



21<sup>ST</sup> CENTURY  
SOLUTIONS

## GEOSPATIAL DATA COLLABORATION

*The Federal Highway Administration (FHWA)*

*GIS in Transportation and Every Day Counts Programs present on...*

# Geospatial Data Collaboration: Tools for Data Sharing

Wednesday, November 18, 2015

**Presenters:**

Mark Sarmiento, FHWA



U.S. Department of Transportation  
**Federal Highway Administration**

GIS in Transportation  
<http://gis.fhwa.dot.gov>

# Overview

- Introduction
- Study Purpose & Methodology
- Study Themes & Highlights

# Introduction

# FHWA Initiatives



**EDC seeks to identify and deploy innovations that reduce highway project delivery time, enhance safety, and protect the environment**

# Every Day Counts

- ❑ Not about inventing the next “Big Thing”
- ❑ Taking effective, proven and market-ready technologies and getting them into widespread use
- ❑ Keep American moving and competitive

# FHWA Initiatives



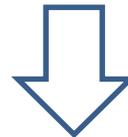
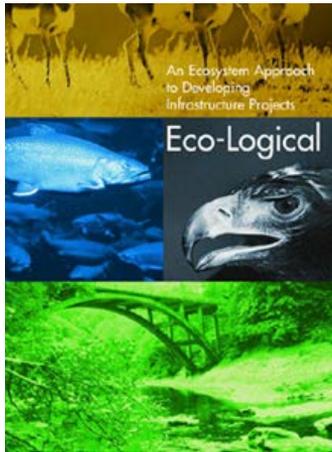
## **GEOSPATIAL DATA COLLABORATION**

**EDC seeks to identify and deploy innovations that reduce highway project delivery time, enhance safety, and protect the environment**

# Geospatial Data Collaboration (GDC)

- ❑ Use and share geospatial data to provide better information
- ❑ Use and share geospatial tools to make efficient transportation decisions
- ❑ State DOTs and partner agencies working better together

# FHWA Initiatives

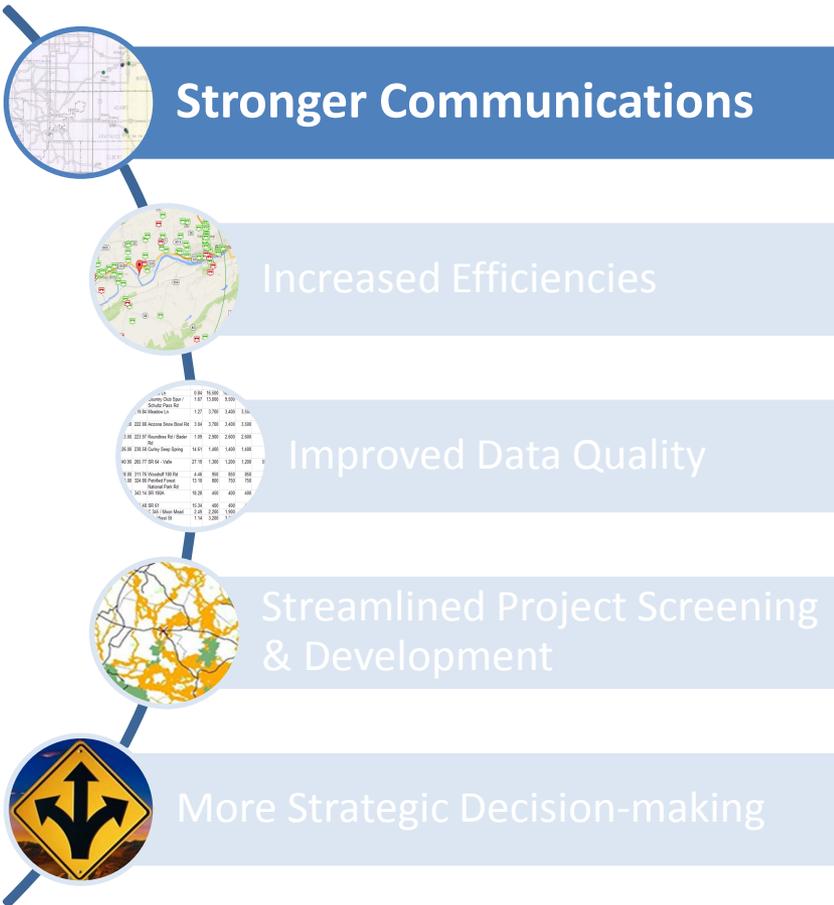


## GEOSPATIAL DATA COLLABORATION

EDC seeks to identify and deploy innovations that reduce highway project delivery time, enhance safety, and protect the environment



# Data-Sharing Benefits



- ❑ Users can consume data as soon they are published
- ❑ They can also view the same data through a common framework

