

Demography  
Conference  
2018



# SDI AND SOUTH DAKOTA: THE DIGITAL TRANSFORMATION

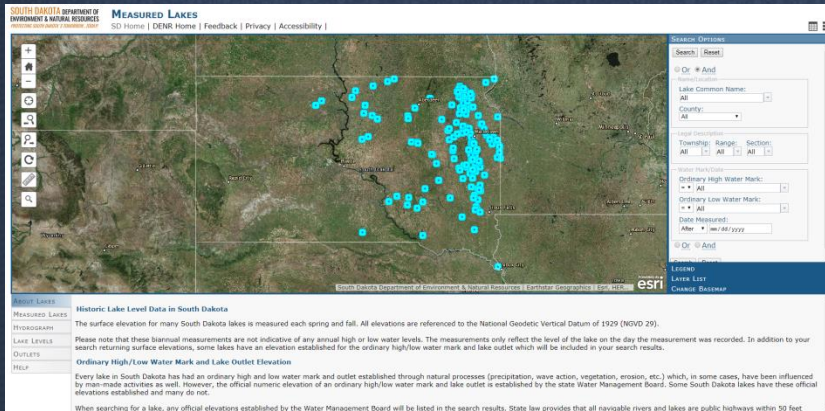
**Danielle Guthrie**

Software Engineer III  
GIS Analyst

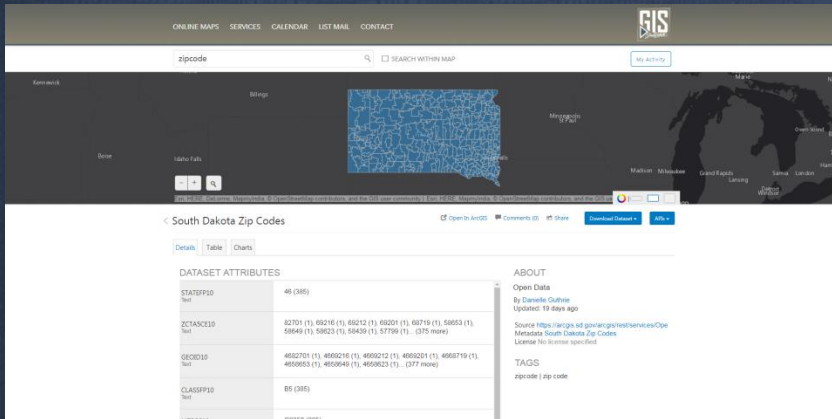
📞 605.367.4756

@ Danielle.Guthrie@state.sd.us

# ABOUT ME



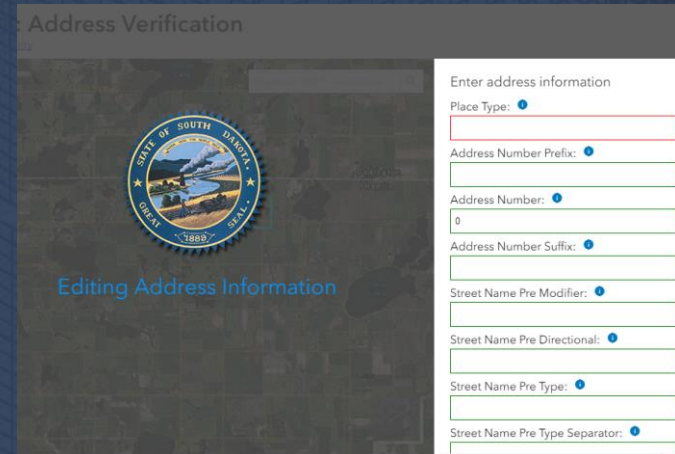
- BS Political Science
  - Political systems and policy
  - **Unintended consequences**
- MS Geography
  - Political, Economic, and Cultural
  - **Land Use, Economic Development, and Rhetoric**
- BIT GIS Software Engineer
  - Application Development for State Agencies
  - **Implemented GIS technology into State Agency work flows**
- BIT GIS Analyst
  - Manage/Acquire Spatial Data on a statewide level
  - Provide GIS technical assistance to State Agencies and Developers
  - Assist in infrastructure maintenance





# OUTLINE

- Definitions
- South Dakota State Gov. and SDI
- Data Validation and Data entry
- User experiences
- State Government Transparency
- Data Accessibility
- Review
- Ideas to take away



Address Verification

Enter address information

Place Type:

Address Number Prefix:

Address Number:

Address Number Suffix:

Street Name Pre Modifier:

Street Name Pre Directional:

Street Name Pre Type:

Street Name Pre Type Separator:

Editing Address Information



# State Government and GIS



They are a perfect fit!

- Spatial area
  - Smallest scale preset
  - Data is always spatial
- Not a quick conversion
  - Time
  - Money



# DEFINITIONS

**def·i·ni·tion** n. 1.  
The teacher gave de  
of the new words.  
of an image (pict



# DEFINITION

## What is SDI (Spatial Data Infrastructure) ?

“the technology, policies, standards, and human resources necessary to acquire, process, store, distribute, and improve utilization of geospatial data.”

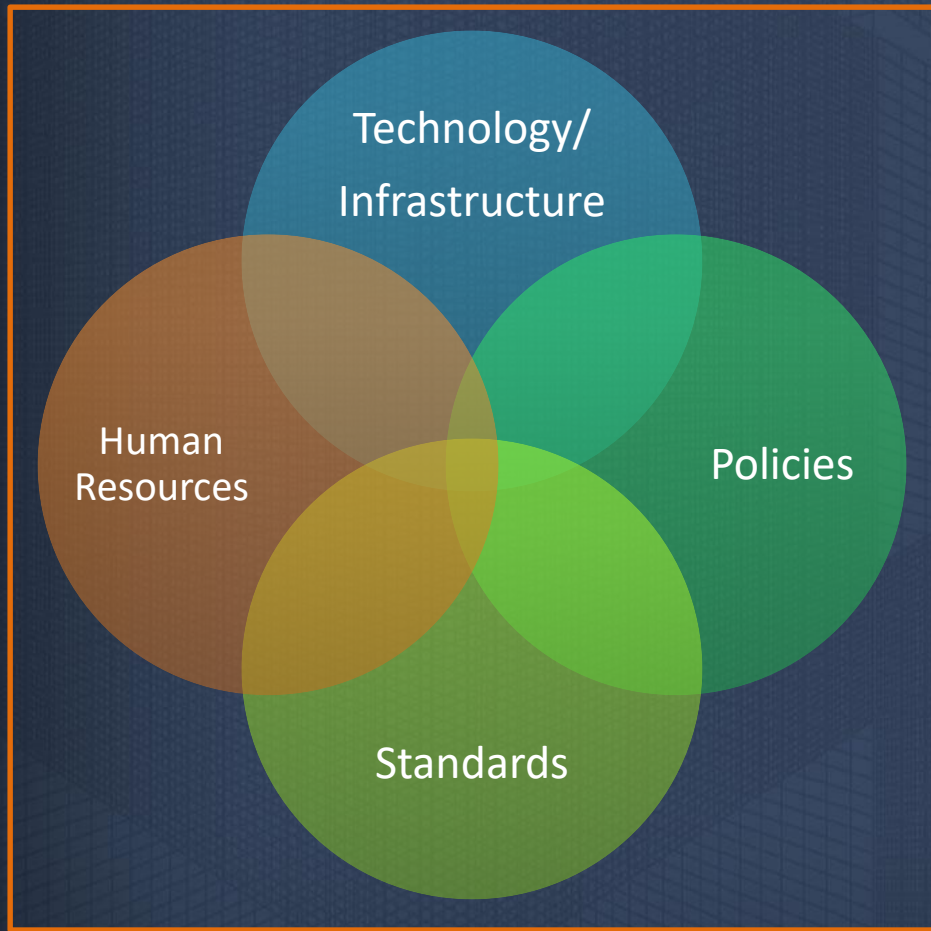
- Description of the National Spatial Data Infrastructure (NSDI) by Executive Order 12906





# DEFINITION

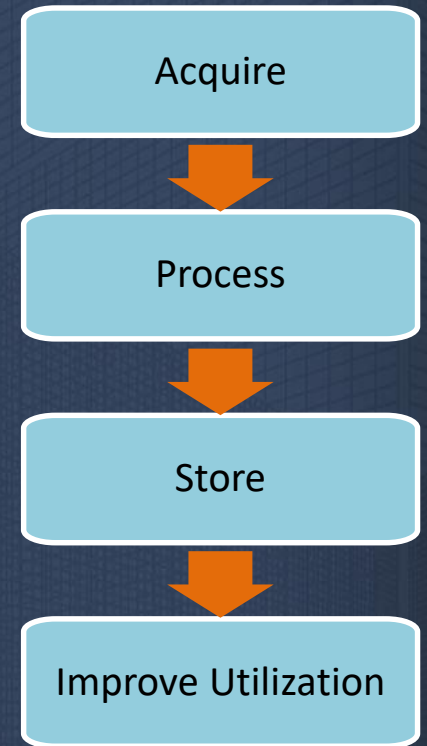
Understructure



Need



Procedure



# DEFINITION

## WHAT IS SDI (SPATIAL DATA INFRASTRUCTURE) ?

"An SDI is a coordinated series of agreements on technology standards, institutional arrangements, and policies that enable the **discovery and use of geospatial information by users** and for purposes other than those it was created for."

