



# *SHRP2 C20: Freight Demand Modeling and Data Improvement*

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



# Freight Demand Modeling and Data Improvement



## **SHRP2 C20 Goals:**

1. Raise awareness and build professional capacity.
2. Develop new and enhanced methods, tools and approaches.
3. Advance the state of the practice is advanced through data quality and modeling improvements and refinements.

# Implementation Assistance Program (IAP)



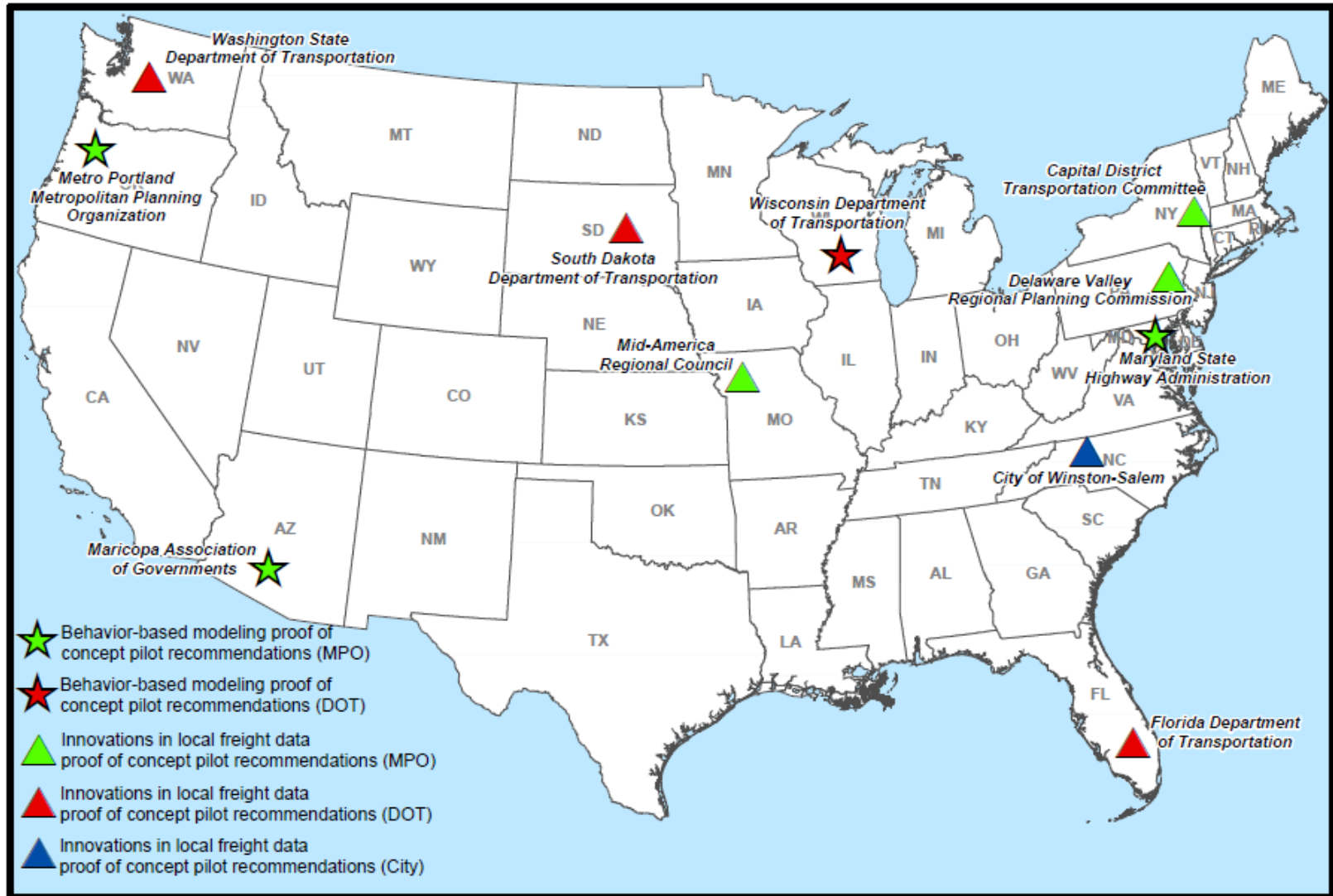
## **Innovations in Local Freight Data Pilot Assistance Program**

- Identify and adapt disparate sources of data
- Refine current data sources
- Develop new data sources on smaller geographic scales

