

FEDERAL HIGHWAY ADMINISTRATION

**ALL PUBLIC ROAD GEOSPATIAL REPRESENTATIVE
STUDY**

Project Overview



Organizational Chart

FHWA Office of Highway Policy Information
David Winter, PE

**Highway Finance
and Recovery Act**

Chris Allen
Team Lead

Mike Slattery
Clarissa Smith
Monique Snow
Ron Vaughn
Maria Bonilla
Tychelle Staten
Paolo Angulo
Chris Lehner

**Motor Fuel
and Tax Evasion**

Ralph Davis
Team Lead

Mike Dougherty
Bryant Gross
Dawn Edwards

**Highway System
Performance**

Vacant
Team Lead

Justin Clarke
Ron Erickson
Joe Hausman
Tom Roff
Rob Rozycki
Ron Vaughn

**Travel Monitoring
and Surveys**

Tianjia Tang, PE
Team Lead

Brad Gudzin
Danny Jenkins, PE
Steven Jessberger
David Jones
Adella Santos
Patrick Zhang, PE
Danielle Gray



Project Introduction

- On August 7, 2012, FHWA announced that the HPMS is expanding the requirement for State DOTs to submit their LRS to include all public roads, and to provide facilities that are divided highways or dual carriageways (as independent features where applicable)
- This requirement will be referred to as the All Road Network of Linear Referenced Data (ARNOLD)
- Many states will be challenged by this requirement, but this project will produce guidance materials to help implement ARNOLD at the state level



Project Team

- US DOT
 - Joe Hausman (Project Manager)
 - Tom Roff (ARNOLD Lead)
 - Justin Clarke (Team Lead)
- Contractors
 - Applied Geographics, Inc. (Prime Contractor)
 - David R. Fletcher (Subcontractor)
 - Michael Baker Jr., Inc. (Subcontractor)
- Expert Panel
 - Mark Sarmiento – FHWA Planning
 - Mike Neathery – FHWA Planning
 - Robert Pollack – FHWA Safety
 - Stuart Thompson – FHWA Safety
 - Maria Chau – FHWA NY Division
 - Dave Blackstone – Ohio DOT
 - Frank Pisani – Utah DOT
 - Frank DeSendi – Pennsylvania DOT
 - Keith Dotson – Kentucky Transportation
 - Sharon Hawkins – Arkansas HDT
 - James Meyer – Arizona DOT
 - Michele Barnes – University of Michigan

