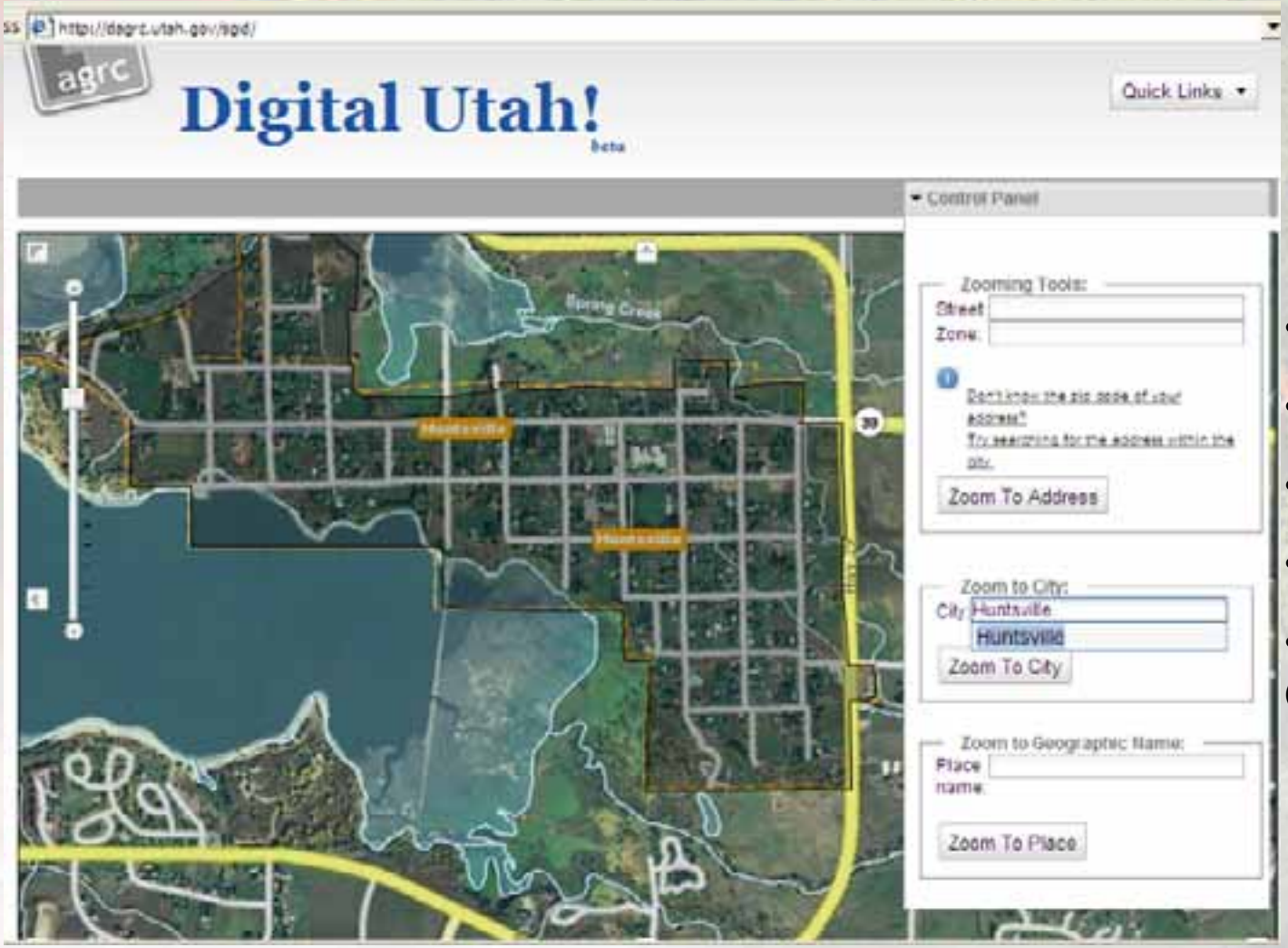
Core Statewide Map Services:

- Publish once, integrate into applications
  - WMS base map services
    - Imagery (via Image Server)
    - Imagery/Streets Hybrid (tile cache)
  - ImageServer
    - Aerial Photography, CIR, (vintages available)
    - Scanned Maps
      - USGS topo series
      - Geology base maps
    - Hillshades



Integrating Web & Map Services

- Tile Map Service
- Address Locator
- City List
- GNIS Placename
- Get Feature Geometry