## **Behavior-Based Freight Modeling Pilot Assistance Program**

- Advance 'tour-based' and 'supply chain' freight modeling
- Improve the understanding of decision-making by freight agents and their implications for network modeling

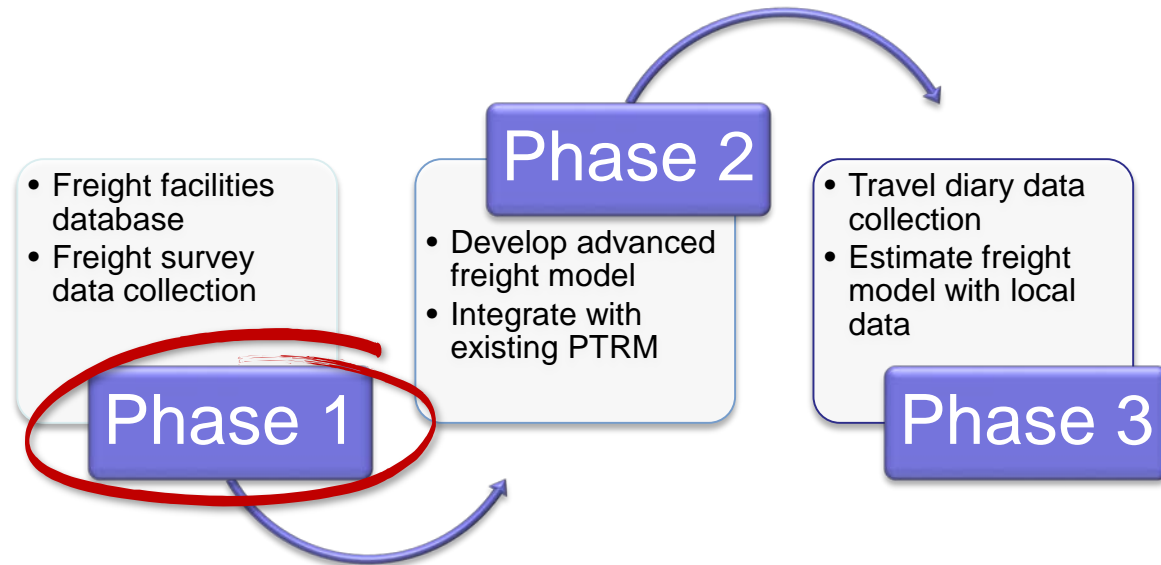
# C20: IAP Projects



# Winston-Salem MPO

## Goals

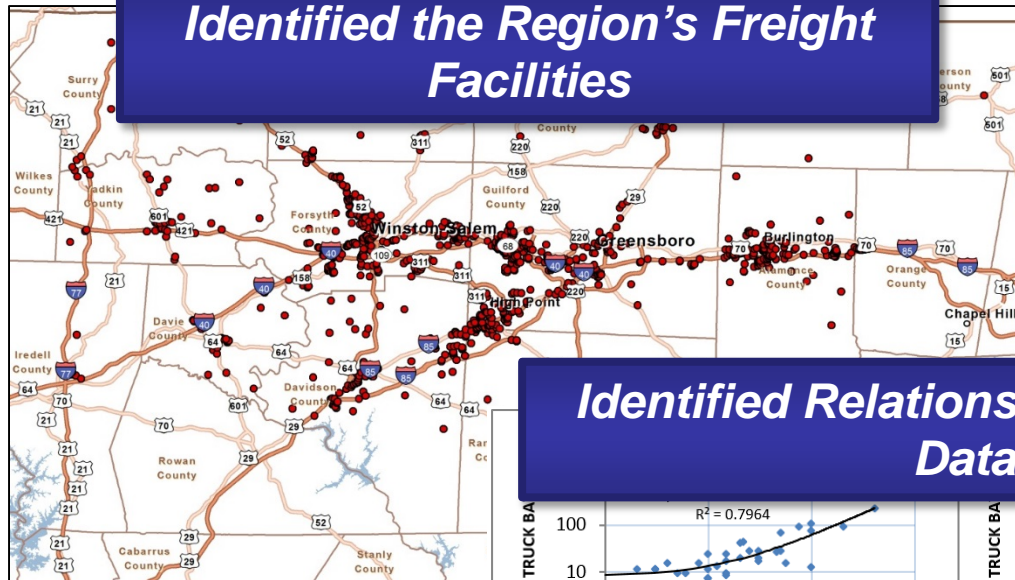
- Produce a new data source and model recommendations.
- Identify and tabulate existing freight facilities.
- Conduct a survey to collect more information on the facilities.