- Kuhn W (2005) Introduction to Spatial Data Infrastructures

**SOUTH DAKOTA DEPARTMENT OF ENVIRONMENT & NATURAL RESOURCES** REGULATED FACILITIES  
SD Home | DENR Home | Employee Intranet | Feedback | Privacy | Accessibility | Code of Federal Regulations | South Dakota Administrative Rules

Legend | Map | Help

Layers

Search

County: All

City: Rapid City

Name: Example: City of Armour

Facility ID: Example: SD0000004603051056

Facility ID	Name	Address	City
SD0000004600001066	Pete Lien & Sons Inc. Ready Mix East	3120 Creek Dr.	Rapid City
SD0000004609900269	Verizon Wireless - RCY Go Fish	112 KNOLLWOOD DR.	Rapid City
SD0000004610300001	Black Hills Power (Ben French)	409 Deadwood Avenue	Rapid City
SD0000004610300005	Rapid City Regional Hospital	353 FAIRMONT BLVD	Rapid City

**South Dakota: Sales Tax Rates by Address**  
About Streamlined Sales Tax | Publications | Download Tables | Developers | DOR Home | SD Home | Privacy | Accessibility | Contact Us

Search Tax Rate | Map | Help | Report Issue

Search:

Single Address

Street Address:

City:

Zip:

Search For Tax Rate | Reset

Results:

Multiple Addresses

Choose File | No file chosen

Upload file

Download example file

Notes: Files containing thousands of addresses may take several minutes to return.

File Format:

- File type: .xlsx (Excel) or .xls (97-2003 Excel)
- Required fields:

Map Information



# DEFINITION



## State of South Dakota: Address Verification

[SD Home](#) | [Email Us](#) | [Privacy](#) | [Accessibility](#)

500 E CAPITOL AVE, PI...

500 E CAPITOL AVE, PIERRE SD 57501-5007

State Capitol

Hollister Football

Powered by Esri

Selected Point's Address:

500 E CAPITOL AVE, PIERRE SD 57501-5007

### Add Rooftop Address

- Click "Add Address" button
- Click on the map to create a new rooftop address point

[Add Address](#)

Or

Select an address point to edit or delete.





# DEFINITION



## South Dakota: Sales Tax Rates by Address

[About Streamlined Sales Tax](#) | [Publications](#) | [Download Tables](#) | [Developers](#) | [DOR Home](#) | [SD Home](#) | [Privacy](#) | [Accessibility](#) | [Contact Us](#)

### Search Tax Rate

[Map](#) | [Help](#) | [Report Issue](#)

#### Search:

##### Single Address <sup>i</sup>

Street Address:

City:

Zip:

#### Results:

##### Multiple Addresses <sup>i</sup>

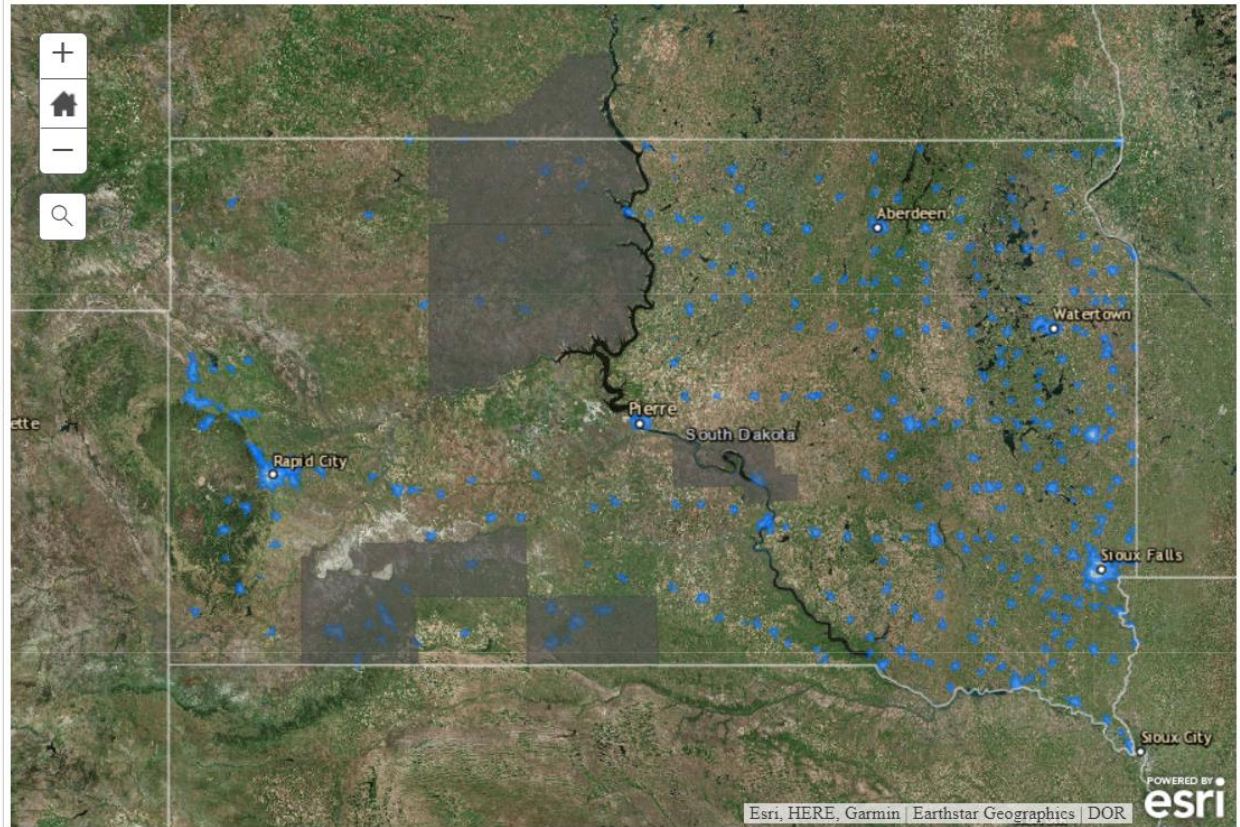
No file chosen

**Note:**Files containing thousands of addresses may take several minutes to return.

##### File format:

- File type: .xlsx (Excel) or .xls (97-2003 Excel)
- Required fields:

[Map Information](#)