This is the interface template for most of our simple interactive maps

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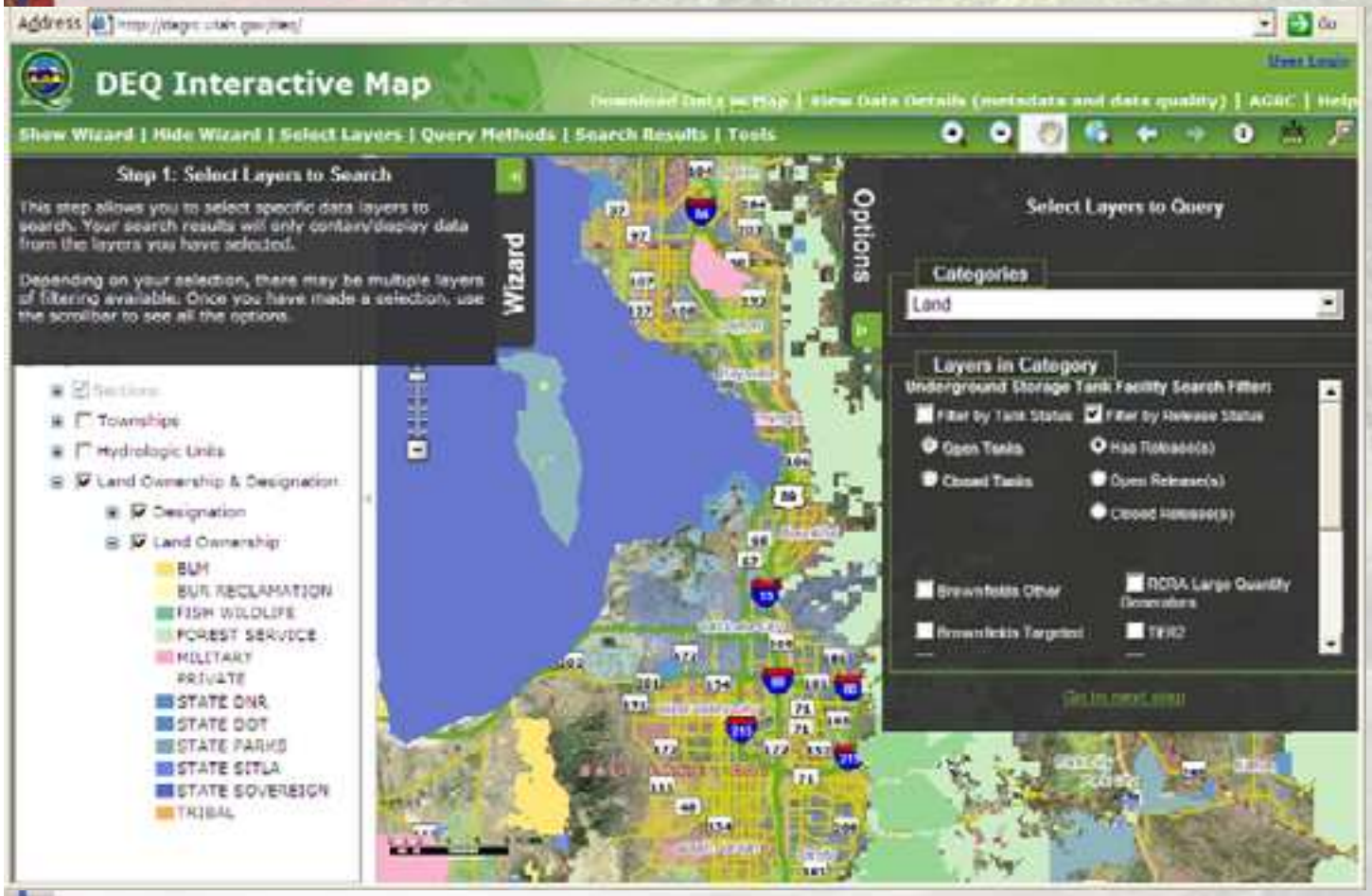

Uses web services for: base map, geocoding, city/placename lists

Environmental Quality Public Information Site

Basic Display/Query

- Wizard or GIS style interface
- Search/view cleanup sites and related data
- Make FOIA request and/or link to document management system