# Data-Sharing Benefits



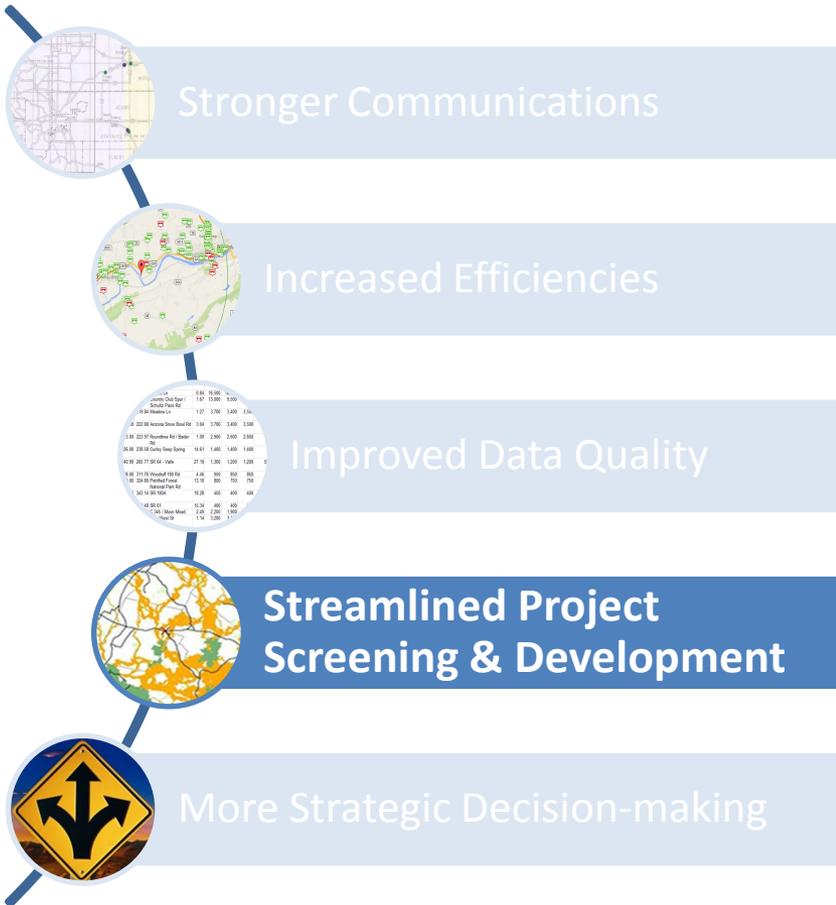
- Users can more easily assess data gaps to better data collection and reduce the possibility that multiple data owners will collect the same information
- Having a common data entry point also makes it easier and more efficient for users to find information and respond to data requests

# Data-Sharing Benefits



- ❑ Making information more transparent helps users see where there are quality control issues
- ❑ Encourages data owners to quickly address errors

# Data-Sharing Benefits



- ❑ Agencies access and share information more easily, allowing for earlier coordination during project development

# Data-Sharing Benefits



- ❑ Nevada DOT's Planning and Needs System (PLANS) has a mapping component that will help Nevada DOT categorize "bundles" of transportation projects that have similar features

# Data-Sharing Benefits



Stronger Communications



Increased Efficiencies

A circular icon containing a data table with multiple columns and rows of numerical values, representing data quality and analysis.

100	100	100	100	100
200	200	200	200	200
300	300	300	300	300
400	400	400	400	400
500	500	500	500	500
600	600	600	600	600
700	700	700	700	700
800	800	800	800	800
900	900	900	900	900
1000	1000	1000	1000	1000

Improved Data Quality



Streamlined Project Screening & Development



More Strategic Decision-making

# **Study Purpose & Methodology**

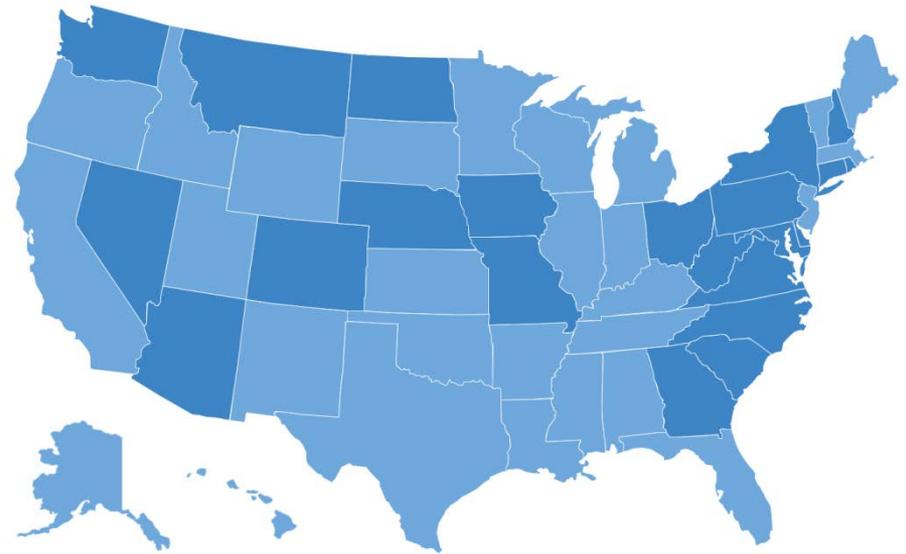
# Study Purpose

- Document examples of tools that support Geospatial Data Collaboration (GDC) goals
- Share lessons learned and success factors among practitioners
- Develop and strengthen a community of practitioners engaging in GDC-related efforts