# Winston-Salem MPO

## Results

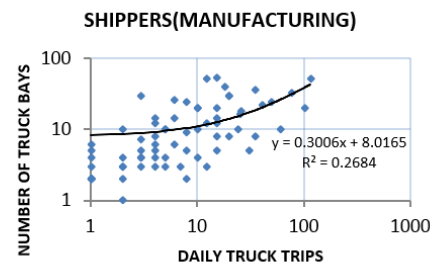
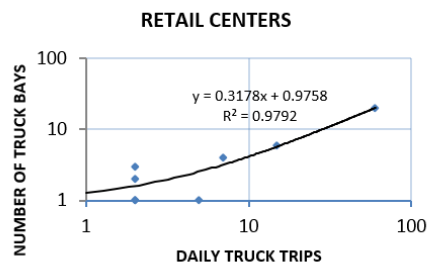
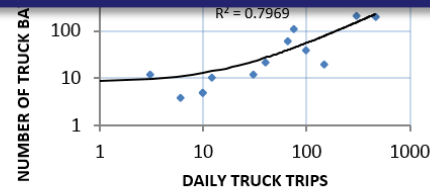
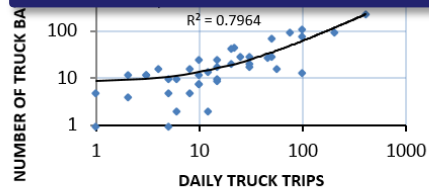
**Identified the Region's Freight Facilities**



**Developed a Freight Facility Database for the Region**

Field Name	Description
ID	TransCAD unique ID
Longitude	Record longitude
Latitude	Record latitude
RecordID	Unique record ID (matches RecordID in survey database)
Source	Source of the Freight Node data
SurveyComp	Survey completed by
Status	Type of survey administered
Name	Name of the Freight Node

**Identified Relationships within the Data**



for the Freight Node

Freight Node

the Freight Node

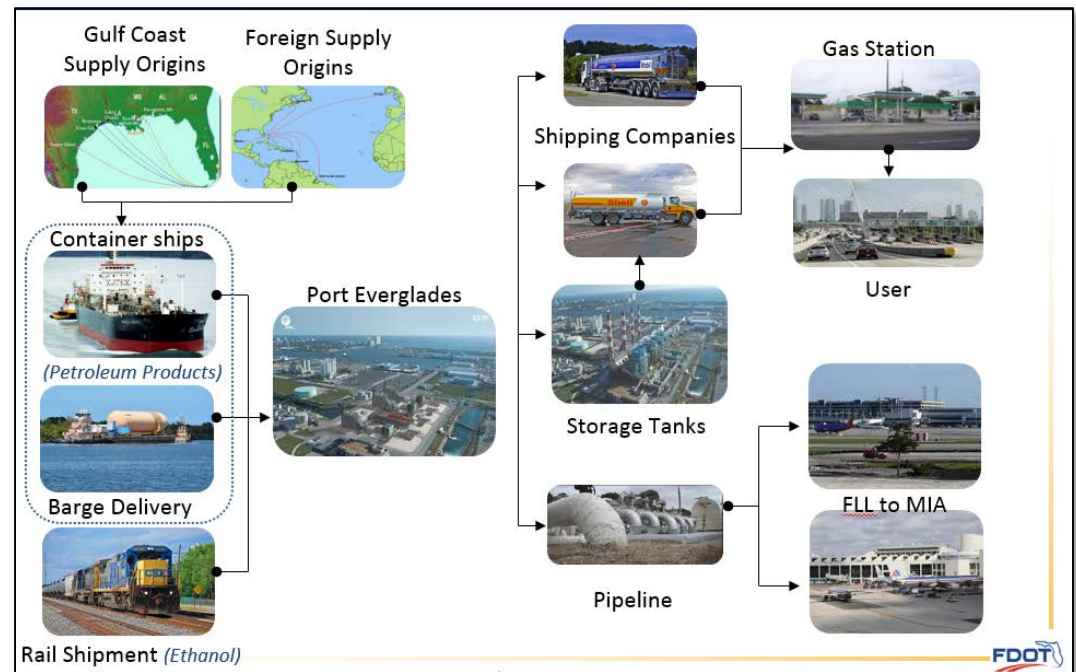
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geory (Distribution Center, Intermodal Facility, Mail

# Florida Department of Transportation

## Goals

- Identify emerging technologies that could be used for automated vehicle recognition and classification counts.
- Evaluate promising technologies and field test one or more of the most promising technologies.
- Use innovative data sources in combination with the field test data to document the petroleum supply chain in South Florida.







