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A Report by a Study Team of the
NATIONAL ACADEMY OF PUBLIC ADMINISTRATION

Improving Transportation Financial Statistics for the Future

A Roadmap for the U.S. Department of Transportation
Bureau of Transportation Statistics

U.S. Department of Transportation
Office of the Secretary of Transportation
Bureau of Transportation Statistics

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About the Academy

The National Academy of Public Administration (the Academy) is a non-profit, non-partisan, and independent organization of top public management and organizational leaders who tackle the nation's most critical and complex public management challenges. With a network of more than 950 distinguished Fellows and an experienced professional staff, the Academy is uniquely qualified and trusted across government to provide objective advice and practical solutions based on systematic research and expert analysis.

Established in 1967 and chartered by Congress in 1984, the Academy continues to make a positive impact by helping federal, state and local governments respond effectively to current circumstances and changing conditions. Learn more about the Academy and its work at www.napawash.org.

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Table of Contents

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Foreword

Transportation is a critical part of America's economy and society. It accounts for over $1 trillion of our GDP and provides employment to millions of people. Transportation connects Americans with their jobs, families, and fellow citizens—and with the global economy. Over the past several months, the COVID-19 pandemic has disrupted all modes of transportation and destabilized supply chains, passenger travel, and employment capacity. Now more than ever, American governments, businesses, and the public need reliable transportation statistics to make current and future decisions.

In the fall of 2019, before the COVID-19 pandemic reached America's shores, the Bureau of Transportation Statistics (BTS) charged the National Academy of Public Administration (the Academy) with developing a strategic roadmap to support the agency's effort to improve its collection and dissemination of transportation revenue, expenditure, and financial statistics. The Academy formed a study team to plan and facilitate a one-day workshop with stakeholders, conduct interviews and additional research, and develop a strategic roadmap to guide BTS' future efforts.

As a congressionally chartered non-partisan, non-profit organization with over 950 distinguished Fellows, the Academy brings nationally recognized public administration experts together to help organizations like BTS address the central challenges of our time. Throughout the project, a three-member Expert Advisory Group of Academy Fellows provided critical advice and input to the study team. I expect that the resulting roadmap will help BTS in providing the timeliest and relevant transportation financial statistics to the nation.

I wish to extend my deepest gratitude to the Academy's Expert Advisory Group, all of whom offered their invaluable insight and keen analysis, and to the professional study team that produced the roadmap. I am pleased that the Academy had the opportunity to work with BTS and its key stakeholders on this critical effort and appreciate all of their support, engagement, and insights along the way.

Teresa W. Gerton
President and Chief Executive Officer
National Academy of Public Administration

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Acronyms and Abbreviations

Acronym or Abbreviation	Definition
AASHTO	American Association of State Highway and Transportation Officials
Academy	National Academy of Public Administration
BEA	Bureau of Economic Analysis
BJS	Bureau of Justice Statistics
BLS	Bureau of Labor Statistics
BTS	U.S. Department of Transportation Bureau of Transportation Statistics
C&P Report	Conditions and Performance Report
CARES Act	Coronavirus Aid, Relief, and Economic Security Act of 2020
CBO	Congressional Budget Office
CPI	Consumer Price Index
DBFOM	Design-build-finance-operate-maintain
DOT	U.S. Department of Transportation
EAG	Expert Advisory Group
EIA	Energy Information Administration
ERS	Economic Research Service
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GARVEEs	FHWA Grant Anticipation Revenue Vehicles
GDP	Gross domestic product
GTFS	Government Transportation Financial Statistics
HCSA	BEA's Health Care Satellite Account
MOU	Memorandum of understanding
NAS	National Academy of Sciences

