Freight Data Dictionary
Linking freight data sources across transportation modes, subjects, and geography

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The National Transportation Library
Bureau of Transportation Statistics
US Department of Transportation
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Overview

- About the National Transportation Library
- Project background
- Functions and features
- Information architecture
- Implementation
- Future development

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About NTL

Bureau of Transportation Statistics, Office of Information and Library Sciences (OILS)

Established in 1998, we provide to:

- Digital collections

- Data services

- Reference and research services

- Networking

We are an **open access** digital repository.
All items are in the **public domain** and available
for reuse **without restriction**.

NTL Mandates

- **Transportation Equity Act for the 21st Century (1998)**
  - "establish and maintain a National Transportation Library, which shall contain a collection of statistical and other information needed for transportation decision making at the Federal, State, and local levels."

- **MAP-21 (2012)**
  - Acquire, preserve and manage transportation information and information products and services for use by DOT, other Federal agencies, and the public
  - Central repository for DOT research results and technical publications
  - Central clearinghouse for transportation data and information of the Federal Government
  - Coordinate among and cooperate with multiple external parties to develop a "comprehensive transportation information and knowledge network"

- **White House Office of Science and Technology Policy memo (2013)** requiring all Executive Departments and Agencies spending more than $100 million/year on R&D to ensure public access to peer-reviewed publications and digital datasets arising from federally-funded scientific research

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Repository and Open Science Access Portal (ROSA P)

United States Department of Transportation
Bureau of Transportation Statistics

National Transportation Library

Home | Collections | Recent Additions | Public Access | Submit Content | About *ROSA P*

All Collections ▾ | Enter keyword or phrase... | **Search**

Advanced Search

BTS Products

Pocket Guide to Transportation 2018

2017 TSAR

USDOT Intelligent Transportation Systems

NHTSA - Behavioral Safety Research

BTS Products

USDOT Bureau of Transportation Statistics collection of statistical reports and data products

View this collection >>

View Archive

Put a ROSA P badge on your website
National Transportation Library

Recently Added
States' Successful Practices Weigh-in-

Most Popular
Updating the school bus standard vehicle for load

Project Background

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Project Background

A national Freight Data Dictionary is proposed that offers a centralized, controlled, authoritative vocabulary capable of supporting:

- Enhanced data inputs
- Improved accuracy, efficiency, and flexibility in freight data interchange
- Freight data analysis and interoperability across the transportation sector
- Improved analysis and decision making at all levels of government

National Cooperative Freight Research Program (NCFRP) Report 35

Implementing the Freight Transportation Data Architecture:
Data Element Dictionary

http://www.trb.org/Main/Blurbs/173083.aspx

- Identifies "readily available" data sources associated with freight.

- Provides examples of freight data uses and applications.

- Presents an inventory of data elements and glossary terms found in the selected sources into a uniform typology.

- Identifies differences in data element definitions.

- Provides metadata tools and resources to guide data users on the appropriate steps and procedures for combining data from multiple freight data sources.

Result: a searchable and sustainable web-based application containing the study findings, an inventory of freight data dictionaries, and a discussion feature to be used by practitioners to exchange ideas and information.

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Why is BTS Interested in the FDD?

- BTS is a freight and transportation statistics aggregator and publisher.
  - Several BTS products are represented in the FDD.
- BTS identified as logical host for FDD.
- FDD can provide a model architecture and platform for BTS metadata harmonization efforts.
  - In 2016 BTS launched a Data Management and Data Curation project.
- FDD provides potential model for other transportation modal data dictionaries.

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Functions & Features

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FDD Home Page
https://fdd.bts.gov/freight-data-dictionary/

United States Department of Transportation

Bureau of Transportation Statistics

Search BTS site

Freight Data Dictionary

Search keywords, dictionary terms and data elements | **SEARCH**

The Freight Data Dictionary provides recommendations for effectively using freight data, identifying and resolving differences in data element definitions, and access to over 6,300 data elements and 13,300 glossary terms from multiple freight data sources.

Click here for additional information.

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FDD Simple Search:
Origin Airport

FDD Simple Search:
Origin Airport

There are two distinct main tables in the system:
Data Dictionaries and **Glossary Terms**

(Don't squint: we will zoom in on each of these.)