# South Dakota Department of Transportation

## Goals

- Gain insight into the State's highly dynamic agriculture industry and related transportation system demands.
- Augment historical trends data with unconventional data sources.
- Support freight forecasting at local and State levels.



# South Dakota Department of Transportation

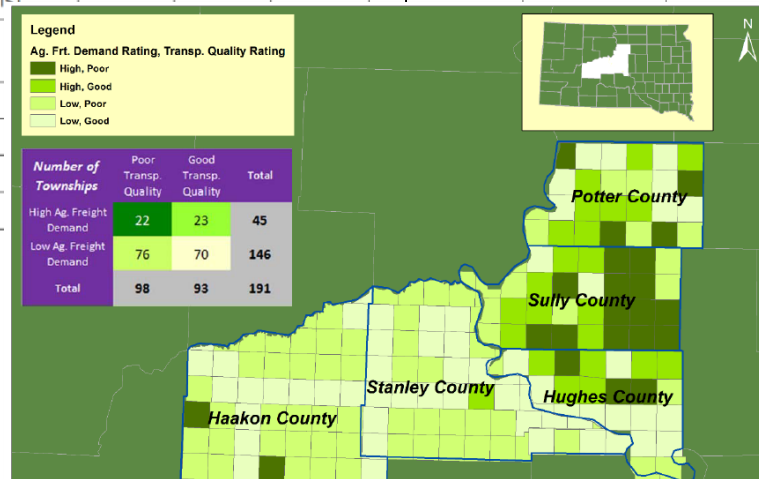
## Results

### Purposes for Improved Data (Derived from Interviews)

Potential User Purposes and Applications	SDDOT	Road Agency	Private Sector
Predict truck and rail demand (current, future)	●	●	●
Assess system condition, performance, and local impacts (e.g. surface, quality of life)	●	●	
Determine maintenance needs (e.g., surface management, resurfacing)	●	●	
Inform maintenance and design standards (e.g., bridge & surface design; geometric & structural considerations)	●	●	
Determine large investments needs (e.g., multimodal, roadway construction)			
Prioritize investments (multimodal, inform STIP)			
Aid siting or permitting of grain elevators and other facilities			
Identify primary transportation system users and beneficiaries			
Identify unintended or undesigned uses of transportation facilities			

### Identified and Assessed Potential Data Sources

State	Source	Availability	Frequency	Adjustment	Notes
	Available land for planting (acreage per area)	USDA CropScape	Yes, as user-defined area	Yes, Annual	No adjustment may not be required as changes in available land are slow
	Corn crop yield (bushels per acre)	USDA NASS	Partially Yes, Projections are national, although historical data exists at state and county level	Yes, Annual	No Further spatial and temporal adjustment may not be required as GMO improvements are slow and steady; Also, no adjustments being made for climate changes (drought, snow, etc.)