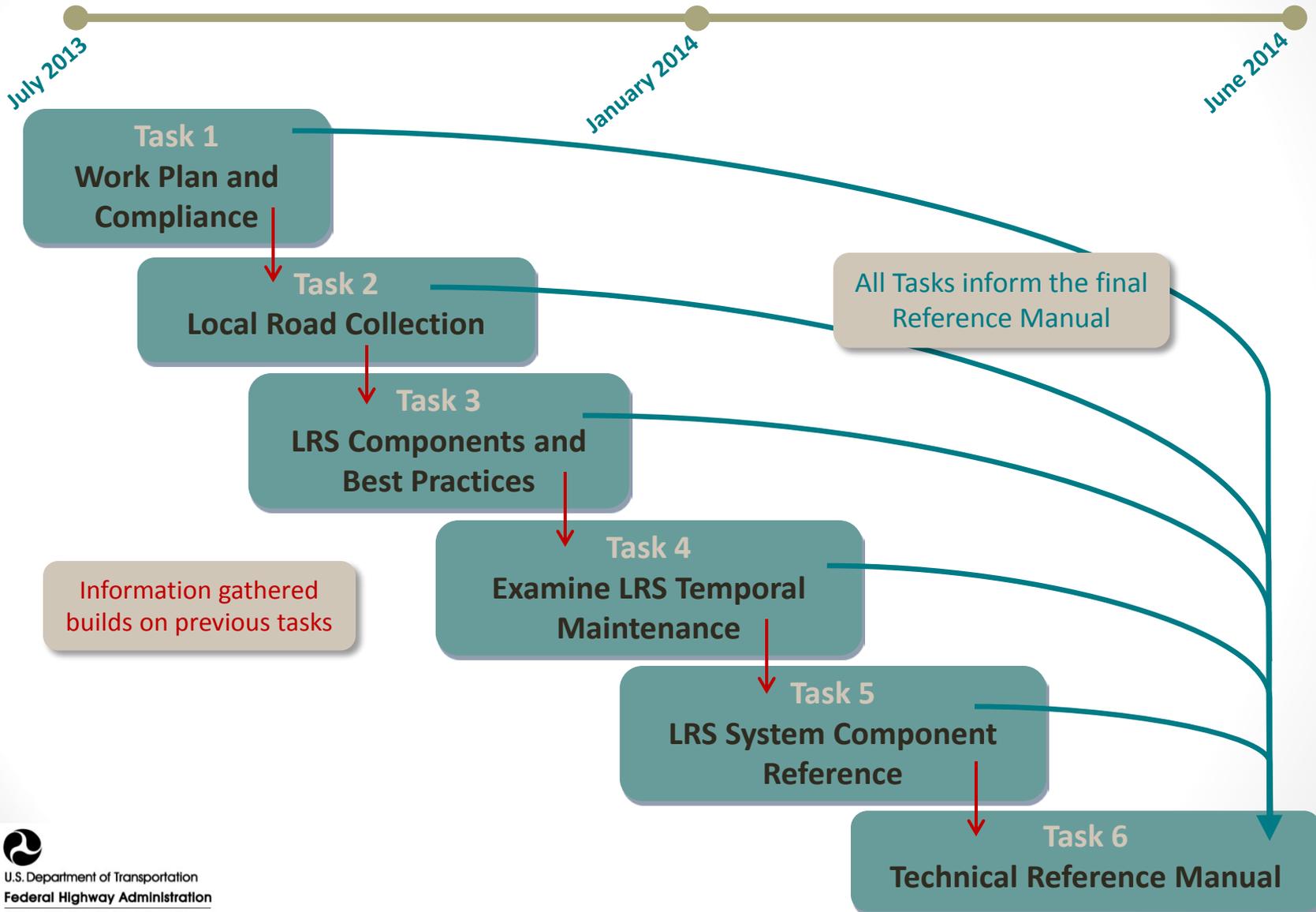


Project Overview

- ✓ **Task 1:** Project Schedule, Risk Assessment and leverage the US DOT –GIO TFTN Strategic Plan
- **Task 2:** Local Road LRS Development - *in progress*
- **Task 3:** Statewide government and private LRS Best Practices - *in progress*
- **Task 4:** LRS Temporal Maintenance
- **Task 5:** LRS System Component Reference
- **Task 6:** Technical Reference manual assembling information gathered from tasks 2-5



Overall Project Workplan



Task 1 – Project Website

The screenshot displays the FHWA All Roads Study Project Homepage. At the top left is the U.S. Department of Transportation Federal Highway Administration logo. A search bar is located at the top right. A left sidebar contains navigation links: Home, Calendar, Project Deliverable Documents, Meeting Notes, Project Team, Research Documents, and Sitemap. Below the navigation is a '25 days since Project Launch' counter. The main content area features a 'Welcome to the FHWA All Roads Study Project Homepage' heading, followed by a paragraph explaining the website's purpose. Below this is a 'Project At A Glance' section listing six tasks: 1. Work plan and compliance, 2. Local Road collection, 3. LRS Component and best practices, 4. Examine LRS temporal maintenance, 5. LRS System components reference, and 6. Technical Reference Manual. A 'Project Overview' section follows, describing the study's goal to identify methodologies for reporting requirements for dual carriageways on divided highways. On the right, a 'Recent Files' section shows a document titled 'FHWA_WorkPlan_v1.docx' (96k, v. 2, dated Aug 8, 2013, 11:24 AM) by Morgen Healy. Below this is a detailed view of the 'Project Deliverable Documents' section, which includes a list of tasks with 'Remove' links and a '25 days since Project Launch' counter.

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

Search this site

Home
Calendar
Project Deliverable Documents
Meeting Notes
Project Team
Research Documents
Sitemap

25
days since
Project Launch

Welcome to the FHWA All Roads Study Project Homepage

On this project website you will find all information related to project schedule, team contact information, meeting notes, document deliverables and more.

Project At A Glance

- Task 1: Work plan and compliance
- Task 2: Local Road collection
- Task 3: LRS Component and best practices
- Task 4: Examine LRS temporal maintenance
- Task 5: LRS System components reference
- Task 6: Technical Reference Manual

Project Overview:

This study will identify methodologies for reporting requirements for dual carriageways on divided highways based Linear Reference System (LRS) Network of Linear Referenced Data expansion of HPMS requirements supported by the U.S. Department of Transportation (USDOT) initiative "Transportation for the Nation" (TFN).

Recent Files

FHWA_WorkPlan_v1.docx 96k - Aug 8, 2013, 11:24 AM

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

Search this site

Home
Calendar
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25
days since
Project Launch

Project Deliverable Documents

This area will hold all final deliverable documents.