<https://apps.sd.gov/rv25taxmatch/main.aspx>





# SOUTH DAKOTA STATE GOVERNMENT AND SDI



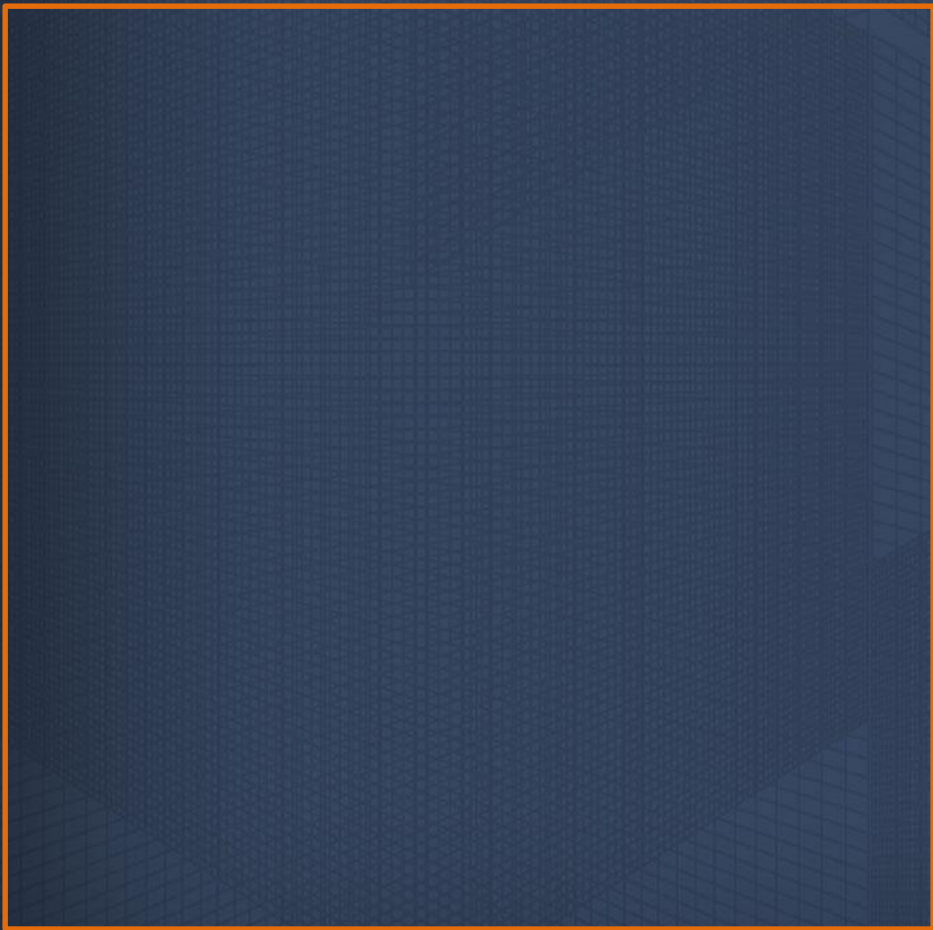
So What does the  
South Dakota's State  
Government SDI Look  
like?



# SOUTH DAKOTA STATE GOVERNMENT AND SDI

Understructure

Procedure



Need





# SOUTH DAKOTA STATE GOVERNMENT AND SDI: NEEDS

## Mapping & Visualization



Understand locations and relationships with maps and visual representations

## Data Management



Collect, organize, and maintain accurate locations and details about assets and resources

## Field Mobility



Manage and enable a mobile workforce to collect and access information in the field