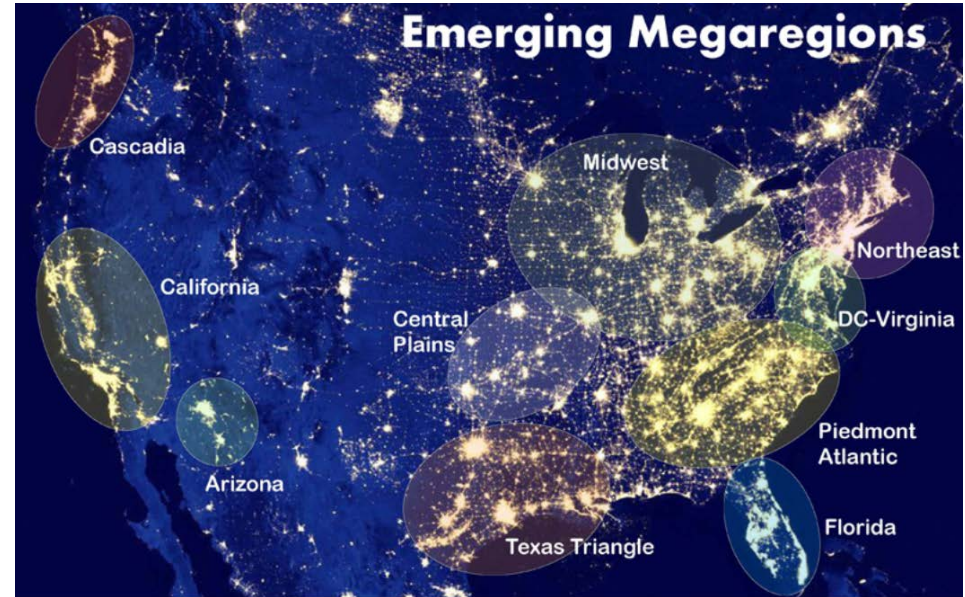


### Estimated Truck Traffic Impacts Based on Crop Production

# Maricopa Association of Governments

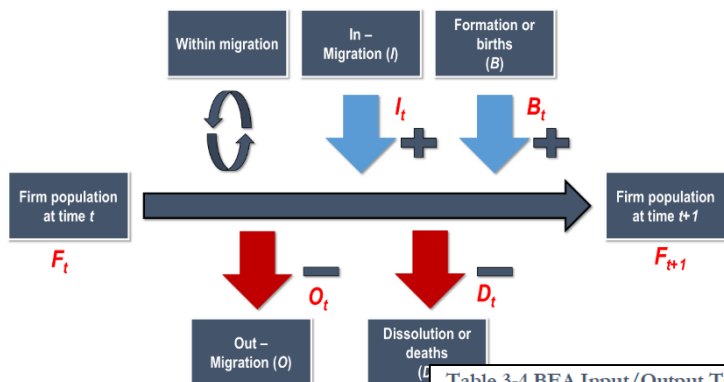
## Goals

- Develop a regional freight model that can be integrated within regional and statewide travel forecasting models.
- Emphasize a behavioral approach to model development to inform coordinated policy development and serve as an effective tool for identifying means to improve freight operations.
- Be considerate of an activity-based passenger modeling framework for MAG data in order to facilitate future integration of the models.