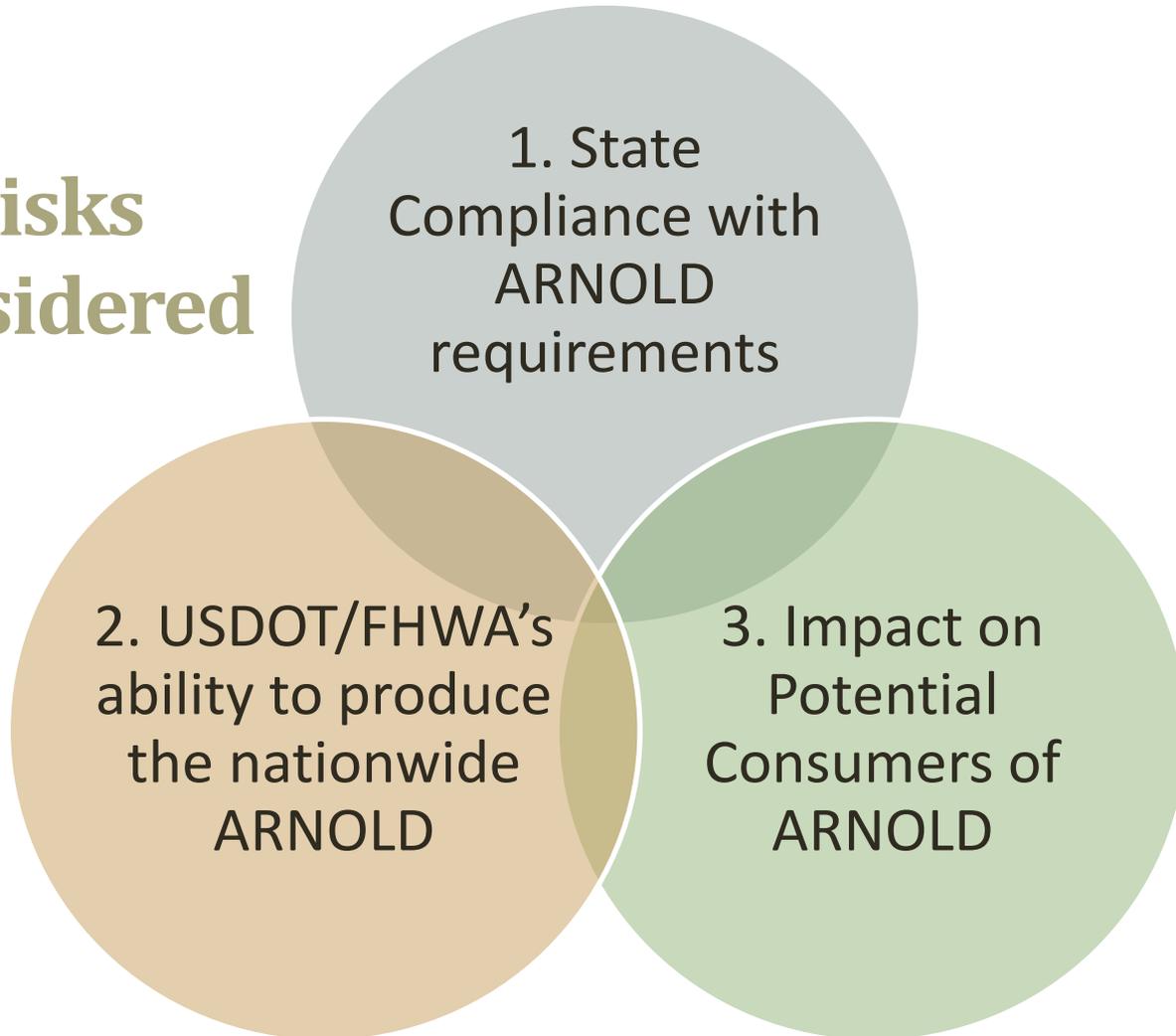
+ Add file + Add link Move to - Delete Subscribe to changes

- Task 1: Work Plan and Compliance (Remove)
- FHWA_WorkPlan_v1.docx 96k v. 2 Aug 8, 2013, 11:24 AM Morgen Healy
View Download
- Task 2: Local Road Collection (Remove)
- Task 3: LRS Component and Best Practices (Remove)
- Task 4: Examine LRS Temporal Maintenance (Remove)
- Task 5: LRS System Components Reference (Remove)
- Task 6: Technical Reference Manual (Remove)