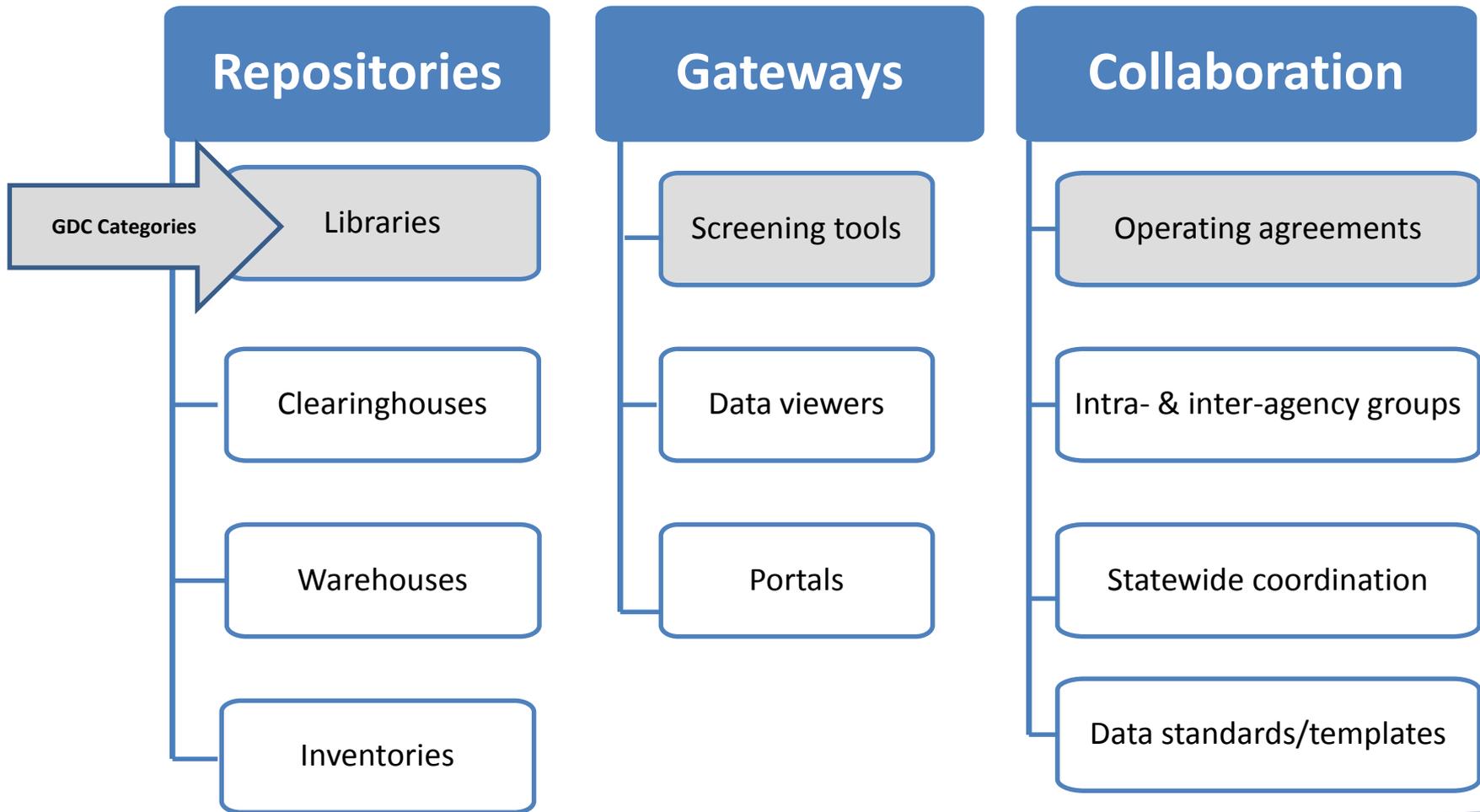
# Methodology

- **Literature review**
- Telephone discussions with **22 transportation agencies**
- **Case studies** describing agencies' experiences
- Follow-on **peer exchanges** in May 2014 (Denver, CO and Raleigh, NC)
- **Final report** is posted on FHWA GIS in Transportation website ([gis.fhwa.dot.gov](http://gis.fhwa.dot.gov))



Map of States interviewed  
(dark shade indicates interviewed State)