## Monitoring



Track, manage, and monitor assets and resources in real-time

## Analytics



Discover, quantify, and predict trends and patterns to improve outcomes

## Design & Planning



Evaluate alternative solutions and create optimal designs

## Decision Support



Gain situational awareness, and enable information-driven decision making

## Constituent Engagement



Communicate and collaborate with citizens and external communities of interest

## Sharing & Collaboration



Empower everyone to easily discover, use, make, and share geographic information

# SOUTH DAKOTA STATE GOVERNMENT AND SDI

Understructure

Technology/  
Infrastructure

Procedure

Acquire

Process

Store

Improve Utilization

Need



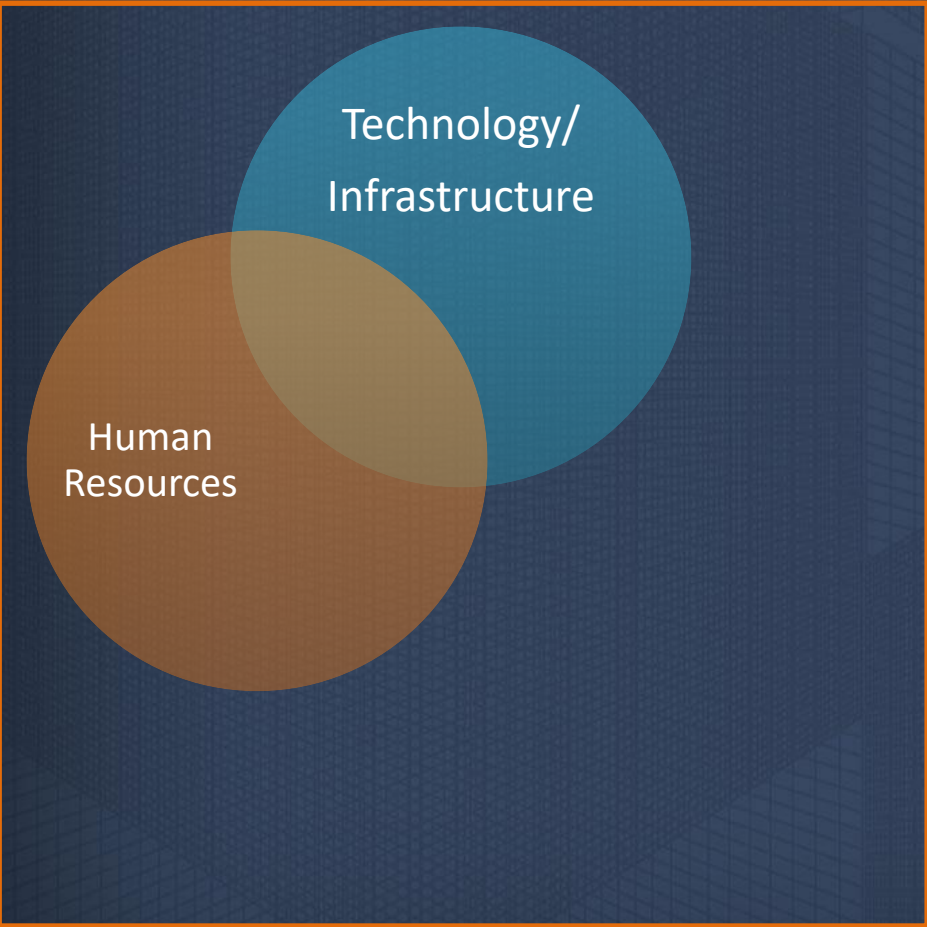


# SOUTH DAKOTA STATE GOVERNMENT AND SDI: INFRASTRUCTURE, SOFTWARE, AND PROCEDURE



# SOUTH DAKOTA STATE GOVERNMENT AND SDI

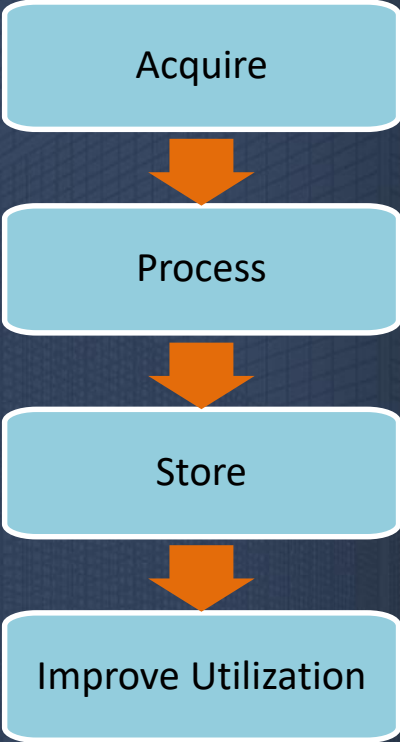
Understructure



Need