Task 1 – Risk Assessment

Risks Considered



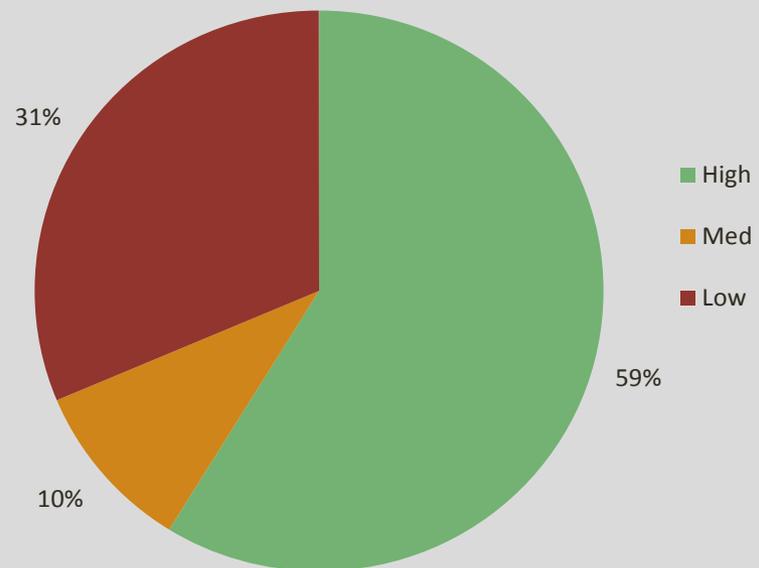
Task 1 – Risk Assessment

Risk 1: State Compliance

Most frequently cited challenges

- Limited resources
- Data maintenance
- Data collection
- LRS technical issues
- Understanding of methodology and requirements
- Communicating benefits of program to stakeholders and leadership

Likelihood of States Implementing ARNOLD by June 2014 Deadline

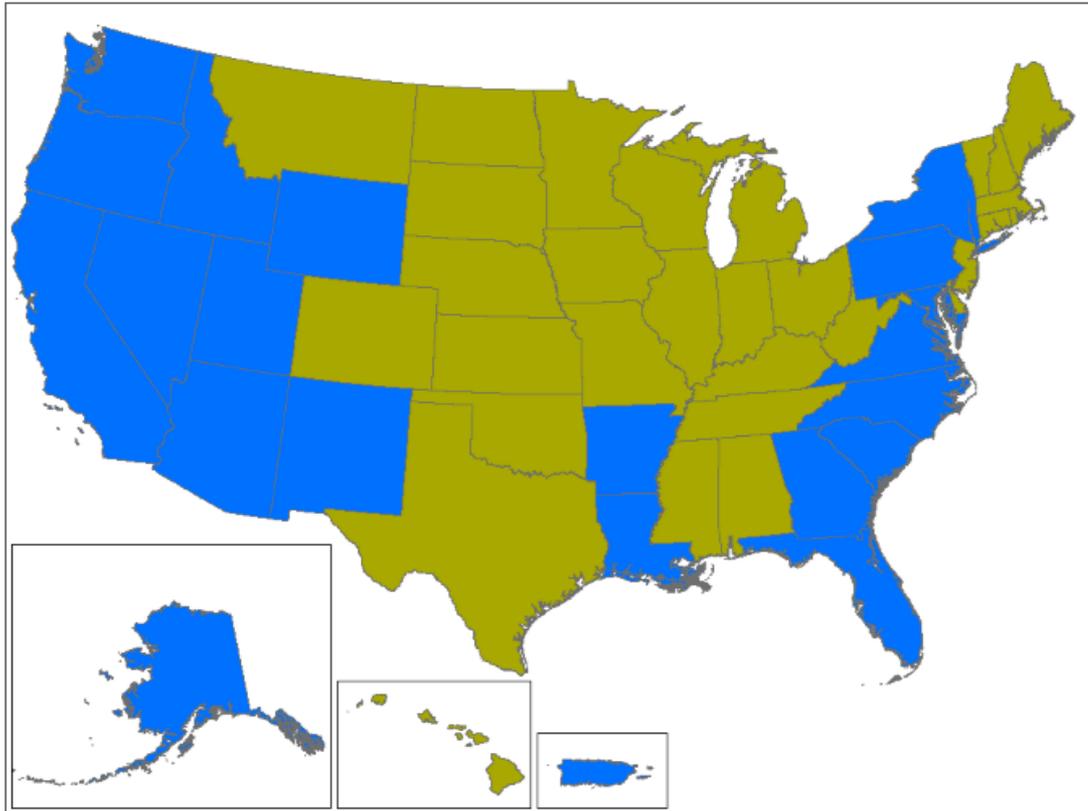


Based on review of State HPMS Plans



Task 1 – Risk Assessment

Likelihood of States Implementing ARNOLD



Green States are most likely to meet the June 2014 due date for having All Public Roads Linear Referenced