# Classification of Tools/Efforts



# Themes & Highlights

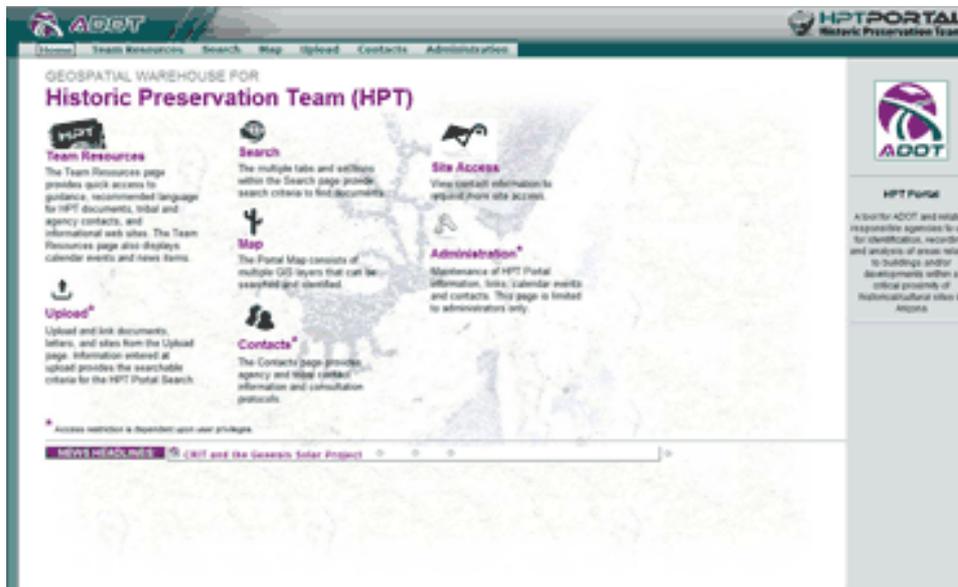
# Motivating & Success Factors

- **Examples of motivating factors:**
  - Federal requirements
  - Natural disasters
  - Perceived need for improved access to information

# Example 1

## Arizona DOT (ADOT)

- Developed the Historic Preservation Portal, which aggregates information on cultural resources, historic property locations, consultation letters, and more
- Portal is accessible to ADOT staff, consultants, and cultural resource professionals
- Portal helps ADOT assess transportation project environmental impacts



For more information:

[www.azdot.gov/business/environmental-services-and-planning/environmental-guidance-documents/nepa-process-guidance/cultural-resources](http://www.azdot.gov/business/environmental-services-and-planning/environmental-guidance-documents/nepa-process-guidance/cultural-resources)

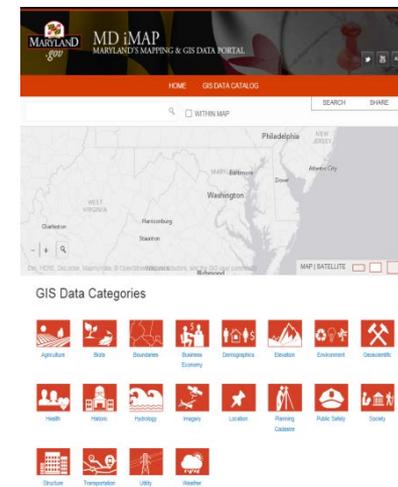
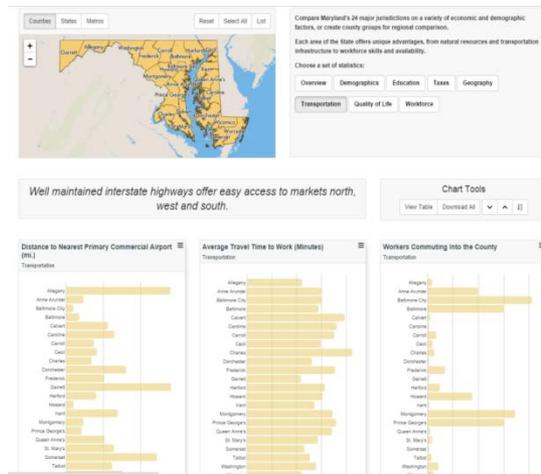
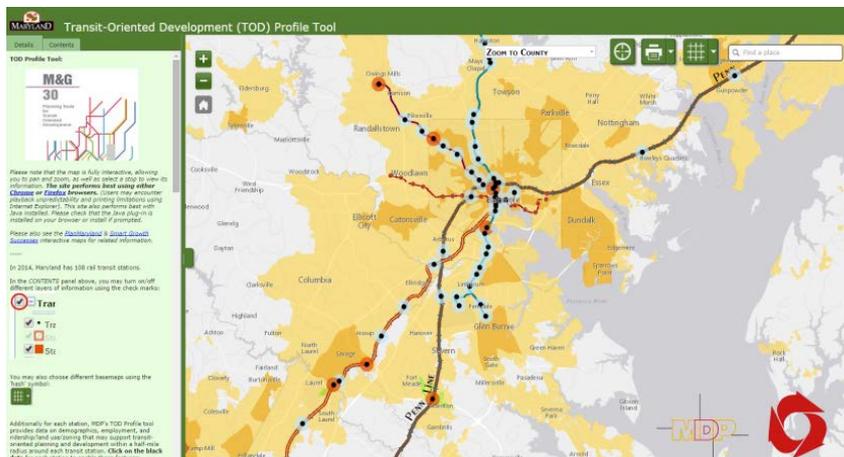
# Motivating & Success Factors