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FDD Simple Search:
Origin Airport 1

Data Dictionary Number and Sources

FDD Simple Search:
Origin Airport 2

Data Dictionary Sources

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FDD Simple Search:
Origin Airport 3

Found 349 data elements from 14 data sources   Air Carrier Statistics ▼

1 **2** **3** **4** **5** ... **14**   next →

Air Carrier Statistics

Air Carrier Statistics (Form 41 Traffic) - U.S. Carriers

Data Table: T-100 Domestic Market (U.S. Carriers)

Field Name	Description	Type	Info
DestStateName	Destination Airport, State Name	Nominal	
Distance	Distance between airports (miles)	Real Number	
DestWac	Destination Airport, World Area Code	Nominal	
DestAirportID	Destination Airport, Airport ID. An identification number assigned by US DOT to identify a unique ai [less]	Nominal	
DestAirportSeqID	Destination Airport, Airport Sequence ID. An identification number assigned by US DOT to identify a [less]	Nominal	
Origin	Origin Airport	Nominal	

DestCityMarketID   Dest   OriginCityName   OriginState   OriginStateFips   OriginCityMarketID   OriginStateName   OriginWac   OriginAirportID
OriginAirportSeqID

Data Dictionary Source Table

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FDD Simple Search:
Origin Airport 4

Data Table: T-100 Domestic Market (U.S. Carriers)

Field Name	Description	Type	Info
DestStateName	Destination Airport, State Name	Nominal	
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DestAirportSeqID	Destination Airport, Airport Sequence ID. An identification number assigned by US DOT to identify a [less]	Nominal	
Origin	Origin Airport	Nominal	

DestCityMarketID Dest OriginCityName OriginState OriginStateFips OriginCityMarketID OriginStateName OriginWac OriginAirportID OriginAirportSeqID

Similar Elements | Complete Table Profile

Added Elements

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FDD Simple Search:
Origin Airport 5

Similar Elements

Similar "Place Identifier" Data Elements			Close (X)
Field Name	**Description**	**Type**	**Info**
Dest	Destination Airport	Nominal	
Origin	Origin Airport	Nominal	
DestWac	Destination Airport, World Area Code	Nominal	
OriginWac	Origin Airport, World Area Code	Nominal	
DestState	Destination State Code	Nominal	
OriginState	Origin State Code	Nominal	
DestCityName	Destination City	Nominal	
DestStateFips	Destination State FIPS (U.S. Federal Information Processing Standard Codes)	Nominal	
DestAirportID	Destination Airport, Airport ID. An identification number assigned by US DOT to identify a unique ai [...] show more	Nominal	
DestStateName	Destination Airport, State Name	Nominal	
OriginCityName	Origin City	Nominal	
OriginStateFips	Origin State FIPS (U.S. Federal Information Processing Standard Codes)	Nominal	

FDD Simple Search:
Origin Airport 6

Complete Table Profile

FDD Simple Search Example

Glossary Terms

Data Dictionaries | **Glossary Terms**

Found 81 glossary terms

1   **2**   **3**   **4**   **5**   next ›

Origin: [Glossary of Shipping Terms (Maritime Administration)]

Origin: [Transportation Expressions and Transportation Acronym Guide (BTS)]

Origin: [Transportation Expressions and Transportation Acronym Guide (BTS)]

Origin: [State of Logistics Report Glossary (CSCMP)]

Airport: [Transportation Expressions and Transportation Acronym Guide (BTS)]

Information Architecture

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Sources

- 28 sources compiled (2 commercial, the rest public)

- 6,322 total number of data elements selected

- For each data source, the minimum required entities are the data source name, a table containing the elements, and the elements themselves.

Sources

1 Air Carrier Statistics
2 Air Carrier Financial Reports
3 Annual Survey of Manufacturers
4 Border Crossing/Entry
5 CTA Intermodal Terminals Database
6 Carload Waybill Sample
7 Commodity Flow Survey
8 County Business Patterns
9 Fatality Analysis Reporting System
10 Federal Railroad Administration Safety Database
11 Foreign Trade
12 Freight Analysis Framework
13 Highway Performance Monitoring System
14 IHS Transearch

15 Motor Carrier Management Information System
16 Motor Carrier Safety Measurement System
17 National Agricultural Statistics Service
18 National Ballast Information Clearinghouse Database
19 National Corridors Analysis and Speed Tool Database
20 North American Transborder Freight Database
21 Pipeline and Hazardous Material Safety Administration
22 Service Annual Survey
23 Survey of Business Owners
24 Topologically Integrated Geographic Encoding and Referencing
25 U.S. Waterway Data
26 Vehicle Inventory and Use Survey
27 Vehicle Travel Information System
28 Woods and Poole Economics, Inc.

Classification schema

- Role-Based Classification Schema (RBCS) organizes and categorizes data elements across multiple data sources

- Top level groups derived from analyzing freight data classification schema

- Secondary level groups differentiates data elements that *identify* objects from data elements that *describe the features* of an object

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Classification schema

Primary, top level groups
- Commodity
- Event
- Humans
- Industry
- Link
- Mode
- Place
- Time
- Unclassified (elements that do not fit in other roles)

Commodities (C) generated by the industry (I) are moved by various transport modes (M) from one place (P) to another (P) along the transportation network (L) within a time period (T). During the transport process, a chain of possible events (E) may occur that involve various stakeholders or individuals (H).