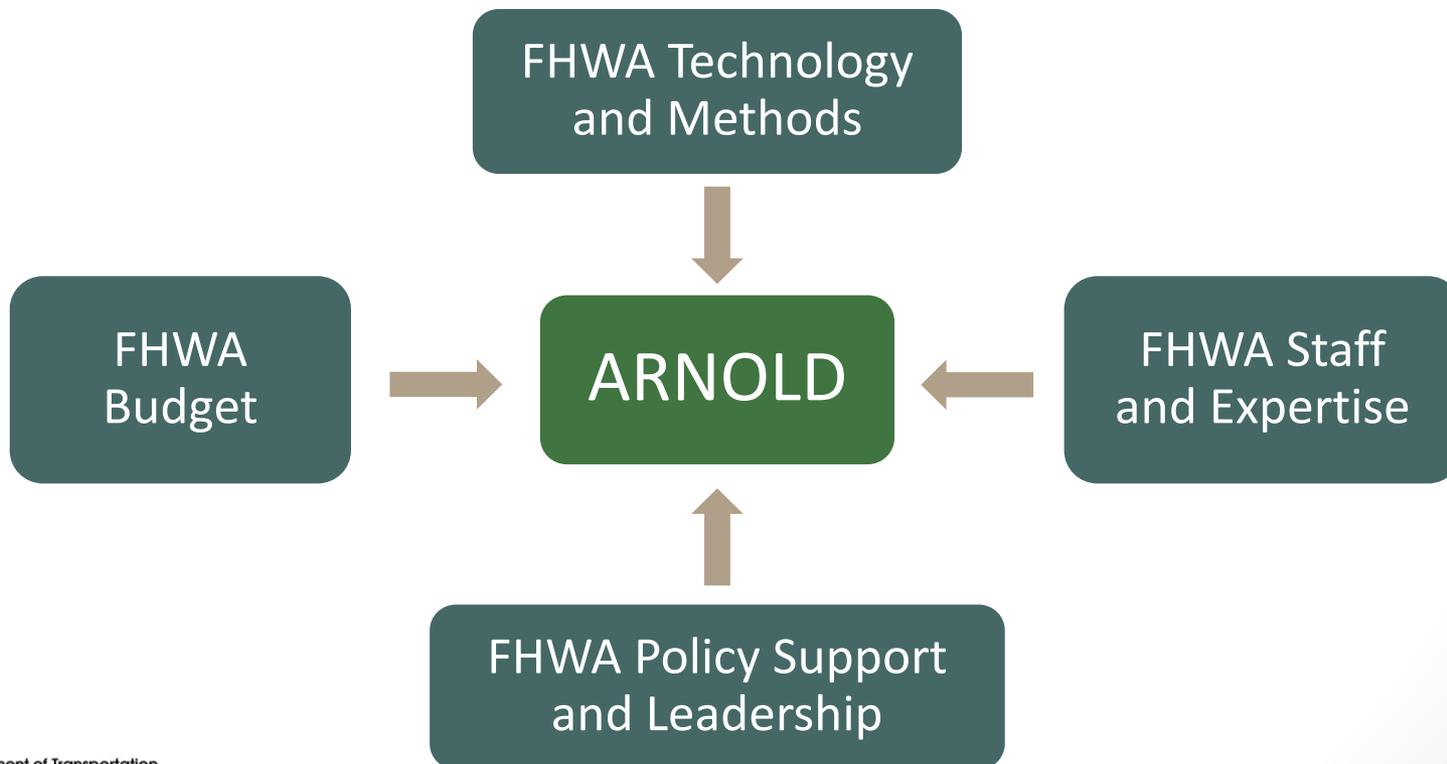
Based on review of State HPMS Plans



Task 1 – Risk Assessment

Risk 2: USDOT/FHWA's Ability to Produce Nationwide ARNOLD

FHWA needs to be able to build *and* maintain a complex integrated dataset, which requires:



Task 1 – Risk Assessment

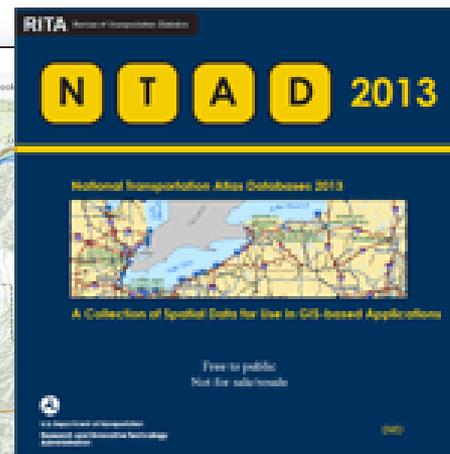
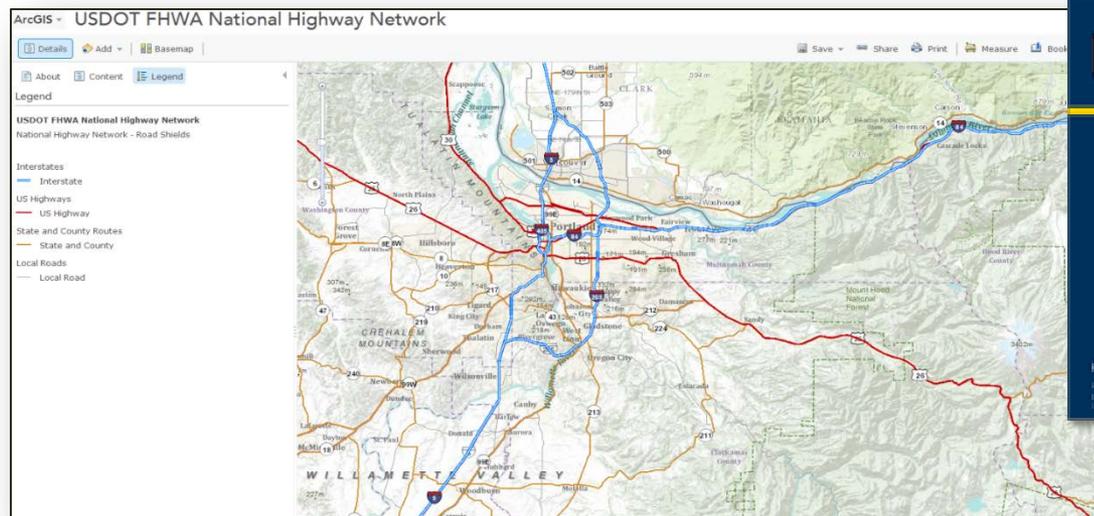
Risk 3: Impact on Potential Consumers of ARNOLD