- **Examples of success factors:**
  - Have a champion(s)
  - Identify common goals and objectives for multi-stakeholder efforts
  - Promote benefits of tools/efforts
  - Demonstrate how tools/efforts support user empowerment

# Example 2

## Maryland State Highway Administration (MDSHA)

- Contributes to MD iMap, a Statewide, publically accessible data gateway
- Developed an enterprise GIS that functions as an internal data gateway for MDSHA
- Coordinates effectively with other Statewide efforts



For more information:

[http://www.gis.fhwa.dot.gov/webcast22\\_maryland.asp](http://www.gis.fhwa.dot.gov/webcast22_maryland.asp)

<http://imap.maryland.gov/Pages/default.aspx>

<https://data.maryland.gov>

# Technologies & Platforms

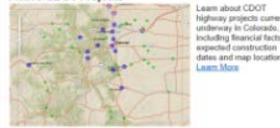
- Agencies using both commercial off-the-shelf (COTS) software solutions as well as customized platforms
- Agencies see a need to:
  - Choose solutions that are flexible/adaptable
  - Quickly integrate new technologies into existing systems to maintain customer service focus
  - Understand capabilities and limitations of new technologies, particularly those that support direct user interaction with data

# Example 3

## Colorado DOT (CDOT)

- Developed the Online Transportation Information System (OTIS), a publically accessible “one stop shop” for transportation, environmental, and other data
- OTIS has evolved over time in response to user requests for information
- OTIS data quality has increased as users identify updates

<p><b>MAP VIEW</b></p> <p>View and query Colorado transportation data and related images and documents. Create customized maps.</p>	<p><b>HIGHWAY DATA</b></p> <p>View highway features, traffic data, photos and documents. Export reports and data.</p>	<p><b>TRAFFIC DATA</b></p> <p>Traffic Data Explorer displays traffic counts and statistics including AADT, Truck AADT and VMT.</p>
<p><b>DATA CATALOG</b></p> <p>Search for spatial and tabular data, documents, metadata and glossary terms.</p>	<p><b>MAPS</b></p> <p>View and download statewide and regional maps. View, download and order the Official Colorado Travel Map.</p>	<p><b>SL DIAGRAM</b></p> <p>SLD (Straight Line Diagram) application displays selected highway features along the road displayed as a straight line and map.</p>
<p><b>WINDSHIELD</b></p> <p>Videolog application that plays highway images as if viewed from the windshield of a vehicle.</p>	<p><b>REPORTS</b></p> <p>View and download annual highway, county and city mileage, Truck statistics, Volume/Capacity and Demographic data.</p>	<p><b>YOUR CDOT \$</b></p> <p>Your CDOT Dollar tracks CDOT performance and transportation expenditures.</p>

<p>How CDOT Spends Transportation Dollars</p> <p><b>CDOT Calculator</b></p> <p>Use the Interactive CDOT Calculator to see how much you contribute each year to keep Colorado's transportation system running. See how CDOT uses your dollars to meet specific transportation needs. <a href="#">Learn More</a></p> 	<p>Where CDOT Spends Transportation Dollars</p> <p><b>Active CDOT Projects</b></p> <p>Learn about CDOT highway projects currently underway in Colorado, including financial facts, expected construction dates and map locations. <a href="#">Learn More</a></p> 
<p>Performance Area: Road Quality</p> <p><b>Highways</b></p> <p>CDOT maintains 9,146 miles of Highways across the state. Colorado motorists drive 26.1 billion miles on these roads in 2012. <a href="#">Learn More</a></p> <p><b>Highway Grade Overall Roadway Condition</b></p>  <p>Long Range Goal: <b>B-</b> Actual for 2013: <b>B-</b></p>	<p>Performance Area: Bridges &amp; Tunnels</p> <p><b>Bridges</b></p> <p>CDOT maintains 3,437 bridges statewide to keep them safe and in good repair for the traveling public. <a href="#">Learn More</a></p> <p><b>Bridge-Deck Area Rated 'Not Structurally Deficient'</b></p>  <p>Long Range Goal: <b>90%</b> Actual for 2013: <b>94.1%</b></p>