NASS	National Agricultural Statistical Service
NCES	National Center for Education Statistics
NCHRP	National Cooperative Highway Research Program
NCHS	National Center for Health Statistics
NCSES	National Center for Science and Engineering Statistics
NTL	Bureau of Transportation Statistics National Transportation Library
OMB	U.S. Office of Management and Budget
OPM	U.S. Office of Personnel Management
ORES	Office of Research, Evaluation, and Statistics
OST-R	U.S. Department of Transportation Office of the Assistant Secretary for Research and Technology
P3	Public-private partnership
PHMSA	Pipeline and Hazardous Materials Safety Administration
QSS	Census Quarterly Service Survey
ROI	Return on investment
SEC	U.S. Securities and Exchange Commission
SEO	Search engine optimization
SOI	Statistics of Income Division, Internal Revenue Service
SPM	Supplemental Poverty Measure
TIFIA	Transportation Infrastructure Finance and Innovation Act
TRB	Transportation Research Board
TRID	TRB's Transportation Research Database

List of Figures

List of Tables

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Executive Summary

The Bureau of Transportation Statistics (BTS), within the U.S. Department of Transportation (DOT), is embarking on a major effort to improve the publication of revenue, expenditure, and other financial statistics relevant to transportation decision makers. BTS aims to find ways to improve the timeliness of popular statistics that it already publishes, to represent public-private partnerships across modes of transportation and all levels of government, and to develop new measures that will provide the transportation community with useful insights.

BTS contracted with the National Academy of Public Administration (the Academy) to develop this high-level statistical roadmap to ensure that the nation has the transportation financial statistics necessary to adequately inform decision making and transportation stakeholders, including on issues related to public financing and public-private partnerships. Established in 1967 and chartered by Congress, the Academy is trusted across government as an independent, non-partisan institution of top policy and management leaders who tackle the most critical, timely, and challenging problems facing government and find practical, innovative solutions to major challenges.

The Academy's unique feature is its approximately 950 distinguished Fellows, who guide and lead the institution and its work. The Academy drew upon these Fellows in the development of this statistical roadmap by forming a three-member Expert Advisory Group of Academy Fellows to provide guidance to the professional study team.

The Academy team's key recommendations and action steps are highlighted in Table Executive Summary-1. Given the relatively small staff and limited resources at BTS, it is important to identify the strategies that are critical to the agency's ability to carry out its mission and require immediate actions. Among the recommended strategies, BTS' immediate priorities should be: (1) providing statistics relevant to policymakers; (2) developing explanatory materials to increase the transparency of inconsistencies; and (3) accelerating the data release process by enhancing relationships with data source agencies. In addition, the Academy team identifies some "quick win" opportunities that are relatively easy to implement and have visible impacts, including improving communication with data users and increasing data geographic granularity.

This ambitious agenda is critical for BTS to ensure that the nation has the necessary transportation financial statistics to inform the policy and management decision making of a variety of transportation actors, including policymakers at all levels of government, both now and into the future. In the midst of the devastating Covid-19 pandemic, such information will become even more important as the United States seeks to rebuild its economy and society. Because many of the recommendations in this roadmap can be applied to non-financial statistics, the Academy team encourages BTS to determine the extent to which these are relevant to its other statistical products and services. If so, this roadmap could be the start of a broader transformation of how BTS gathers and disseminates transportation statistics to the American people.

Table Executive Summary-1. Key Recommendations

RECOMMENDED GOAL FOR BTS	RECOMMENDATION	KEY ACTION STEPS
Serve as a reliable and credible data source for policymakers and other data users	*Develop and publish explanatory material to assist users with interpretation and highlight inconsistencies to increase transparency*	• Further develop BTS methodology documentation to include clear and complete explanatory material that helps users understand the agency's data definitions, terminology, and data collection assumptions, and highlight the definition inconsistencies among major data sources (e.g., crosswalks/equivalency tables). • Ensure explanatory material is available to all users in easily accessible and user-friendly formats. • Establish policies and procedures to review and update the methodology documentation/explanatory material on a regular basis.
	Accelerate data release process by enhancing relationships with data source agencies	• Establish regular communication with its current major data source agencies, such as FHWA, Census, and BEA, to build productive working relationships, streamline data collection processes, and identify opportunities to release preliminary data. • Collaborate with other agencies (such as FAA and FTA) and the broader statistical community (such as AASHTO) to explore potential alternative data sources. • Develop interagency agreements/MOU with its data sources as appropriate to formalize their partnerships. • Become part of the DOT-wide data coordinating efforts and leverage the department-wide committee to help reinforce the relationships between BTS and other DOT agencies.