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Classification schema

Secondary classification groups

- Time elements: time period for reporting or freight movement
- Place elements: O-D freight movement or event location
  – Place identifier (e.g. city name, county, state, country ... or geo point)
  – Place feature (e.g. population, area)
- Commodity elements
  – Commodity identifier (standard commodity codes)
  – Commodity feature (e.g. liquid, bulk, value)
- Link elements
  – Link identifier (e.g. roadway name, waterway name)
  – Link feature (e.g. width, length)

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Classification schema

Secondary classification groups, cont'd.

- Mode elements
  - Mode identifier (e.g. truck, rail, air, pipeline)
  - Mode feature (e.g. unit train, vehicle class)
- Industry elements
  - Industry identifier (NAICS, SIC)
  - Industry feature (e.g. number of employees, sales)
- Event elements
  - Event identifier (e.g., an accident report number, a dredging operation)
  - Event feature (e.g., number of fatalities, number of port calls)
- Human elements
  - Human identifier (e.g., investigating officer, reporting agent)
  - Human feature (e.g., drunk driver)

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Glossaries

- 13,554 terms from 13 glossaries compiled into a single glossary

- Entries include glossary terms and their definitions, link to glossary term source

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Recommended Data Types

Data Type	Description
Nominal	Values exist in name only, can be counted not measured
Binary	Values involve 2 things (e.g. yes or no, true or false)
Date/Time	Time of day, day of week or month, year, time period
Real Number	Values can be measured, can be expressed in non-whole numbers (miles, tonnage, …)
Integer	Values expressed only in whole numbers (number of trucks)
Currency	Monetary values
Ratio	Relation between 2 numbers (e.g. passenger miles per available seat miles)
Percentage	Values expressed as fraction of 100 (e.g. percentage truck traffic)
Geometry	Representation of GID data (e.g. point, line, polygon)

Implementation

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Objective

The primary goal of this acquisition was to provide the solution and services necessary for BTS to offer freight vocabulary control for transportation industry and community in the manner of efficiency, agility, innovation, and potential cost savings.

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Timeline

- BTS received the finished project from Texas University at Austin in 2015.
- BTS allocated the funding for the Migration of the System to Microsoft Azure Cloud in 2016.
- The National Transportation Library migrated the system to the DOT internal testing environment in mid-2017.
- NTL created the Project Charter, Performance Based Statement of Work (PBSW), and other related documents in late summer 2017.
- The Project was approved and funded in October 2017 for FY 2018.

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Milestones

- Setup the Freight Data Dictionary in DOT network (early 2017)

- Convert Unix based oracle to Windows based Oracle (early 2017)

- Convert Oracle to Microsoft SQL Server in Azure Cloud (mid 2017)

- Implement Azure Index to the application (mid 2017)

- Recode the application in PaaS in Azure (early 2018)

- System testing (April 2018)

- Develop Web based Public Access API (May 2018)

- Move to staging and Production environment (May 2018)

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Future

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Challenges

- FDD lacks export feature
- Units of measurement are US
- Data elements cannot be displayed individually
- Source code not available
- Search is very simple – no Boolean operators
- No user documentation
- Point of contact for each data source not identified
- Planned as a collaborative platform

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Future opportunities

- Collaborate with freight data community on governance and submission of new terms
- Forthcoming project for Federal Aviation Administration data dictionary using the same technology
- Planned enhancements: Boolean search, individual source search, download function, term suggestion form
- Outreach

Questions or comments?

ROSA P

https://rosap.ntl.bts.gov/

Freight Data Dictionary

https://fdd.bts.gov/freight-data-dictionary/

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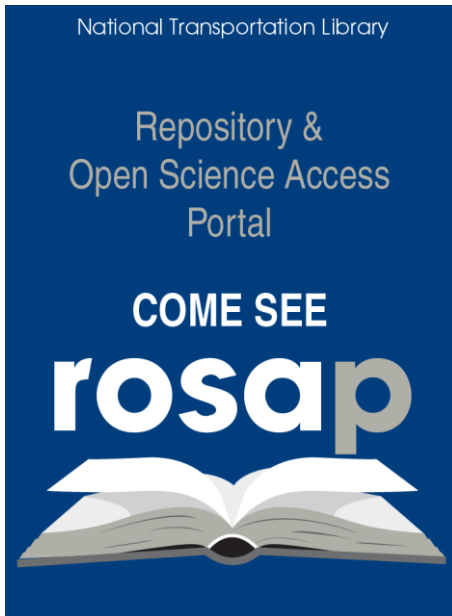
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https://transportation.libanswers.com/

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