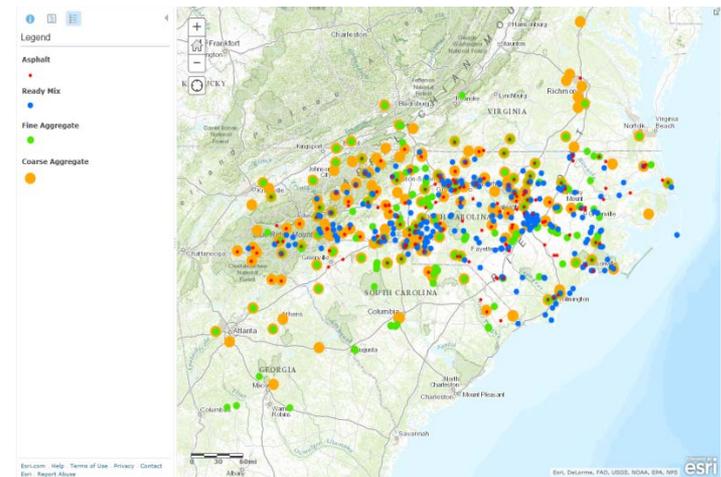
For more information:

<http://dtdapps.coloradodot.info/otis>

# Example 4

## North Carolina DOT (NCDOT)

- Developed Go!NC to aggregate and share NCDOT's geospatial information with users both within and outside the agency
- Go!NC uses cloud-based technology to help NCDOT more effectively engage with a broader range of users
- Participated in inter-agency group to share lessons learned for using the cloud



For more information:

<http://ncdot.maps.arcgis.com/home/>

# Data Management & Governance

Establishing Data & Governance Standards

Assigning Data Owners

Setting Standards for Metadata

# Data Management & Governance

## Establishing Data & Governance Standards

- Most agencies have not yet developed formal standardization processes, but are examining options
- One effective approach to standardization is to develop a guidance document

## Assigning Data Owners

## Setting Standards for Metadata

# Example 5

## Montana Department of Transportation (MDT)

- Developed best practices guide for its MDT AGOL site
- Provides guidance but does not set specific standards



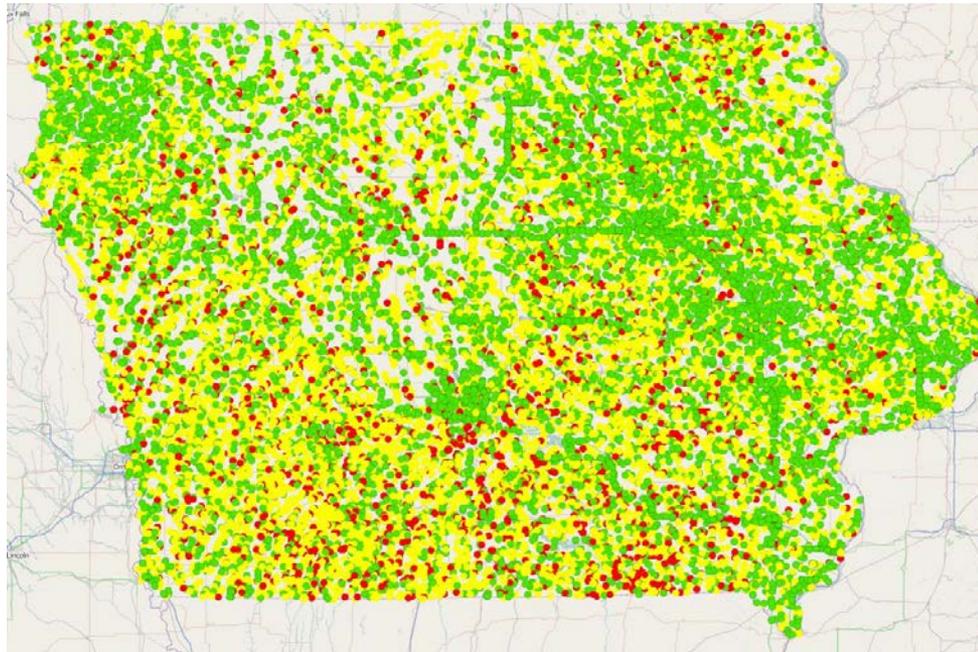
For more information:

<http://mdt.maps.arcgis.com/home/>

# Example 6

## Iowa DOT

- Developed Geospatial Governance Guidance document
- Lays out responsibilities of Iowa DOT GIS Council, metadata and project standards, etc.