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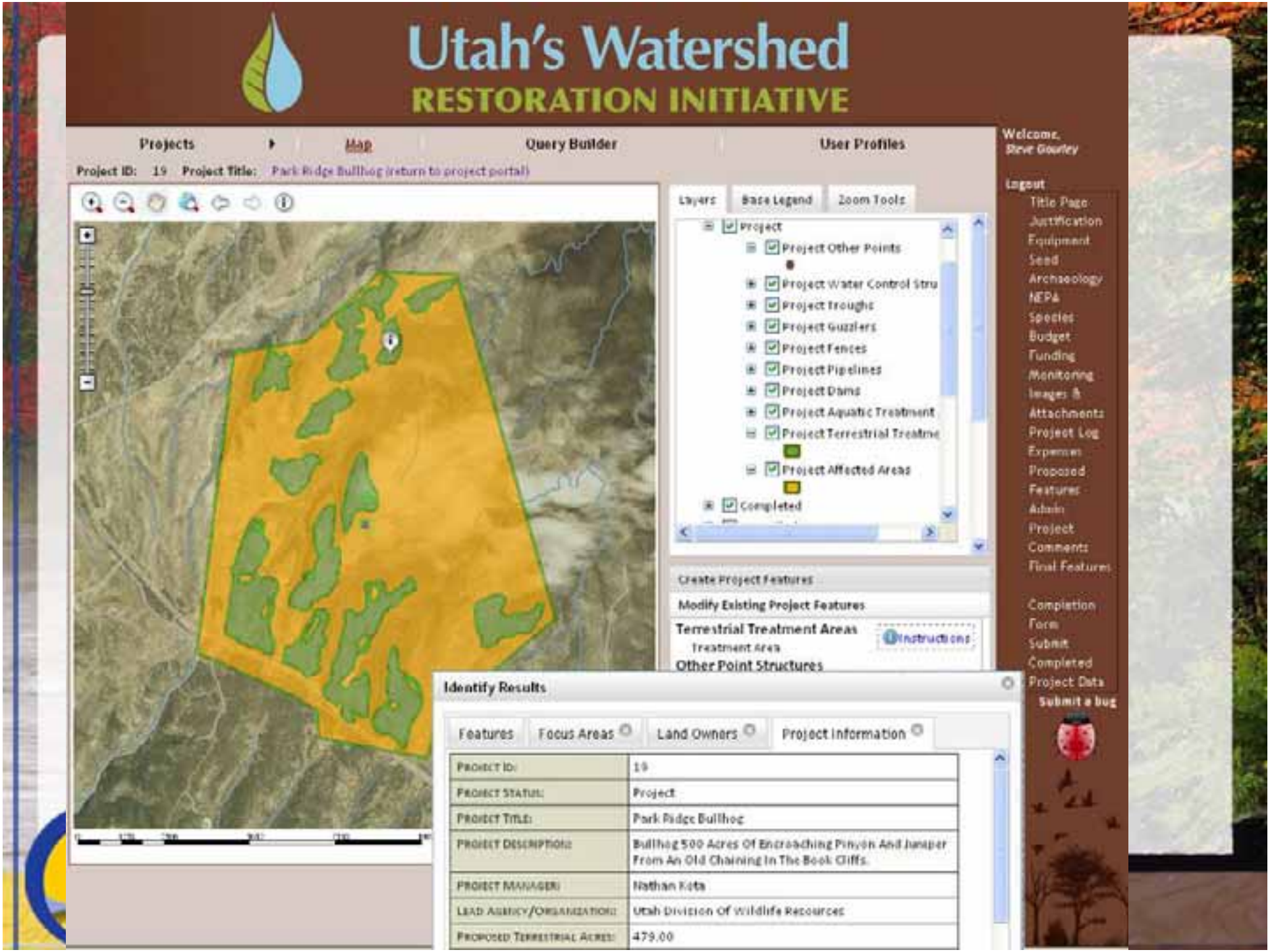
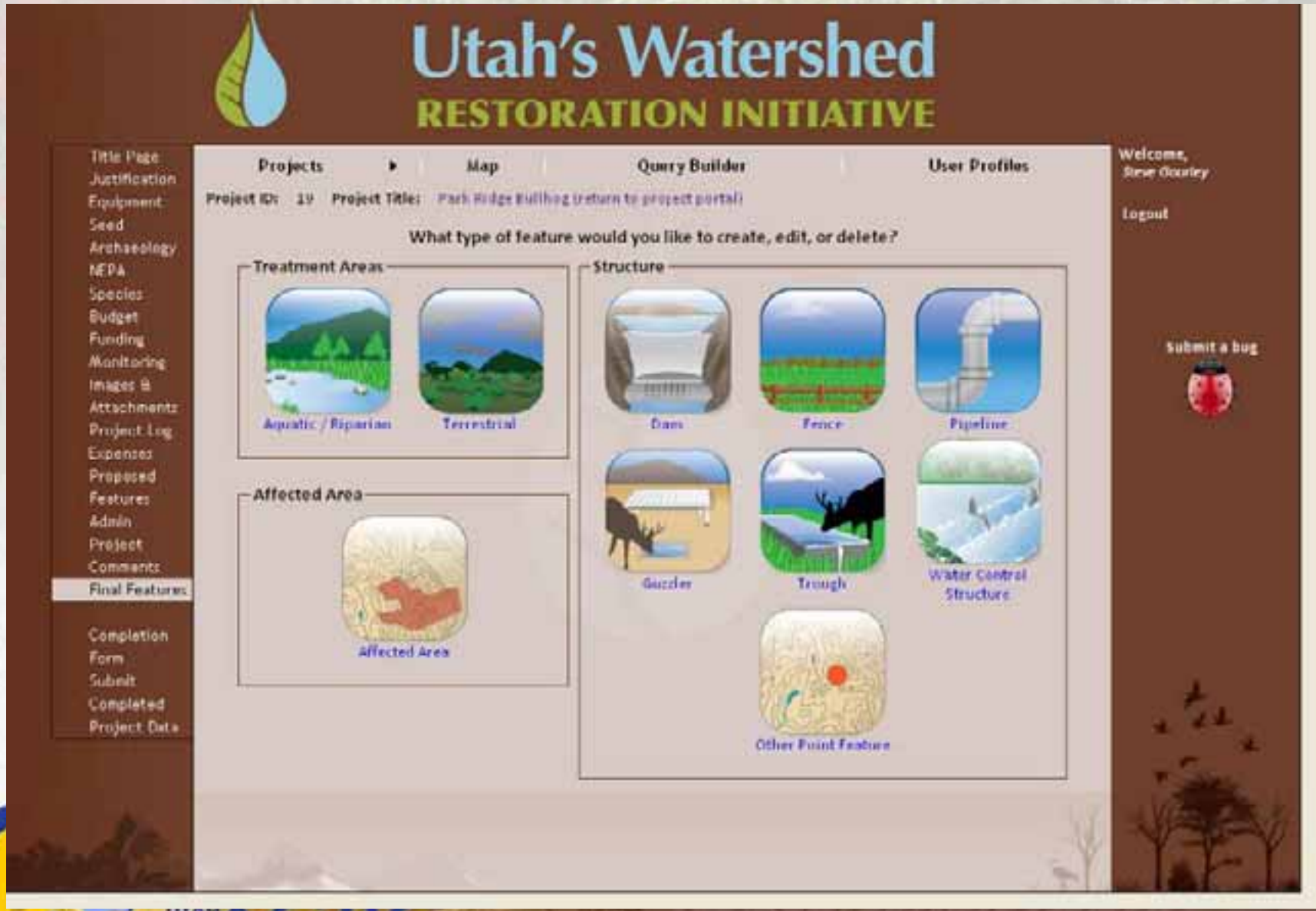