"build once, use many times"

Certain systems and products are at risk if ARNOLD does not succeed

Systems at Risk: Internal to USDOT

- USDOT RITA/BTS: National Transportation Data Atlas
- USDOT Office of Planning, Environment, and Realty: National Highway Planning Network



Task 1 – Risk Assessment

Risk 3: Impact on Potential Consumers of ARNOLD

Systems at Risk: External to USDOT

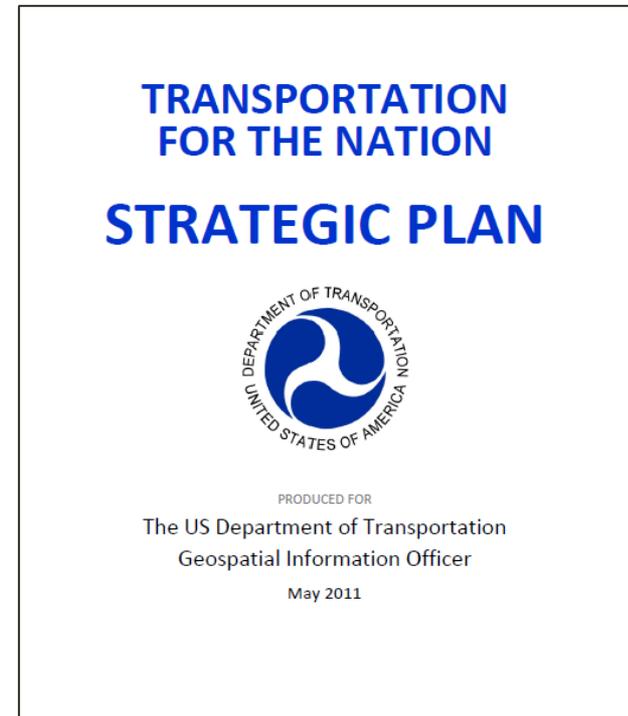
- The following provides an overview of non-USDOT systems that are at risk, or face higher costs if ARNOLD does not come into being:
- National Spatial Data Infrastructure, the Geospatial Platform, and The National Map
- US Census Bureau TIGER and LUCA data
- FCC National Broadband Map (which currently uses TIGER data)
- Open Street Map
- Commercial Navigation Data Systems



Task 1 – TFTN Alignment

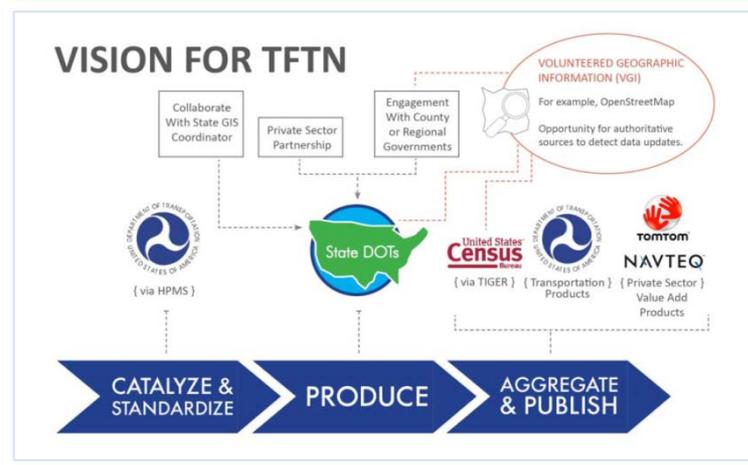
The Study is aimed at State DOT business and data processes to support HPMS reporting requirements, whereas the TFTN is a national initiative. Consequently while the Study may provide precedent data necessary for the TFTN, it is not directly concerned with the strategy or next steps laid out in the TFTN Strategic Plan.