# Data Management & Governance

Establishing Data & Governance Standards

## Assigning Data Owners

- Difficult for agencies to establish authoritative data sources and maintain data quality
- To address this, agencies decide who is responsible for maintaining data

Setting Standards for Metadata

# Example 6

## Pennsylvania DOT (PennDOT)

- Business units will be “data owners” for PennShare
- Implementing formal administrative system to avoid duplication of efforts, ensure data quality, and maintain consistent branding
  - User agreement
  - Product form
  - Data approval process



For more information:

<http://pennshare.maps.arcgis.com/home/>

# Data Management & Governance

Establishing Data & Governance Standards

Assigning Data Owners

Setting Standards for Metadata

- Many challenges to developing robust metadata:
  - Limited understanding metadata's necessity
  - Variety of suggested metadata standards
  - Unclear data ownership

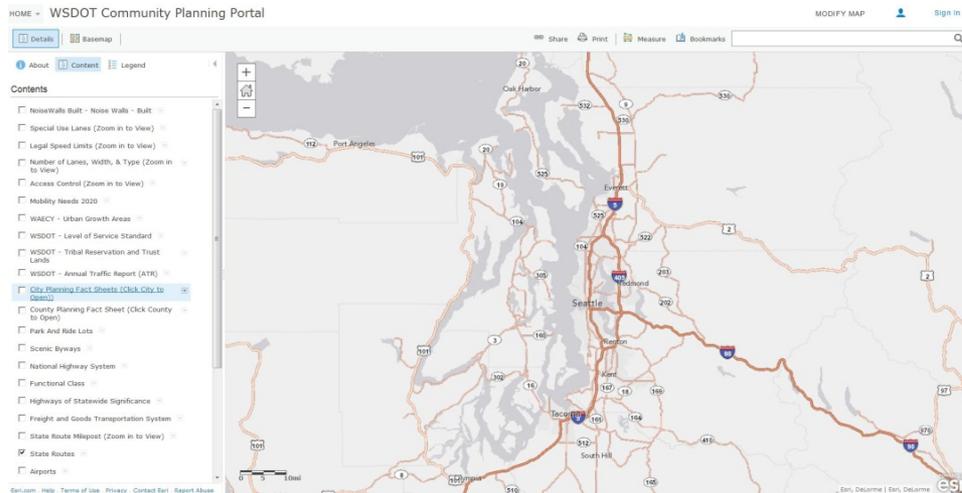
# Coordination

- Large variety of coordination efforts
- Both formal and informal
- Challenges arise due to fear of sharing and uncertainty of data quality

# Example 7

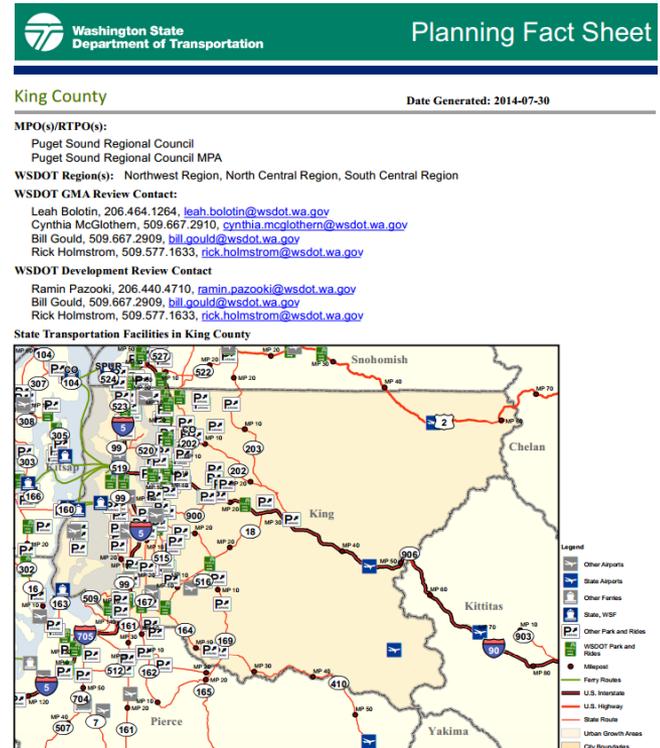
## Washington State DOT (WSDOT)

- WSDOT's Community Planning Portal (CPP) helps state, regional, and local planners understand the transportation system in their area
- WSDOT worked closely with local agencies to develop the portal



For more information:

<http://www.wsdot.wa.gov/planning/community/>



# Example 8

## Montana DOT (MDT)

- Montana State Library keeps an official record of all State-produced geospatial data
- Library staff ensure all data is compatible with the library systems, and states can rely on this data to support interagency collaboration efforts

The screenshot shows the Montana State Library's Geographic Information website. The header includes the Montana State Library logo and navigation links for SERVICES, AGENCIES, LOGIN, and SEARCH. The main content area is titled "Geographic Information" with the tagline "Providing Montana a Sense of Place". A navigation bar below the title lists "MSDI", "Data", "Geography", and "Web Changes". The main content is divided into several sections: "Geographic Information" with a description of the library's role in managing geospatial data; "What's New?" with a list of recent updates; "Featured MSDI Theme" highlighting the "Structures and Addresses Montana Spatial Data Infrastructure Framework Theme"; "Search Geographic Information" with a search box and a "Go" button; and "Upcoming Events" with a link to the "Montana State Library Event Calendar". A "Geography" sidebar on the right features a map and the text "All of our best applications and maps at your fingertips."