RECOMMENDED GOAL FOR BTS	RECOMMENDATION	KEY ACTION STEPS
	Provide guidance on statistical products	• Develop guidance and use cases to help data users understand and effectively use BTS' current statistical products. • Provide user guidance through multiple channels, such as instruction manuals, training videos, webinars, and in-person user training sessions made available on the BTS website.
Understand the needs of data users and provide relevant statistical products or services	*Provide statistics relevant to policymakers at all levels of government*	• Implement the previous Academy Panel's recommendation to develop a communication strategy/plan. • Establish regular meetings with DOT leaders and other policymakers (including leaders at the state and local levels) to gain insight into their data needs. BTS should utilize these meetings to provide information on its current data and statistics, give policymakers the opportunity to ask questions and offer feedback, and use the feedback to inform the development of data products in the future. • Provide data and statistics in a form that can be used by policymakers who usually do not have a statistical background. • Provide on-demand consultative support and assistance to ensure that the policymakers understand how to correctly interpret and use the data to guide their decision making. • Take steps to ensure that the latest data is both available and utilized for policymakers.
	Improve communication with data users	• Connect with its data users on a regular basis through multiple mechanisms, such as advisory committees, meetings with data users, workshops and conferences, industry events, newsletters/emails, and social media messages.

RECOMMENDED GOAL FOR BTS	RECOMMENDATION	KEY ACTION STEPS
		• Redesign its website to present data in a more accessible way to different users. • Consider upgrading the search engine optimization (SEO) strategy for its statistical products so that people are more likely to come across the BTS website and statistics. • Expand its website functionality to include report customization features that allow users to filter the agency's statistical products and tailor datasets to the categories (e.g., certain years or modes of transportation) they need. • Add functionality to its website that allows users to craft data visualizations, such as charts, graphs, and maps, from the existing statistical products to further illustrate the statistics.
	Keep up with new technological development and understand their implications on data needs	• Identify its key partners in the private sector (e.g., private firms, nonprofit organizations, trade associations) in the next five years and have a strategy in place to develop relationships/collaborations with these partners. • Form an advisory group composed of experts from academia and the transportation industry to enhance the agency's ability to anticipate major challenges and identify emerging trends in the transportation field. • Utilize existing resources and mechanisms to monitor emerging areas and understand their implications on financial statistics. For example, BTS has good working relationships with TRB data committees and should explore the opportunity to build connections with other TRB committees (e.g., the technology committees), to leverage their expertise.

RECOMMENDED GOAL FOR BTS	RECOMMENDATION	KEY ACTION STEPS
		• Develop and maintain a flexible system allowing the agency to adjust its statistical products and services based on its analysis of major trends and significant technological advancements.
	Increase geographic granularity	• Expand aggregate national statistics to include more detailed information at the state level.
Promote efficient and effective data management and data use	*Increase linkages with other data sources*	• Establish MOU/interagency agreements with its data source agencies to institutionalize their partnerships. • Leverage existing mechanisms to enhance its relationships with other data sources by playing an active role on the Federal Interagency Council on Statistical Policy and the Economic Classification Policy Committee to raise the profile of BTS statistics, build relationships, and strengthen the federal statistical system. • Actively participate in the National Cooperative Highway Research Program (NCHRP)'s data standardization project. • Form and enhance its connection with the broader community such as the U.S. Chamber of Commerce, AASHTO, TRB, Aviation for America, American Statistical Association, Public Transportation Association, Build America Bureau, and so on.
	Report P3 data	• Coordinate with other agencies and organizations that provide P3 data to learn what information and data they provide and build on their existing efforts/initiatives. For example, AASHTO focuses primarily on surface transportation, and BTS could open another channel and build a similar P3 data collection in other modes of transportation.

RECOMMENDED GOAL FOR BTS	RECOMMENDATION	KEY ACTION STEPS
	Use Nontraditional Data Sources	• Leverage administrative data from state transportation departments, as appropriate; • Leverage administrative data from the Build America Bureau and other relevant federal entities; and • Work with other statistical agencies and interagency committees to learn their experiences and lessons learned in this area and identify opportunities for BTS to make greater use of data from alternative sources.