# Maricopa Association of Governments

## Innovative Models Capture Changing Demographics



$$F_{t+1} = F_t + B_t - D_t + I_t - O_t$$

## Operational Mega-regional Model

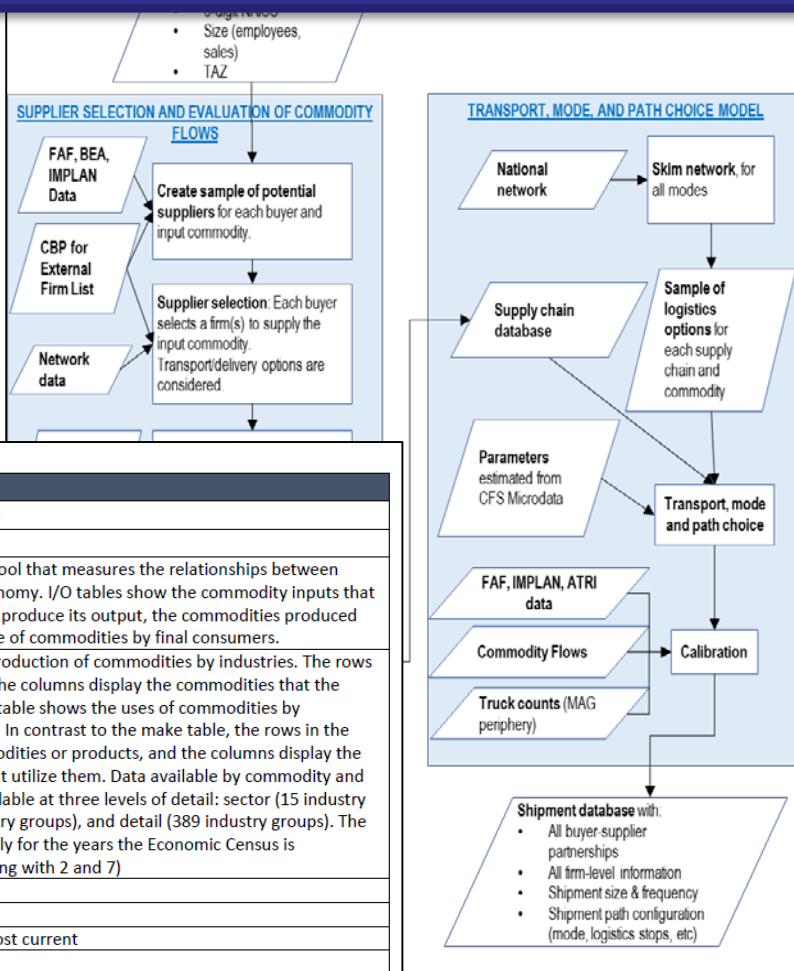


Table 3-4 BEA Input/Output Table Metadata

Name	BEA Input/Output Tables
Agency/Source	Bureau of Economic Analysis
Data Type	National Accounts
Description	I/O analysis is an economic tool that measures the relationships between various industries in the economy. I/O tables show the commodity inputs that are used by each industry to produce its output, the commodities produced by each industry, and the use of commodities by final consumers.
Data Coverage	The make table shows the production of commodities by industries. The rows present the industries, and the columns display the commodities that the industries produce. The use table shows the uses of commodities by intermediate and final users. In contrast to the make table, the rows in the use table present the commodities or products, and the columns display the industries and final users that utilize them. Data available by commodity and industry. Data generally available at three levels of detail: sector (15 industry groups), summary (71 industry groups), and detail (389 industry groups). The detail tables are available only for the years the Economic Census is conducted (in the years ending with 2 and 7)
Modes of Freight	N/A
Commodities	Based on SCTG codes
Years of Data	1997 to 2013. 2013 is the most current
Format of Data	Excel Spreadsheet

## Data Inventory

# Key Gaps

## DATA

- Skills, experience, and equipment
- Collection costs, challenges
- Licensing

## MODELING

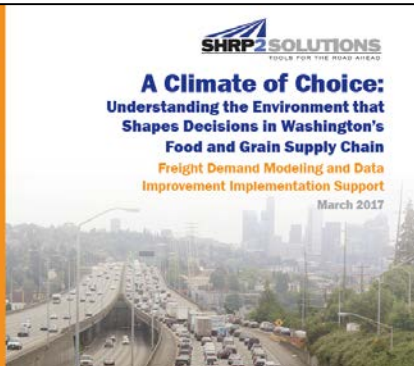
- Applicability
- Transferability and integration
- Complexity

## IMPLEMENTATION

- Moving forward from pilot projects
- No “one size fits all”

# What's Next?

CASE STUDY



**SHRP2 SOLUTIONS**  
TOOLS FOR THE ROAD AHEAD

**Farm to Markets:**  
Innovative Data Analysis to  
Enhance Agricultural Freight  
Connectivity

**BACKGROUND AND CHALLENGE**

In South Dakota, freight growth is closely linked to agricultural production. Recent advancements in plant genetics and technology have boosted production of many of the State's key crops. The South Dakota Department of Transportation (SDDOT) takes the movement of agricultural goods into consideration as it invests in expanding and improving transportation infrastructure across the State. However, the dynamic nature of the industry has complicated the use of agricultural data in transportation system decision-making.

Given the importance of agricultural products to the State, SDDOT sought and received assistance from the SHRP2 C20 program to conduct research on a framework to allow data on agriculture output to better inform transportation planning.

**APPROACH**

This project's goals include:

- Obtain an understanding of agricultural trends and issues in South Dakota.
- Obtain an awareness of existing data sources used in the State's agriculture industry.
- Develop an approach to integrate agricultural and transportation data sources.
- Test and evaluate the approach in a real-world location.
- Document the replicability of the approach for use in other agriculture scenarios and locations.

Project Type: Innovations in Local Freight Data  
Grant Recipient: South Dakota Department of Transportation  
Agency: South Dakota Department of Transportation  
Location: South Dakota  
Duration of Activity: 2014 to 2016  
Budget: \$150,000

Objective	Work Approach	Outcome
Document South Dakota agriculture trends.	Conduct literature review.	Better understanding of major agriculture trends in South Dakota as well as applicable data sources.
Identify data purposes.	Interview agriculture and transportation stakeholders.	Short and long-term purposes for improved agricultural freight data.
Define data needs and sources.	Develop a list of ideal data requirements and a list of available data sources.	List of most promising data sources and identification of existing data gaps.
Develop and test a proof of concept.	Synthesize data, identify study area, test new analytical methods, and document work products.	A transferable framework that can be used to support transportation planning questions related to agricultural activities.

Case studies

Outreach material

Self-assessment tool

Handbook

# Contact Information



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Freight\\_Demand\\_Modeling\\_and\\_Data\\_Improvement](https://www.fhwa.dot.gov/goshrp2/Solutions/All/C20/Freight_Demand_Modeling_and_Data_Improvement)