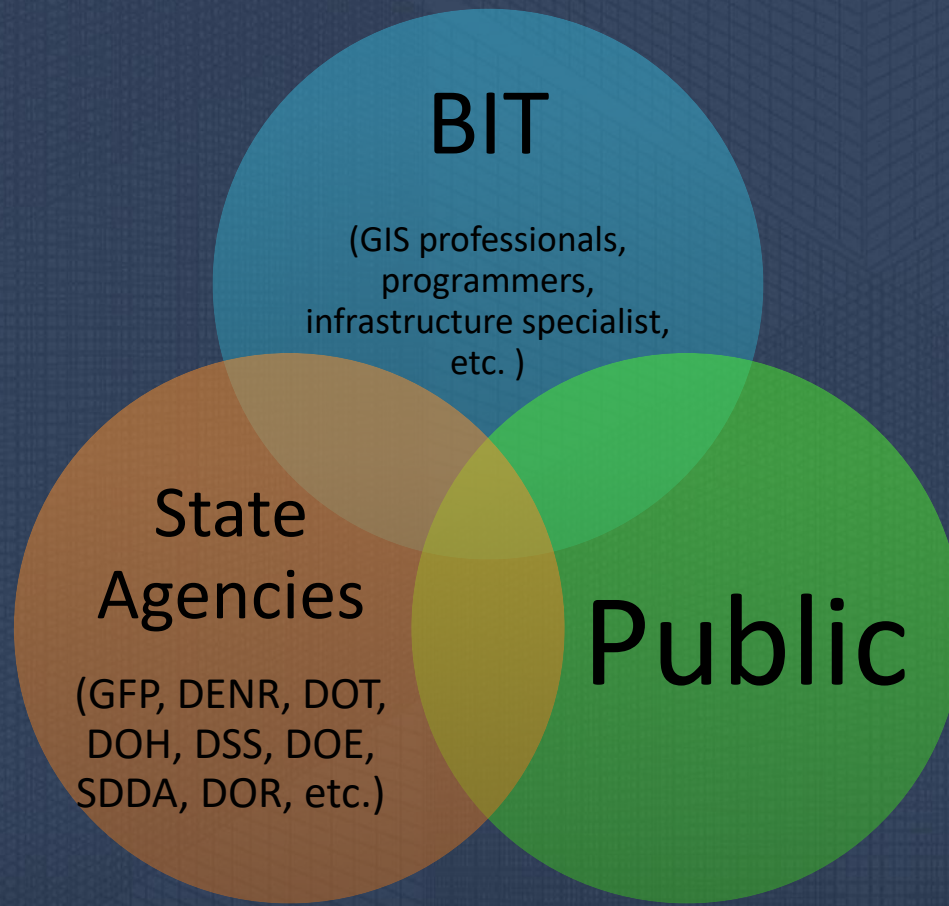


Procedure



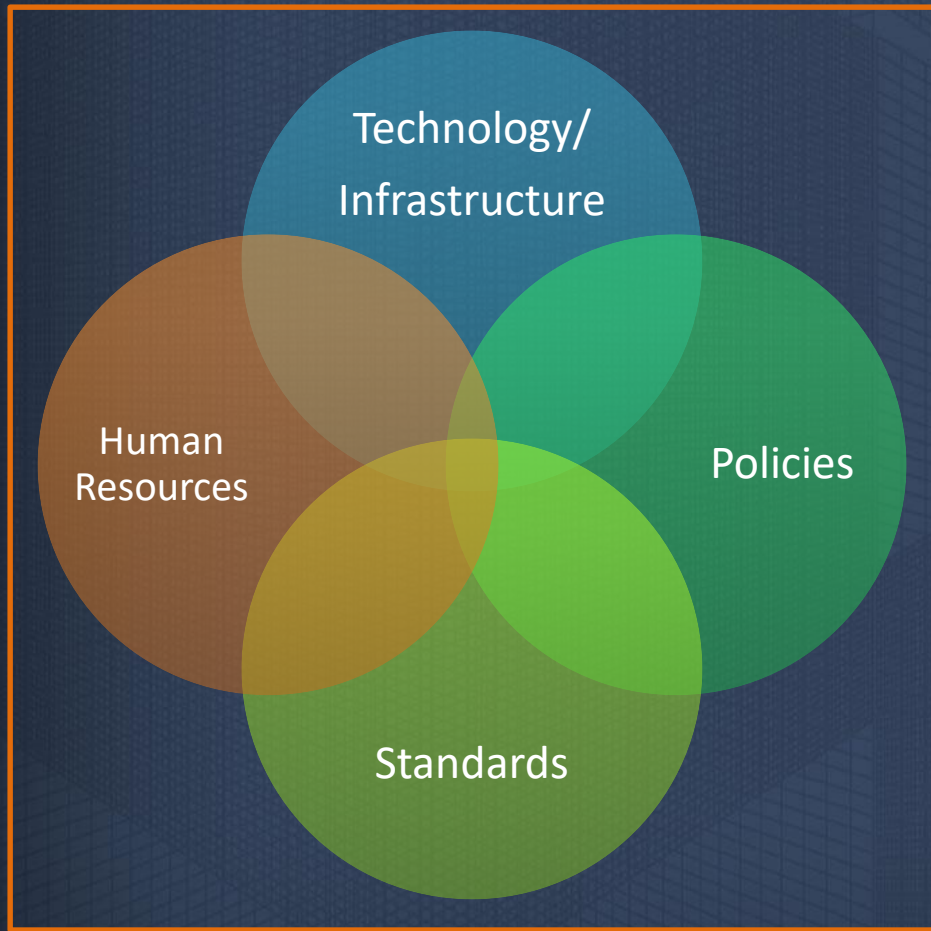


# SOUTH DAKOTA STATE GOVERNMENT AND SDI: HUMAN RESOURCES



# SOUTH DAKOTA STATE GOVERNMENT AND SDI

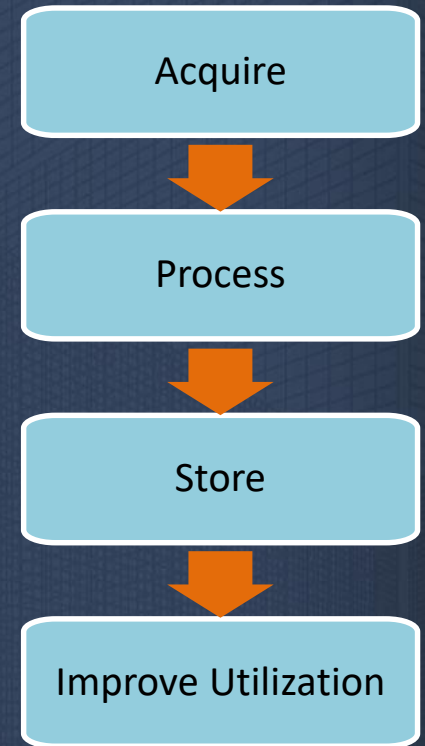
Understructure



Need

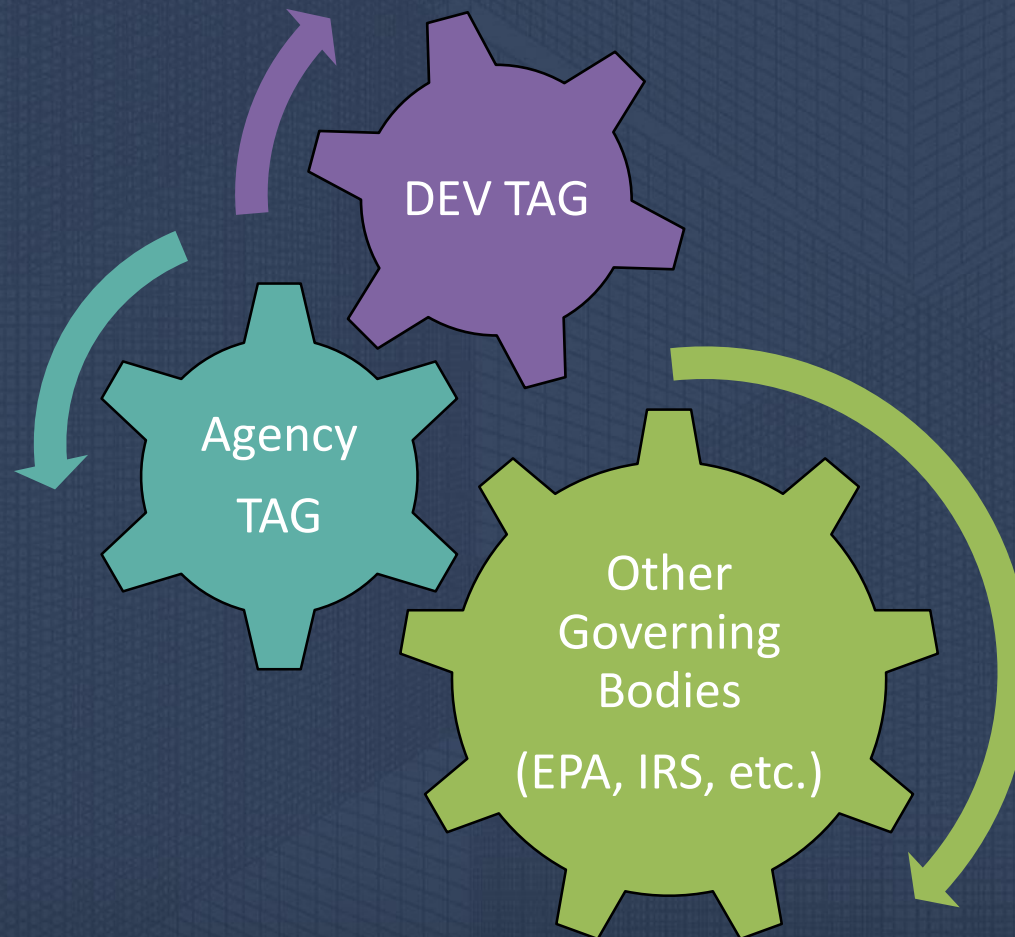


Procedure





# SOUTH DAKOTA STATE GOVERNMENT AND SDI: POLICIES AND STANDARDS

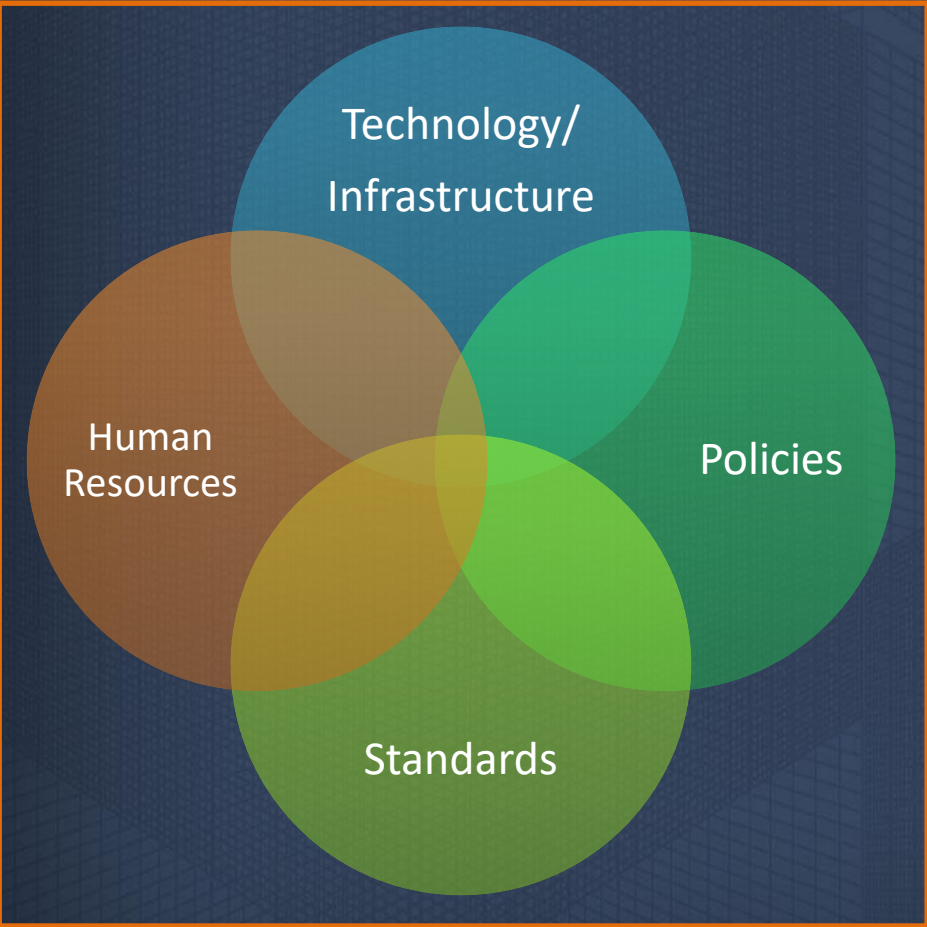


TAG: Technology Advisory Group



# SOUTH DAKOTA STATE GOVERNMENT AND SDI

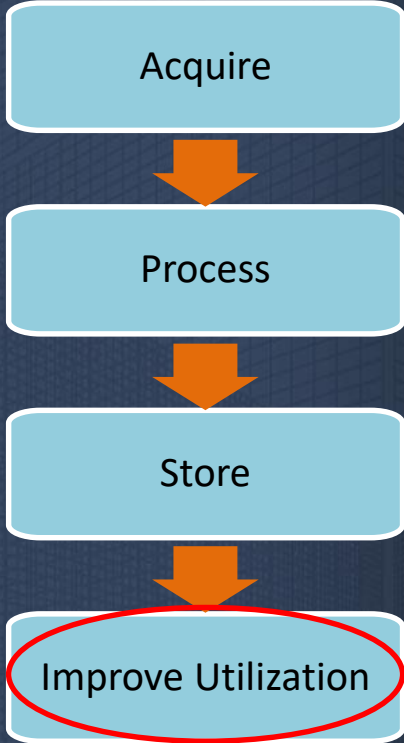
Understructure



Need

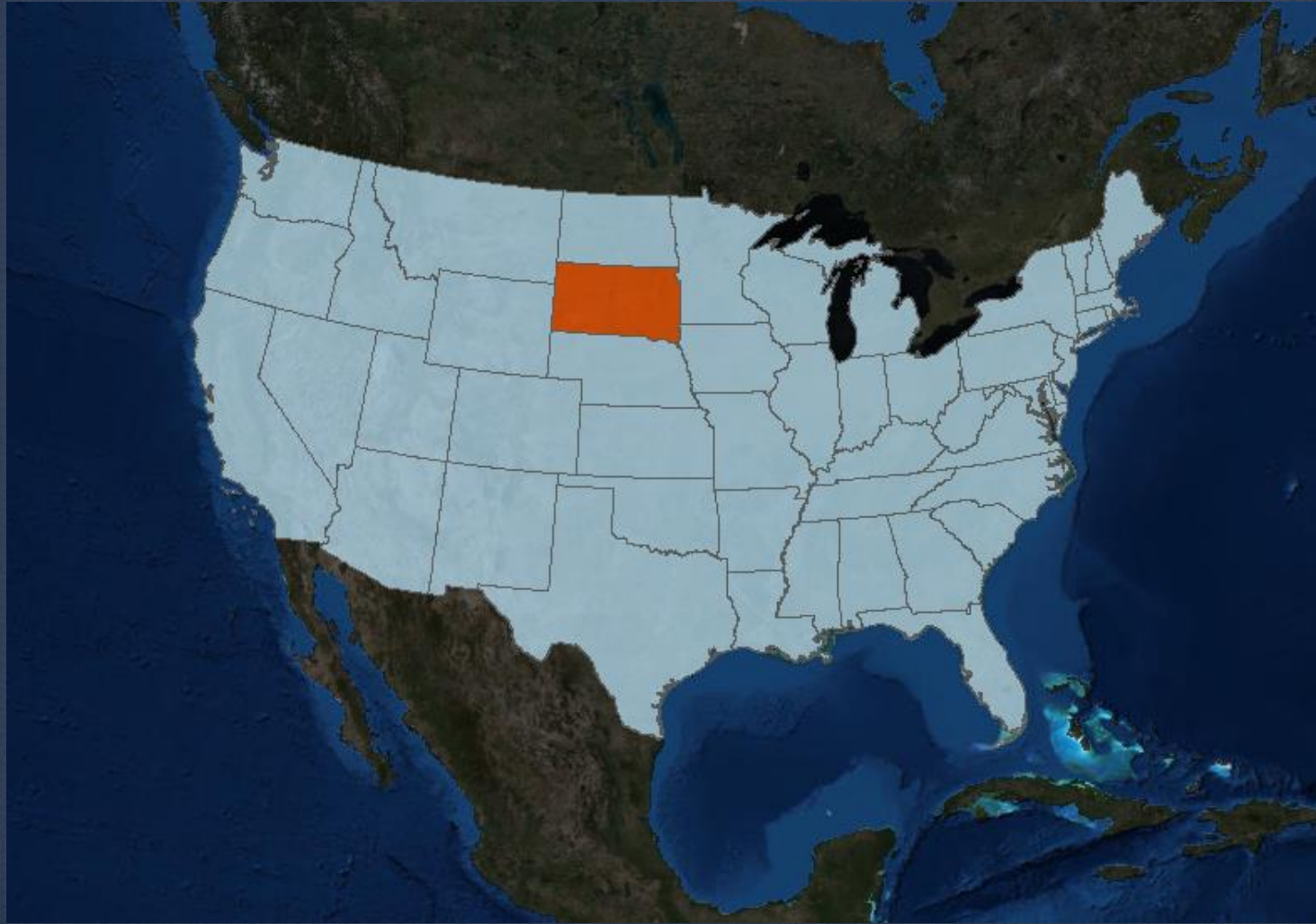


Procedure





# IMPROVE UTILIZATION



# IMPROVE UTILIZATION: EVOLUTION OF THE DATA

## WHAT IS SDI (SPATIAL DATA INFRASTRUCTURE) ?

"An SDI is a coordinated series of agreements on technology standards, institutional arrangements, and policies that enable the **discovery and use of geospatial information by users and for purposes other than those it was created for.**"