Chapter 1:   Overview

Federal statistical agencies play a vital role in providing the data and information that governments, businesses, and the public can rely on to make informed decisions. The Bureau of Transportation Statistics (BTS) within the U.S. Department of Transportation (DOT) is embarking on a major effort to improve the publication of revenue, expenditure, and financial statistics relevant to transportation decision makers. BTS aims to find ways to improve the timeliness of popular statistics that BTS already publishes, to represent public-private partnerships across modes of transportation and all levels of government, and to develop new measures that will provide the transportation community with useful insights.

BTS contracted with the National Academy of Public Administration (the Academy) to develop this high-level statistical roadmap to ensure that the nation has the transportation financial statistics necessary to inform decision making, including for issues related to public financing and public-private partnerships.

Overview of BTS

BTS was established by the Intermodal Surface Transportation Efficiency Act of 1991 to "provide timely, accurate, credible information on the U.S. transportation system, the movement of people and goods, and the consequences of transportation for the economy, society, and the environment."[1] BTS is one of the thirteen federal statistical agencies and serves as the primary source of transportation statistics including commercial aviation, multimodal freight activity, and transportation economics. [2] Each modal administration provides statistics related to their missions, and BTS was created to improve data comparability and quality. The BTS Director reports to the Assistant Secretary of Transportation for Research and Technology and, by law, serves as the senior advisor on data and statistics to the Secretary of Transportation.

As described in BTS' 2018 strategic plan, its vision is to be:

> … the preeminent source of statistics on commercial aviation, multimodal freight, and transportation economics, and provides context to decision makers and the public for understanding statistics on transportation. BTS assures the credibility of its products and services through rigorous analysis, transparent data quality, and independence from political influence. BTS promotes innovative methods of data collection, analysis, visualization, and dissemination to improve operational efficiency, to examine emerging topics, and to create relevant and timely information products that foster understanding of transportation and its transformational role in society. The Bureau's National Transportation Library (NTL) is the permanent, publicly accessible home for research publications from throughout the transportation community; the gateway to all DOT data; and the

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1. BTS, *Bureau of Transportation Statistics Strategic Plan*, July 2018.
2. "About the Bureau of Transportation Statistics," BTS, updated February 26, 2019, https://www.bts.gov/about-BTS.

help line for the Congress, researchers, and the public for information about transportation.[3]

To achieve its mission and vision, BTS provides statistical products and services to DOT and the transportation community, such as:

- Interpretive reports;
- Statistical summaries;
- Dashboards, tables, graphics, and maps;
- Applications for build-your-own tables, graphics, and maps;
- Data files;
- Guidance documents;
- National Transportation Library document collection;
- Information searching and usage aids;
- Public information service;
- Confidential Close Calls Reporting Program;
- Statistical consulting; and
- Knowledge management.

BTS is one of a number of federal agencies within the federal statistical system. This system is decentralized, with responsibility for producing data about people, economy, infrastructure, and natural resources of the United States. Other agencies within the federal statistical system include:[4]

- ***Bureau of Economic Analysis*** (BEA) (in the Department of Commerce): provides official macroeconomic and industry statistics, including the Gross Domestic Product of the United States and its various units and personal income, corporate profits, and government spending in their National Income and Product Accounts (in the U.S. Department of Commerce). According to OPM, it has 485 employees as of June 2019. In FY 17, it had 488 employees.
- ***Bureau of Justice Statistics*** (BJS) (in the Department of Justice): collects, analyzes, and publishes data relating to crime, criminal offenders, crime victims, and justice system operations in the United States. Its statistics are not listed on the U.S. Office of Personnel Management's (OPM) site. In FY17 it had 56 employees.
- ***Bureau of Labor Statistics*** (BLS) (in the Department of Labor): collects, processes, analyzes, and disseminates essential statistical data, including information on prices,

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3. BTS Strategic Plan.
4. FY17 employment statistics found in a *Washington Post* article containing a chart from Steve Pierson, American Statistical Association: https://www.washingtonpost.com/education/2020/03/31/understaffing-threatens-work-key-us-education-statistics-agency-experts-say/.
FY19 employment statistics are available at: https://www.fedscope.opm.gov/
FY18 budget statistics are available at: Office of Management and Budget "Statistical Programs of the United States Government," Fiscal Year 2018.

employment and unemployment, compensation and working conditions, and productivity. According to OPM, it has 2,201 employees as of June 2019. In FY17, it had 2,035 employees.