- The Study supports and is aligned with the following TFTN Next Steps:
 - Continue working with Stakeholders/advocates to sustain support for TFTN
 - Work with Stakeholders/advocates to gain support for TFTN implementation



Task 1 – TFTN Alignment

- Alignment occurs along several axes:
 - The overall Study goals are consistent with the TFTN Strategic Vision.
 - Technical tasks of the Study support the TFTN goal to establish LRS guidelines.
 - Technical tasks of the Study also support TFTN Phase 2 (statewide production of LRS data).
 - The Contractor for this Study was also involved with the development of the TFTN Strategic Plan, ensuring institutional continuity of the deep knowledge implicitly incorporated in the TFTN.



Task 1 – TFTN Alignment

Assessing alignment of various TFTN goals with ARNOLD goals

TFTN	Direct ARNOLD Alignment	Indirect ARNOLD Alignment
Development Strategy		
Catalyze development of TFTN via FHWA HPMS reporting requirements		X
Support States in developing statewide inventories	X	
Aggregate state-level data into nationwide map and publish data to stakeholders.		X
Keep the TFTN current: data update and maintenance		X
Next Steps		
Continue working with Stakeholders/advocates to sustain support for TFTN		X
FHWA determination on whether to require states to provide complete, statewide road geometry	X	
Assemble Internal USDOT TFTN Committee to establish inter-departmental cooperative agreements		X
Assemble funding necessary for Business Planning and prototyping	X	
Development of Detailed Business & Implementation Plan		X
Formally engage US Census, and other potential partners, for inter-departmental agreements		X
Work with Stakeholders/advocates to gain support for TFTN implementation		X
Commence TFTN operational implementation		X



Task 2 - Local Road Collection

Currently in Progress

- Interview FHWA approved entities on Business Processes and viability
 - DOT (5)
 - Local Government (2)
 - MPOs (2)
- Develop Approach for States for All Public Roads LRS
 - Must include on-going maintenance of roadways
- Write and Deliver **Systematic Approach Report**
 - Circa November



Task 3 - LRS Components and Best Practices

Currently in Progress

- Literature Review
- Document Best Overall Practices from Task 2 respondents + private industry
- Write and Deliver **Current Best Practices Assessment Report**
 - Circa December



Task 2 + 3

Best Practices Framework

Assess States **Supply Chain Patterns**

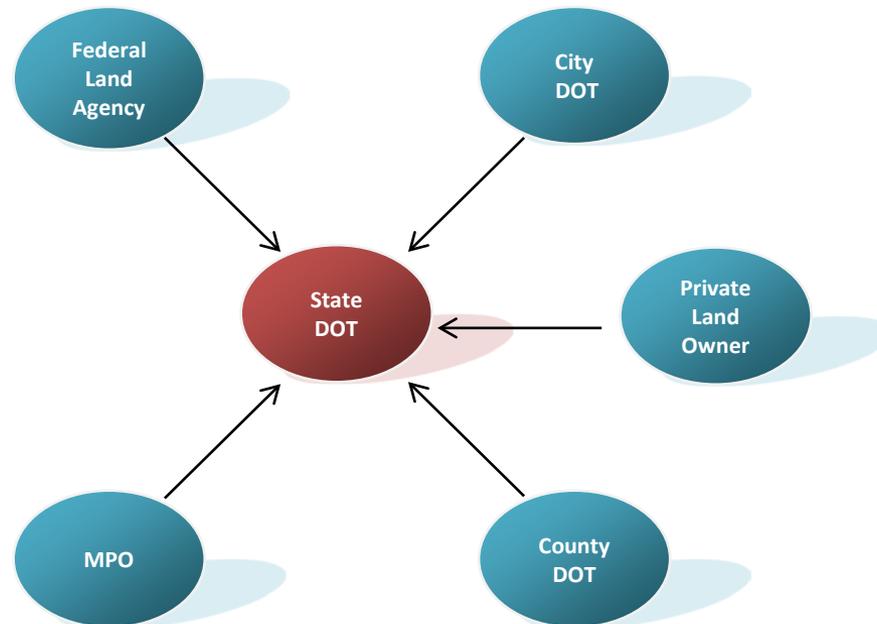
1. Local governments supply geospatial road data to the DOT
2. A third party (non-DOT) creates statewide data and supplies it to the DOT
3. Hybrid approach whereas the state gathers as much as possible from a non-DOT entity (e.g regional agency or clearinghouse), and then gets the rest from locals
4. The DOT does it all