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Legend | Map | Help

Layers

Search

County: All

City: Rapid City

Name: Example: City of Armour

Facility ID: Example: SD0000004603510556

Facility ID	Name	Address	City
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SD0000004609900269	Verizon Wireless - RCY Go Fish	112 KNOLLWOOD DR	Rapid City
SD0000004610300001	Black Hills Power (Ben French)	409 Deadwood Avenue	Rapid City
SD0000004610300005	Rapid City Regional Hospital	353 FAIRMONT BLVD	Rapid City

**South Dakota: Sales Tax Rates by Address**  
About Standardized Sales Tax | Publications | Download Tables | Developers | DOR Home | SD Home | Privacy | Accessibility | Contact Us

Search Tax Rate

Map | Help | Report Issue

Search:

Single Address

Street Address: [input]  
City: [input]  
Zip: [input]  
[Search For Tax Rate] [Reset]

Results:

Multiple Addresses

[Choose File] [No file chosen]  
[Upload File]

Notes: Files containing thousands of addresses may take several minutes to return.  
[Download example file]

File Format:

- File type: .xlsx (Excel) or .xls (97-2003 Excel)
- Required fields:

Map Information





# DATA VALIDATION AND DATA ENTRY EXPERIENCES



In order to evolve the data we must improve the data



# DATA VALIDATION AND DATA ENTRY EXPERIENCES

While updating applications:

- Latitude and Longitude in the wrong columns or set to 0
- Missing zip codes, counties, etc.
- Typos, multiple spelling variations, non standardized abbreviations, etc.





# DATA VALIDATION AND DATA ENTRY EXPERIENCES

How to improve  
accuracy  
and  
decrease  
human error ?



# DATA VALIDATION AND DATA ENTRY EXPERIENCES

State of South Dakota: Address Verification

SD Home | Email Us | Privacy | Accessibility

Example: 500 E Capitol Ave

Selected Point's Address:  
(NA)

Add Rooftop Address

- Click "Add Address" button
- Click on the map to create a new rooftop address point

Add Address

Or

Select an address point to edit or delete.

- Auto population
  - Spatial query

State of South Dakota: Address Verification

SD Home | Email Us | Privacy | Accessibility

Editing Address Information

RAPID CITY

Additional Location Information:

Complete Landmark Name:

Mile Post:

Country: US

State: SD

County: Pennington

Longitude: -103.20595382800938

Latitude: 44.07548307141543

- Dropdown boxes
  - domains





# DATA VALIDATION AND DATA ENTRY EXPERIENCES

State of South Dakota: Address Verification

SD Home | Email Us | Privacy | Accessibility

Example: 500 E Capitol Ave

Selected Point's Address: (NA)

Add Rooftop Address

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Add Address

Or

Select an address point to edit or delete.

State of South Dakota: Address Verification

SD Home | Email Us | Privacy | Accessibility

Editing Address Information

RAPID CITY

Additional Location Information:

Complete Landmark Name:

Mile Post:

Country: US

State: SD

County: Pennington

Longitude: -103.20595382800938

Latitude: 44.07548387141543

- New Addressing Application
  - State's geocoder
  - Streamline Sales Tax
- Update an existing point's location , update data, or add a point
- Several fields are auto populated based on map click (X,Y)



# DATA VALIDATION AND DATA ENTRY EXPERIENCES

**State of South Dakota: Address Verification**  
[SD Home](#) | [Email Us](#) | [Privacy](#) | [Accessibility](#)

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Add Address

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South Dakota School of Mines & Tech

Powered by Esri



# DATA VALIDATION AND DATA ENTRY EXPERIENCES

State of South Dakota: Address Verification

[SD Home](#) | [Email Us](#) | [Privacy](#) | [Accessibility](#)

Editing Address Information

South Dakota  
School  
Map & Tools

City: RAPID CITY

Additional Location Information: ⓘ

Complete Landmark Name: ⓘ

Mile Post: ⓘ

Country: ⓘ  
US

State: ⓘ  
SD

County: ⓘ  
Pennington

Longitude: ⓘ  
-103.20585382880938

Latitude: ⓘ  
44.07548367141543

USDA BSA, DataCamp, GeoEye, Microsoft | DOJ | Esri, HERE, Garmin, ICF

Powered by Esri



# DATA VALIDATION AND DATA ENTRY EXPERIENCES

Improvements with GIS:

- Latitude and Longitude from click event
- Use x,y to perform a spatial queries on rest services
- Utilize State, Census, USGS, etc. data for data validation and data entry
- Think “Lean”, Every time our agencies create a layer there is the potential to increase **accuracy and speed**

WHY REINVENT THE  
WHEEL WHEN YOU  
DON'T HAVE TO?



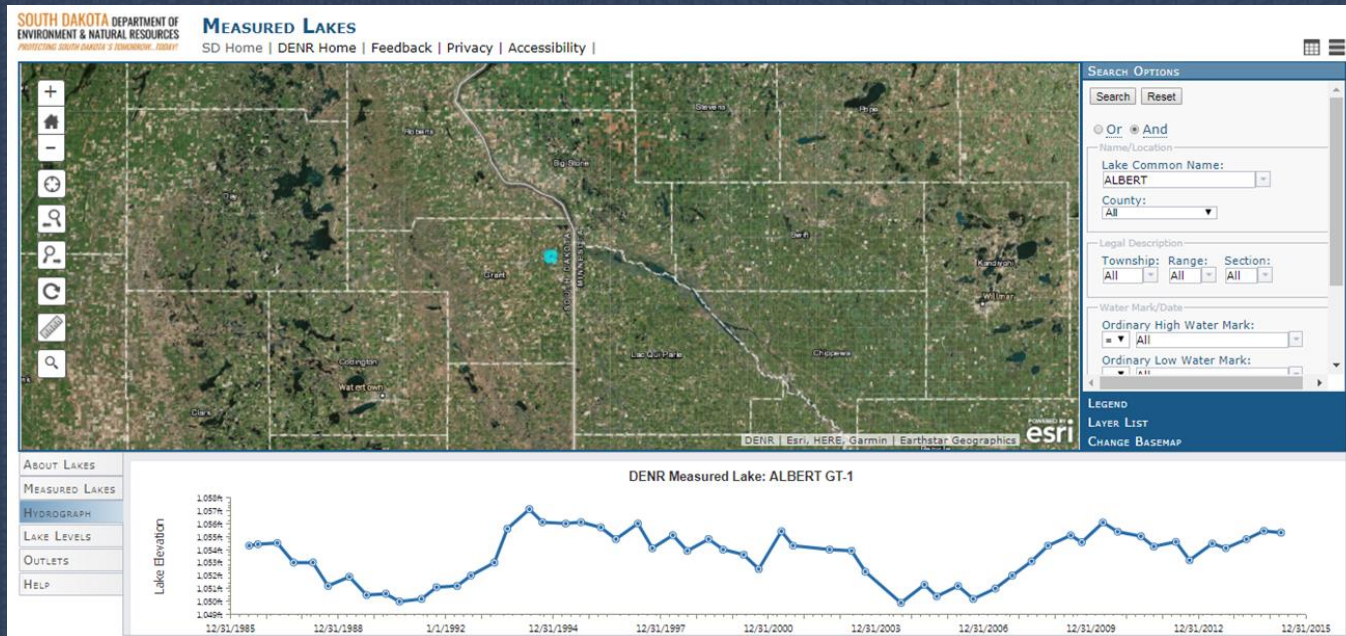


# USER EXPERIENCES



A user interface is like a joke. If you have to explain it, it is not that good.