- **U.S. Census Bureau**: produces data about the people and the economy and conducts the decennial census and the American Community Survey, the U.S. Economic Census, and the Current Population Survey. According to OPM, it has 17,702 employees as of June 2019, growing to accommodate the decennial census for 2020. In FY17, it had 7,265 employees.

- **Energy Information Administration** (EIA) (in the Department of Energy): collects, analyzes, and disseminates energy information, including data on coal, petroleum, natural gas, electric, renewable and nuclear energy. Its statistics are not listed in OPM's database. In FY17, it had 341 employees.

- **Economic Research Service** (ERS) (in the Department of Agriculture): provides information on economic and policy issues related to agriculture, food, natural resources, and rural America, including the Agricultural Resource Management Survey. According to OPM, it has 285 employees as of June 2019. In FY17, it had 348 employees.

- **National Agricultural Statistics Service** (NASS) (in the U.S. Department of Agriculture): provides statistical information on agricultural production, economics, demographics, and the environment, including the United States Census of Agriculture every five years. According to OPM, it has 826 employees as of June 2019. In FY17 it had 1,037 employees.

- **National Center for Education Statistics** (NCES) (in the Department of Education): collects, analyzes, and publishes statistics on education and public school district finance, including international comparisons. Its statistics are not listed on OPM's database. It is estimated to have approximately 90 employees as of March 2020; in FY17, it had 52 employees.

- **National Center for Health Statistics** (NCHS) (in the U.S. Department of Health and Human Services): provides statistical information to guide actions and policies to improve the health of the American people, including the National Vital Statistics System, National Health Information Survey, National Health and Nutrition Examination Survey, and National Health Care Surveys. Its statistics are not listed in OPM's database. In FY17, it had 503 employees.

- **National Center for Science and Engineering Statistics** (NCSES) (in the National Science Foundation): provides data on the American science and engineering workforce, graduates of advanced U.S. science and engineering programs, and R&D expenditures by U.S. industry. Its statistics are not listed in OPM's database. In FY17 it had 52 employees.

- **Office of Research, Evaluation, and Statistics** (ORES) (in the Social Security Administration): provides statistical data on SSA's benefits programs, analyzes Social Security solvency proposals, and sponsors special-purpose survey data. Its statistics are not listed in OPM's database. In FY17, it had 64 employees.

- **Internal Revenue Service Statistics of Income Division** (SOI) (in the Treasury Department): provides data on American and international income and taxes. Its statistics are not listed in OPM's database. In FY17, it had 140 employees.

BTS is one of the smaller of these agencies. As of 2018, BTS staff consisted of a Director, Deputy Director, 7 office directors, a public affairs director, 2 support staff, and over 40 statisticians, economists, and specialists in geospatial data, information technology, and library science. Currently, the total number of BTS Full-Time Equivalent employees is approximately 52.

Table 1-1. Budgets and Employment Numbers of Federal Statistical Agencies

Agency	FY17 Employees	FY19 Employees from OPM	FY18 Budget ($M)
BEA	488	485	97.0
BJS	56	Data unavailable	49.9
BLS	2,035	2,201	607.8
BTS	68	52	26.0
Census	7,265	17,702	1,681.4
EIA	341	Data unavailable	118.0
ERS	348	285	76.7
NASS	1,037	Data unavailable	185.7
NCES	52	Data unavailable	330.1
NCHS	503	Data unavailable	330.1
NCSES	52	Data unavailable	56.9
ORES	64	Data unavailable	32.5
SOI	140	Data unavailable	33.6

Background on BTS Transportation Financial Statistics

BTS provides a variety of transportation statistics products and services, and its primary transportation financial statistics product is the Government Transportation Financial Statistics (GTFS), which provides transportation-related revenue and expenditures information for federal, state, and local governments and for all modes of transportation.[5] BTS publishes GTFS data and supporting documents on its website. GTFS only includes transportation revenues and expenditures from government entities and relies on such data sources as the Office of Management and Budget, the U.S. Census Bureau, the U.S. Department of Commerce's Bureau of Economic Analysis, the U.S. Environmental Protection Agency, the Air Transportation Association, the Federal Highway Administration, Federal Aviation Administration, Federal Transit Administration, Surface Transportation Board, and Saint Lawrence Seaway Development Corporation.[6] Appendix C provides a list of the data tables and visualizations published by BTS in the GTFS.