Utah's Watershed
RESTORATION INITIATIVE
Projects
Map
Query Builder
User Profiles
Project ID: 19 Project Title: Park Ridge Bullhog (return to project portal)
Welcome,
Steve Gourley
Logout
Title Page
Justification
Equipment
Seed
Archaeology
NEPA
Species
Budget
Funding
Monitoring
Images &
Attachments
Project Log
Expenses
Proposed
Features
Admin
Project
Comments
Final Features
Completion
Form
Submit
Completed
Project Data
Submit a bug
Layers
Base Legend
Zoom Tools
Project
Project Other Points
Project Water Control Stru
Project troughs
Project Guzzlers
Project Fences
Project Pipelines
Project Dams
Project Aquatic Treatment
Project Terrestrial Treatme
Project Affected Areas
Completed
Create Project Features
Modify Existing Project Features
Terrestrial Treatment Areas
Instructions
Treatment Area
Other Point Structures
Identify Results
Features
Focus Areas
Land Owners
Project Information
PROJECT ID: 19
PROJECT STATUS: Project
PROJECT TITLE: Park Ridge Bullhog
PROJECT DESCRIPTION: Bullhog 500 Acres Of Encroaching Pinyon And Juniper From An Old Chaining In The Book Cliffs.
PROJECT MANAGER: Nathan Kota
LEAD AGENCY/ORGANIZATION: Utah Division Of Wildlife Resources
PROPOSED TERRESTRIAL ACRES: 479.00