# USER EXPERIENCES



- DNR Measured Lakes
  - Lake level information
  - Outlets Locations
  - Some data complex and extensive
- Visually display data related to a spatial location

<https://apps.sd.gov/NR65LakeInfo/public.aspx>





# USER EXPERIENCES

**South Dakota: Sales Tax Rates by Address**  
About Streamlined Sales Tax | Publications | Download Tables | Developers | DOR Home | SD Home | Privacy | Accessibility | Contact Us

**Search Tax Rate** | Map | Help | Report Issue

**Search:**

**Single Address** ⓘ

Street Address:

City:

Zip:

**Results:**

**Multiple Addresses** ⓘ

No file chosen

Note: files containing thousands of addresses may take several minutes to return.

**File format:**  
Map Information

Map: +, Home, -, Search

Map showing South Dakota with cities labeled: Gillette, Rapid City, Pierre, South Dakota, Aberdeen, Watertown, Sioux Falls.

Map powered by Esri, HERE, Garmin, Earthstar Geographics, DOR, esri

- DOR Tax Match
  - Sales tax rates by location
- Helps users visualize boundaries and how they relate to a them personally
- Use GIS technology without a map



# USER EXPERIENCES

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Search Tax Rate    Map    Help    **Report Issue**

**Search:**

Single Address ⓘ

Street Address:

City:

Zip:

**Results:**  
Applicable Tax Rates for 500 E CAPITOL AVE, PIERRE, 57501

Agency	Code	Rate
State of South Dakota	---	4.5%
Pierre	284-2	2%
<b>Total Applicable Tax Rate</b>	---	<b>6.5%</b>

This city also imposes a Municipal Gross Receipts tax of 1% which can apply to any combination of the following: Alcoholic beverage sales; Sales at Eating Establishments; Lodging Accommodations; Admissions to Places of Amusement; Athletic Events; or Cultural Events. For additional information regarding the Municipal Gross Receipts tax, please contact the City of Pierre.

Map Information

Esri, HERE, Garmin, iPC, DigitalGlobe, Microsoft | DOR **esri**

- Stake holders help improve data
  - Point in wrong location
  - City boundaries incorrect
- Updates are linked to two other applications





# USER EXPERIENCES

The screenshot shows a web application titled "State of South Dakota: Address Verification". The interface includes a search bar with the text "Example: 500 E Capitol Ave" and a search icon. Below the search bar is a map of a city area with several green and red dots representing address points. A label "South Dakota School of Mines & Tech" is visible on the map. To the right of the map, there is a section titled "Selected Point's Address:" with the value "(NA)". Below this is a section titled "Add Rooftop Address" with two bullet points: "Click 'Add Address' button" and "Click on the map to create a new rooftop address point". A button labeled "Add Address" is positioned below the instructions. Below the button is the word "Or" and a section titled "Select an address point to edit or delete." The bottom of the map area contains small text: "USDA, ESA, DigitalGlobe, GeoEye, Microsoft, LIDOR, Esri, HERE, Garmin, IPC" on the left and "Powered by Esri" on the right.

State of South Dakota: Address Verification

[SD Home](#) | [Email Us](#) | [Privacy](#) | [Accessibility](#)

Example: 500 E Capitol Ave

Selected Point's Address:  
(NA)

Add Rooftop Address

- Click "Add Address" button
- Click on the map to create a new rooftop address point

Add Address

Or

Select an address point to edit or delete.

USDA, ESA, DigitalGlobe, GeoEye, Microsoft, LIDOR, Esri, HERE, Garmin, IPC

Powered by Esri

- Address application
  - Update points and add missing points





# USER EXPERIENCES

HOME | ADDRESS MANAGEMENT | GENERATE |

## Boundary Edit

Editor

### Edit Production Polygons

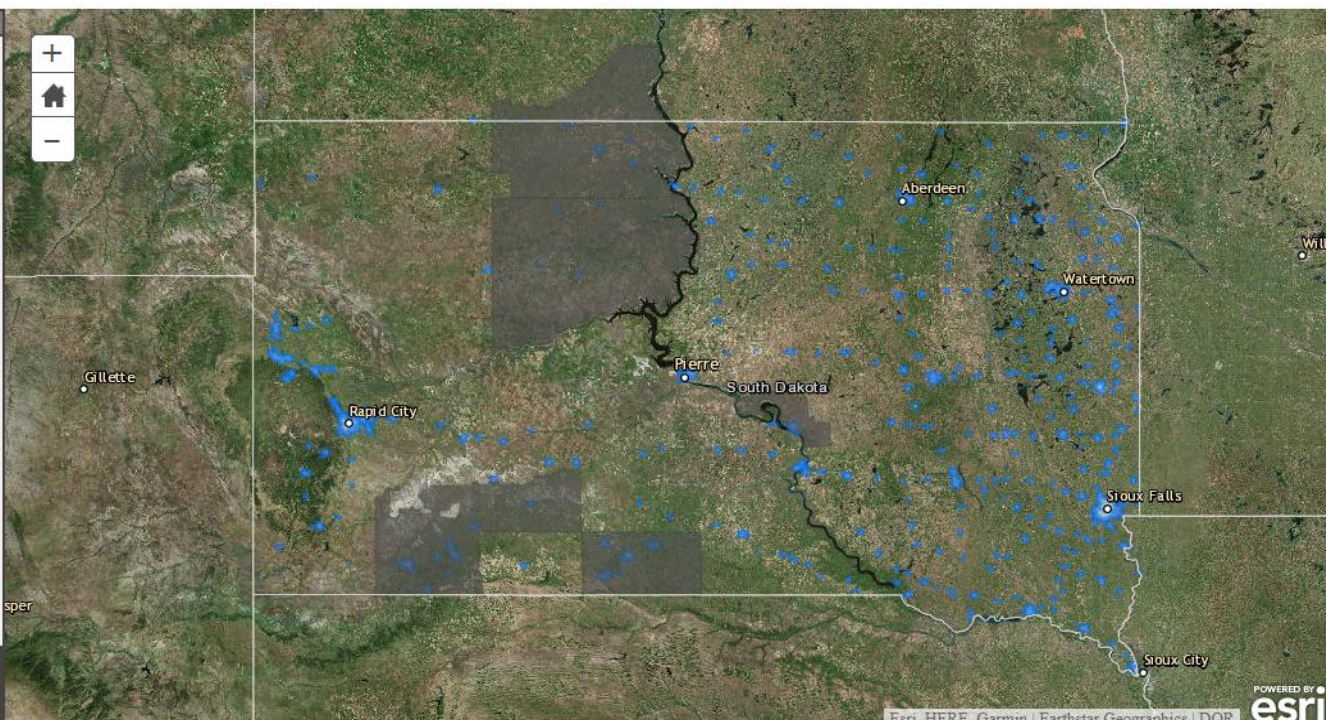
#### Edit City Boundaries

1. Select a city from the "Production" layer:
2. Click the "Copy" button in order to move the "production" polygon into the "staged" layer.
3. If you need to draw additional polygons, click the "Staged City Boundaries" icon.

#### Edit Special Tax District

1. Select a district from the "Production" layer:
2. Click the "Copy" button in order to move the "production" polygon into the "staged" layer.

Search  
Map Information  
Change Basemap



The screenshot shows a web application for editing city boundaries. The top navigation bar includes 'HOME', 'ADDRESS MANAGEMENT', and 'GENERATE'. The main interface is titled 'Boundary Edit' and features a sidebar on the left with instructions for editing production polygons and special tax districts. The main map area displays a satellite view of South Dakota with city boundaries and production polygons. The sidebar includes a search bar, map information, and a change basemap option. The map area includes a zoom control and a home button. The bottom right corner of the map area features the Esri logo and the text 'POWERED BY esri'.

- Edit official State City boundary layer
  - Receive updates from local governments
- Statewide layer pushed out quarterly





# INCREASING GOVERNMENT TRANSPARENCY

## South Dakota GIS Data

Search South Dakota GIS Data



This is the State's public platform for exploring and downloading publicly available Geographic Information Systems (GIS) data.