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5. Government Transportation Financial Statistics (GTFS) 2020 Release.
6. *Measurement of Government Transportation Financial Statistics 2012*, February 2012.

In the transportation financial statistics area, BTS' current role is largely limited to posting data collected by other federal statistical agencies on the BTS website. BTS for the most part does not collect its own transportation financial data, nor does it provide interpretive reports or analyses.

Study Approach and Methodology

The Academy assembled a three-member Expert Advisory Group (EAG) of Academy Fellows to direct the study. The EAG represents leading experts in the fields of transportation financial data, public finance, and public-private partnerships. The EAG held three meetings to provide guidance on the study methodology, forum planning, and the development of the strategic roadmap. Appendix A contains a short biographical sketch of each EAG member.

To inform the development of the roadmap, the Academy study team convened a one-day forum, *Improving Transportation Financial Statistics for the Future*, to solicit input from leading experts in the area of transportation finance. To prepare for the forum, the Academy worked closely with BTS to select participants from a range of stakeholder groups including federal and state governments, nonprofit organizations, academia, and the private sector, with expertise related to transportation, economics, statistics, and public finance (Appendix B provides a list of forum participants and their affiliations). Additionally, the Academy study team conducted telephone interviews and discussions with a number of BTS officials and knowledgeable individuals to receive their insights on transportation financial data priorities, data gaps, and potential improvements and identify issues that warrant discussion at the forum (Appendix B provides a list of interviewees). Moreover, in consultation with BTS, the Academy study team developed the forum agenda and read-ahead packages and shared the meeting materials with forum attendees in advance of the forum.

Twenty-four participants attended the forum on January 28, 2020. Over the course of the day, forum attendees participated in a series of large group discussions, breakout sessions, and interactive activities. The Academy study team facilitated discussions on three primary topics:

- Current state and data gaps of transportation financial statistics,
- Future state of transportation financial statistics (transportation financial statistics that meet the needs of public decision makers and others), and
- Potential improvements that ensure the nation has the transportation financial statistics necessary to inform decision making.

When prioritizing the potential improvements, the Academy study team asked participants to place the potential improvements on an action priority matrix, basing the potential improvement's position on the effort required and resulting impact. Figure 1-1 below is the matrix participants used at the forum.

Figure 1-1. Action Priority Matrix

Quick Wins Low Effort High Impact	**Transformational Efforts** High Effort High Impact
Momentum Builders Low Effort Low Impact	**Distractions** High Effort Low Impact
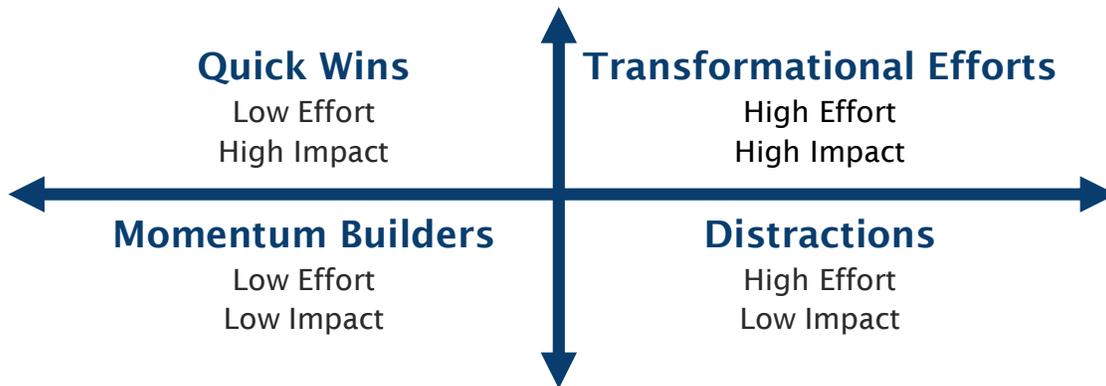
The strategic advice participants gave largely lied in the "Quick Wins" and "Transformational Efforts" categories, which informed the Academy's development of the recommended strategy for BTS.