DNR Watershed Restoration Initiative: Web-Based Feature Editing



DNR Watershed Restoration Initiative: Document Management

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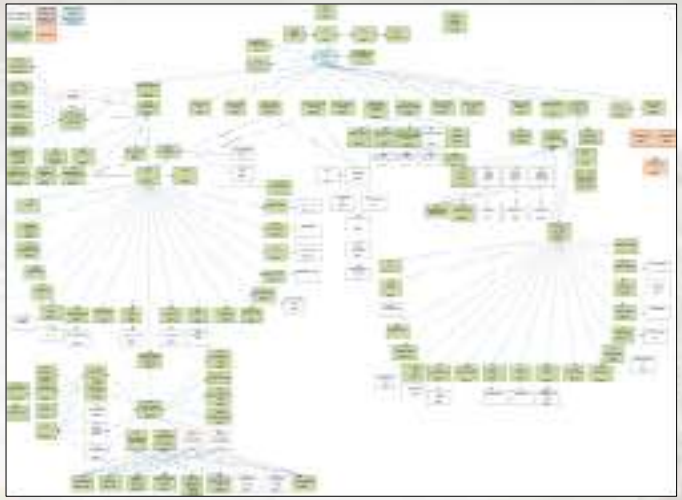
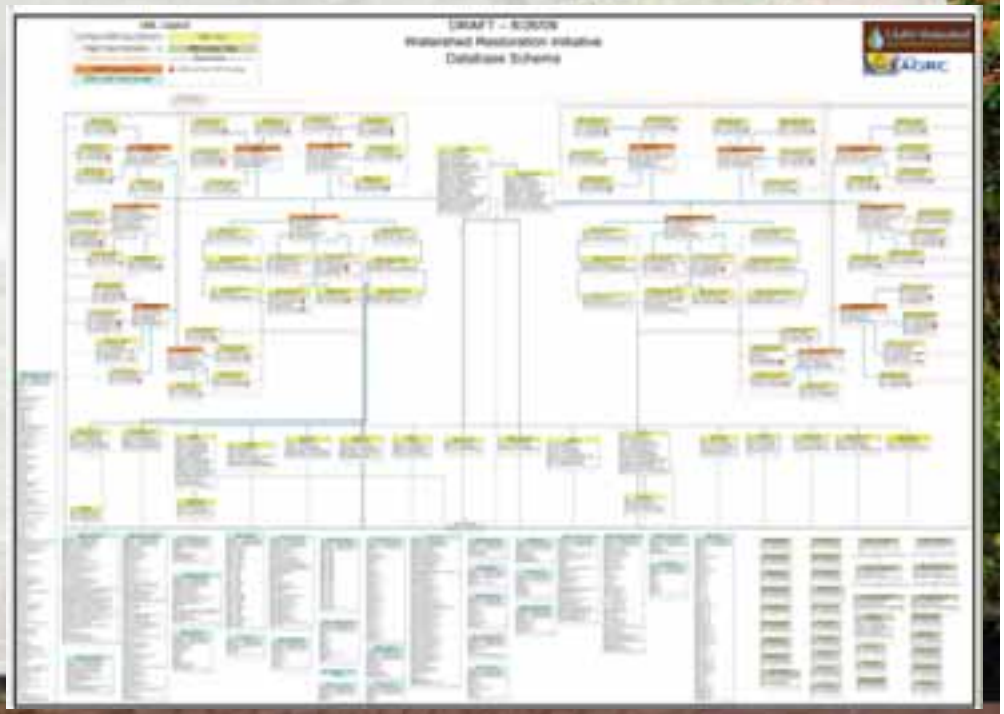
DNR Watershed Restoration Initiative: Budget Mgmt Interface

New technical requirements:

- Enterprise apps require skill sets, specializations database design, use cases, flow diagramming
- CS/IT skill set can quickly become more important than geospatial





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What's next:

- Refine management processes for web/map services
- More core web & map services
- Outreach to developers
- App Dev Projects
  - Agriculture - salinity
  - Oil & Gas
  - Biotics - T & E species
  - Regional 3 fish DB
  - Health info integration (IBIS, flu)

Summary: SSDI Geospatial Web Services

- Extend benefits of geospatial investment
- Takes commitment, forethought, resources
- Important focus areas
  - Geography → CS, IT
  - Industry standards
  - Performance orientation, focus can't be on the size of the data pile
  - Reaching non-GIS audiences with GIS data and maps

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Comments/Questions

- mpeters@utah.gov @mattagrc
- mapserv.utah.gov

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Where have we been?

We have all been building databases

Geospatial Database are primarily used by Geospatial folks

You must have certain software/hardware to interact with the data

We needed to develop core services/components so we could build once and use many times

Rely on existing data already developed and stored in a database

AGRC needed to look at its personnel structure and decide what the focus should be

Refer to strategic plan…….does this fit

The Problem

You need to have good data, bad data really shows up bad!

The value of a data set is a direct porportion to the amount of use it gets

Deq screen shots

WRI Screen Shots (3 Slides)

Or 5 or six slides with functionality