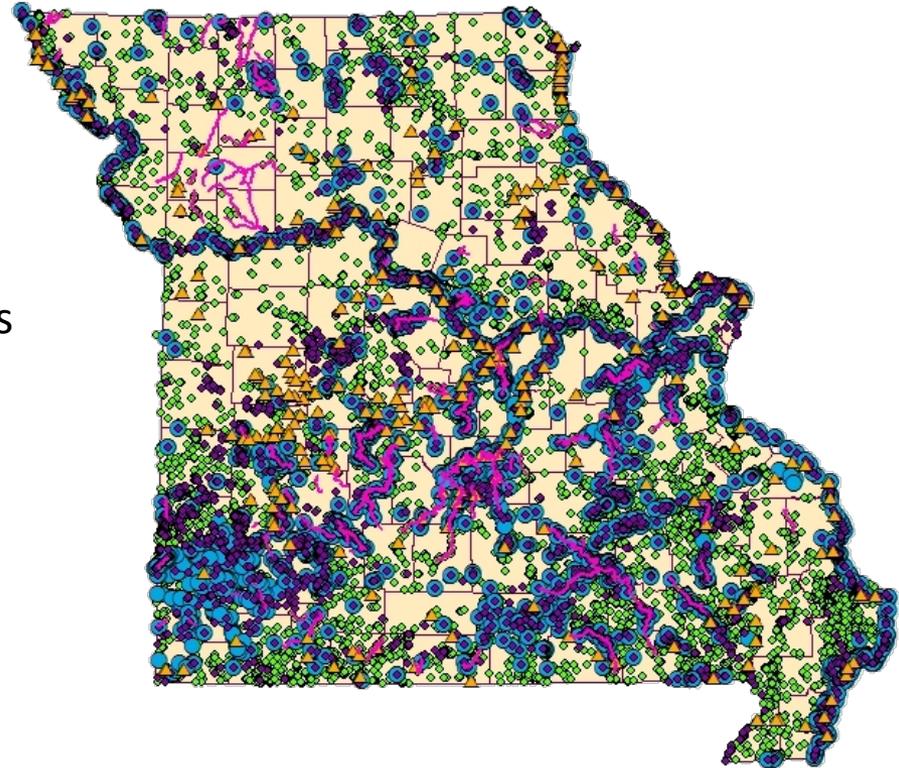
For more information:

<http://geoinfo.msl.mt.gov/>

# Example 9

## Missouri DOT (MoDOT)

- Agency developing memorandum of understanding (MOU) with other state agencies on:
  - Sharing natural resource information
  - Integrating planning
  - Updating best management practices



# Future of Data-Sharing

## Evolving Data Requirements & Practices



Federal reporting requirements

Data owner responsibilities



State agency coordination

# Future of Data-Sharing

## Advances in Technology



Public input

Feedback  
mechanisms



Field editing

# Future of Data-Sharing

## Funding Challenges & Solutions



More with less

Government transparency



# Data-Sharing Benefits



Stronger Communications



Increased Efficiencies

A circular icon containing a data table with multiple columns and rows of numerical values, representing data quality and analysis.

100	100	100	100	100
200	200	200	200	200
300	300	300	300	300
400	400	400	400	400
500	500	500	500	500
600	600	600	600	600
700	700	700	700	700
800	800	800	800	800
900	900	900	900	900
1000	1000	1000	1000	1000

Improved Data Quality



Streamlined Project Screening & Development



More Strategic Decision-making

# Geospatial Data Collaboration Every Day Counts

## Better

- ❑ Data
- ❑ Tools
- ❑ Working relationships with partners

## We can

- ❑ Reduce highway project delivery time
- ❑ Enhance safety
- ❑ Protect the environment

# Contact Information and Resources

## Mark Sarmiento

Community Planner  
FHWA, USDOT Headquarters  
Washington, D.C.

[Mark.Sarmiento@dot.gov](mailto:Mark.Sarmiento@dot.gov)

202-366-4828

**FHWA GIS in Transportation Program**  
[gis.fhwa.dot.gov](http://gis.fhwa.dot.gov)

**Every Day Counts**  
[www.fhwa.dot.gov/everydaycounts](http://www.fhwa.dot.gov/everydaycounts)

**Geospatial Data Collaboration Initiative**  
[www.fhwa.dot.gov/everydaycounts/edctwo/2012/gis.cfm](http://www.fhwa.dot.gov/everydaycounts/edctwo/2012/gis.cfm)

**Planning and Environmental Linkages**  
[www.environment.fhwa.dot.gov/integ/index.asp](http://www.environment.fhwa.dot.gov/integ/index.asp)

**Eco-Logical**  
[www.environment.fhwa.dot.gov/ecological/eco\\_index.asp](http://www.environment.fhwa.dot.gov/ecological/eco_index.asp)

**American Association of State Highway and  
Transportation Officials**  
GIS for Transportation Symposium  
[www.gis-t.org/](http://www.gis-t.org/)