©South Dakota Tourism



# Increasing Government Transparency

The screenshot displays the South Dakota Department of Environment & Natural Resources website. The top navigation bar includes links for Air, Land, Water, Funding, Permits/Forms, About Us, and Press. Below the navigation bar, there are several interactive GIS applications, each with a map preview and a title: Waterbodies Eligible under L..., Regulated Air Quality Facilities, Dry Draw Location Notice, Recycling Facilities, Construction Aggregate Mini..., Tanks Database Viewer, Spills Reports, Water Well Completion Repo..., Observation Wells, Measured Lakes, and Permitted Solid Waste Facil... The bottom section shows a search for 'zipcode' on a map of South Dakota, leading to a detailed view of the 'South Dakota Zip Codes' dataset. This view includes a table of dataset attributes and an 'ABOUT' section.

Attribute	Count
STATEFP20	46 (385)
ZCTACE20	62701 (1), 60216 (1), 60212 (1), 60201 (1), 60719 (1), 58653 (1), 58649 (1), 58623 (1), 59439 (1), 57799 (1), ... (375 more)
SEC0010	4692701 (1), 4699216 (1), 4699212 (1), 4699201 (1), 4698719 (1), 4659653 (1), 4659649 (1), 4659623 (1), ... (377 more)
CLASSFP20	85 (385)

**ABOUT**  
Open Data  
By Danette Coulter  
Version: 10 days ago  
Source: <https://arcgis.sd.gov/arcgis/rest/services/OneMetadata/SouthDakotaZipCodes>  
License: No license specified

**TAGS**  
zipcode | zip code

- Public Facing Applications
- Publicly Available Layers
  - Filtered Datasets
  - Several formats:
    - Shapefiles
    - KML
    - Spread Sheet
    - Rest Service
- Continuous improvement





# INCREASING DATA ACCESSIBILITY

The screenshot displays the homepage of the South Dakota Department of Environment & Natural Resources. At the top left is the state seal. The main header includes the department name and the slogan "PROTECTING SOUTH DAKOTA'S TOMORROW...TODAY!". Contact information for the Joe Foss Building is provided. A navigation bar lists categories: Air, Land, Water, Funding, Permits/Forms, About Us, and Press. Social media icons for Facebook and a Google Custom Search box are also present. The main content area features a grid of 12 interactive map-based data tools, each with a title and a small preview image:

- Waterbodies Eligible under t...
- Regulated Air Quality Facilities
- Dry Draw Location Notice
- Recycling Facilities
- Construction Aggregate Mini...
- Tanks Database Viewer
- Spills Reports
- Water Well Completion Repo...
- Observation Wells
- Measured Lakes
- Permitted Solid Waste Faciliti...

<https://denr.sd.gov/datagis.aspx>



# INCREASING DATA ACCESSIBILITY

## South Dakota GIS Data

Search South Dakota GIS Data



This is the State's public platform for exploring and downloading publicly available Geographic Information Systems (GIS) data.

©South Dakota Tourism

<https://opendata2017-09-18t192802468zsdbit.opendata.arcgis.com/>





# Recap

- With digital mapping the State of South Dakota is:
  - Improving data accuracy
  - Improving data entry
  - Improving user experiences
  - Decreasing duplicate data, reusing layers
  - Creating a more transparent Government
- Current road blocks
  - Time
    - It takes time to implement new technology on a state wide level
  - Money
    - States have budgets



# Recap



Continually Improve



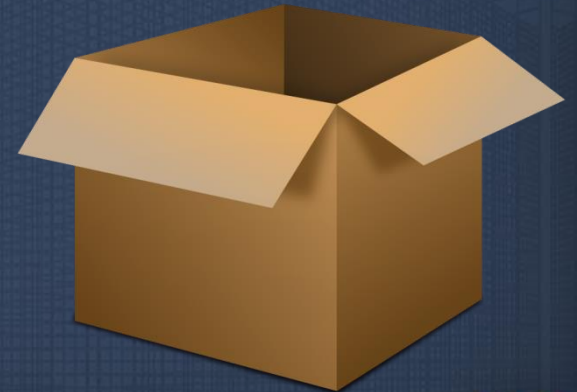
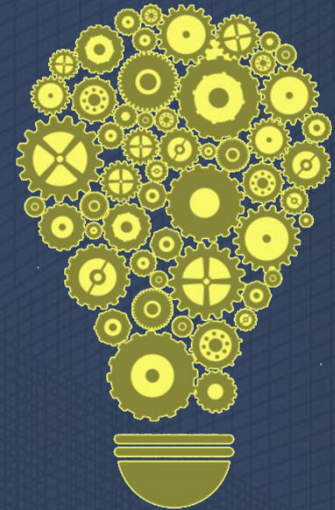


# Ideas to Take Away

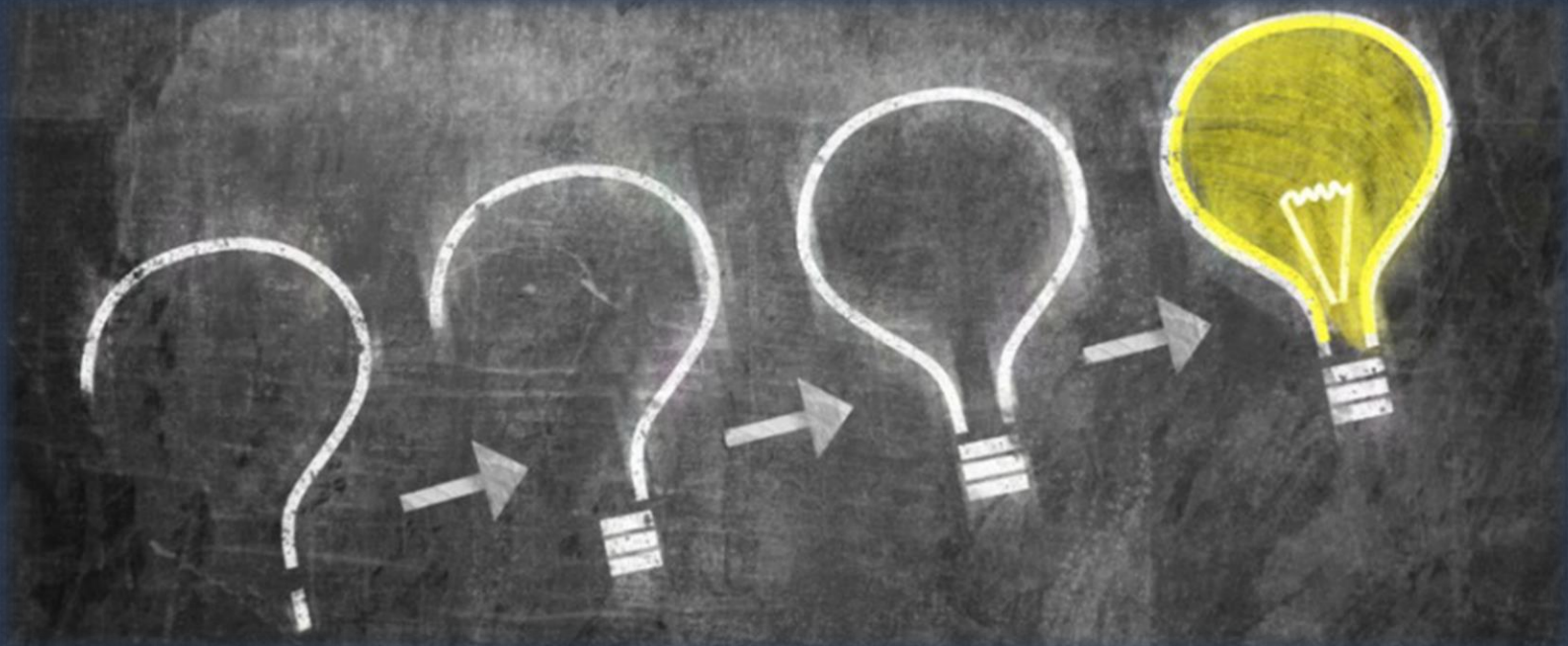
- Think outside the box
- Limited by your own imagination
- Living in an exciting historic time, embrace it!

“Maps codify the miracle of  
existence.”

— Nicholas Crane, *Mercator: The Man Who Mapped  
the Planet*



# Any Questions



**Danielle Guthrie**

Software Engineer III

GIS Analyst

📞 605.367.4756

@ Danielle.Guthrie@state.sd.us





# Links

<https://apps.sd.gov/rv25taxmatch/main.aspx>

<https://denr.sd.gov/datagis.aspx>

<http://arcgis.sd.gov/server/sdGIS/>

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