Task 2 + 3

Supply Chain Pattern #1

Local governments supply geospatial road data to the DOT



Task 2 + 3

Supply Chain Pattern #2

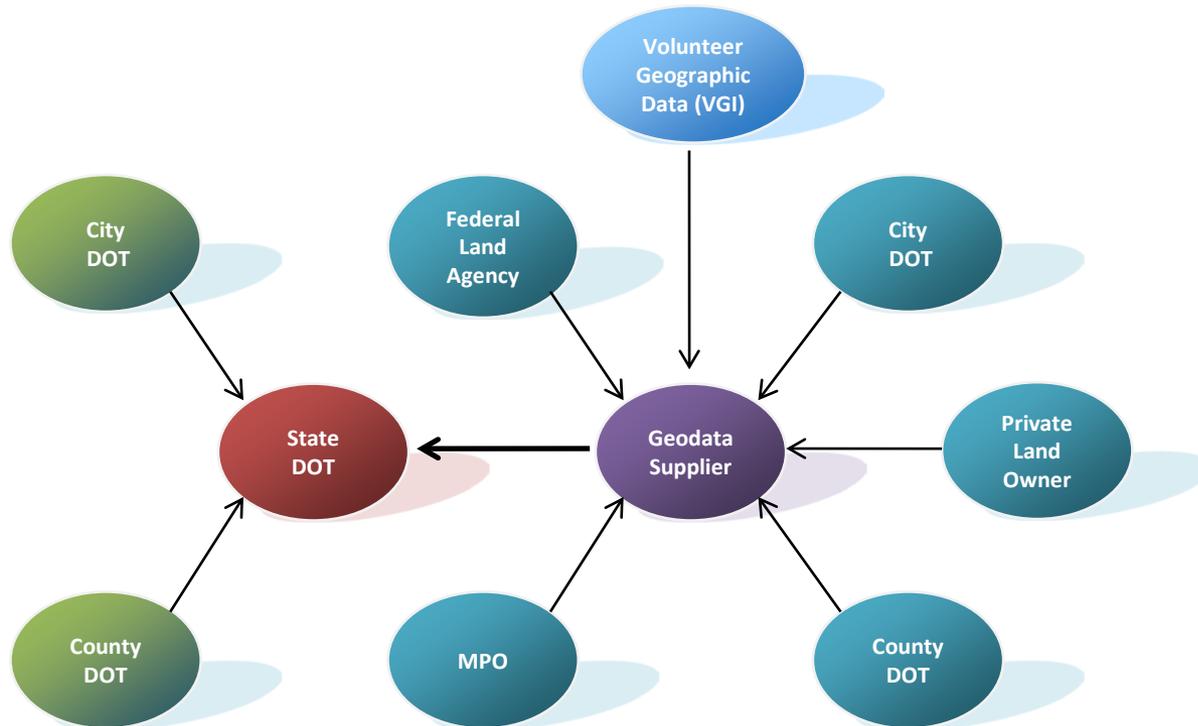
A third party (non-DOT) creates statewide data and supplies it to the DOT



Task 2 + 3

Supply Chain Pattern #3

Hybrid approach



Task 2 + 3

Supply Chain Pattern #4

The DOT does it all



Task 2 + 3

Best Practices Framework

Categorize Local Roads **Level of Maturity** using
Common **Baseline Network Requirements** (D R A F T)

Road Centerline Geometry

All public and private highways, roads and streets

Dual carriageway representation

Updated/certified annually

1:24,000 scale

Basic Road Centerline Attributes

Persistent road ID number

Road/street name

Functional Class

Year

State

Address Ranges

Right side/left side address ranges

Urban and rural addresses used for E911

LRS Control

Linear precision: 0.001 miles

Centerline Mileage Begin/ End accuracy: 0.001 miles

Network/ Linear Topology

Common topology for road network models (e.g. spatial analysis, buffering)



Task 4

Examine LRS Temporal Maintenance

- Identify mechanisms (methods, tools, best practices) for ongoing data maintenance
 - Use NCHRP 2027
- Develop recommendations informed by tasks 2 and 3
 - Consider existing cost/ benefit analysis
- Write and Deliver **Maintenance Plan Report Document**
 - Completed six (6) months after award (1/18/14)



Task 5

LRS System Components reference

- Literature review of LRS business rules based on respondents from Task 2
 - Federal
 - State (DOT)
 - Local Governments
 - MPO's
 - Private Sector
- Develop technical requirements for LRS systems
 - Research existing best practices and business rules
 - Synthesis and simplification of existing technical instruction manuals
 - Consider impact of enterprise business factors
- Write and Deliver **Technical Instructions Manual**
 - Completed eight (8) months after award (3/18/14)



Task 6

Technical Reference Manual

- Write and Deliver **Final Technical Reference Manual** summarizing Tasks 1-5
 - Quantitative Outcomes and Feasibility Assessment
 - Draft: Completed within nine (9) months of award (4/18/14)
 - Final: Completed within eleven (11) months of award (6/18/14)
- **PowerPoint presentation** about final Technical Reference Manual



Questions and Discussion