Following the forum, the Academy study team produced a forum key takeaway document and circulated the draft document with BTS and EAG members to solicit their feedback, which is incorporated into the roadmap as appropriate. The Academy study team also delivered the key takeaways to forum participants.

After the workshop, BTS authorized a second phase of the project in which the study team conducted additional primary and secondary research to supplement the workshop findings and proposed recommendations. Based on this research and advice from the EAG, the Academy study team developed this high-level roadmap that includes three key elements discussed in more detail in subsequent chapters:

- Current state of transportation financial statistics,
- Data gaps, and
- Strategy moving forward.

Chapter 2: Current State of Transportation Financial Statistics

Through research, the Academy study team identified the following sources of major transportation financial statistics used by transportation policymakers, decision makers, and researchers. These sources are summarized in Table 2-1.

Table 2-1. Major Sources of Transportation Financial Statistics

U.S. DOT Conditions and Performance reports	U.S. Department of Transportation's Conditions and Performance reports (C&P Reports) provides Congress and government decision makers an overview of the "physical conditions, operational performance, and future capital investment needs of highways, bridges, and transit systems."[7] C&P Reports rely on the performance and financial data from state and local governments and public transit operators.
Federal Highway Administration (FHWA) Highway Statistics	FHWA publishes an annual report providing statistics on motor fuel, motor vehicle registrations, driver licenses, highway user taxation, highway mileage, travel, and highway finance[8] (revenue, debt obligations for highways, apportionments, obligations, and expenditures).
Pipeline and Hazardous Materials Safety Administration (PHMSA) data	PHMSA provides a variety of statistics, including pipeline performance measures, hazardous materials incident statistics, and hazardous material registration statistics, to help improve industry performance and prevent hazardous material transportation incidents, accidents, injuries, and fatalities.[9]
Transportation Infrastructure Finance and Innovation Act (TIFIA)	The TIFIA website provides detailed and timely information on TIFIA projects (project costs, funding sources, TIFIA credit assistance detail, financial status, etc.).
Congressional Budget Office (CBO) data	CBO periodically publishes reports to provide statistics on federal, state, and local government

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7. *Conditions and Performance Report, 23rd Ed.*, U.S. Department of Transportation Federal Highway Administration and Federal Transit Administration, 2019.

8. *Highway Statistics Series*, FHWA, 2018.

9. Data and Statistics, PHMSA. https://www.phmsa.dot.gov/data-and-statistics/pipeline/data-and-statistics-overview

	spending on transportation and water infrastructure. CBO's reports focus on two types of spending: capital and operation & maintenance. CBO recently issued a report on Public-Private Partnerships for Transportation and Water Infrastructure (January 2020).
U.S. Energy Information Administration (EIA)	EIA provides a wide range of financial market analysis and financial data and projections, such as Market Prices and Uncertainty Charts; Electric Sales, Revenues, and Average Price (annual reports); and Financial Review of Global Oil and Natural Gas Industry.
U.S. Department of Treasury Financial Report of the United States Government	These Treasury annual reports provide a number of financial indicators, including unaudited cash flows and trust fund data.
Thomson Reuters SDC and Debt Statistics	Thomson Reuters SDC provides information on bond and equity new issues, M&A, syndicated loans, project finance, etc.
P3 Bulletin	P3 Bulletin provides information on public-private partnerships (projects, policies, news, in-depth market reports) in the U.S., Canada, and Latin America.
U.S. Security and Exchange Commission's (SEC) Electronic Municipal Market Access (EMMA) database	SEC's EMMA, which is operated by the Municipal Securities Rulemaking Board, is the official database of municipal securities data and disclosure documents. This database includes data on municipal bonds, taxable bonds, and private activity bonds through the reported municipal disclosure documents. The database offers market data on the real-time prices at which the bonds are bought and sold. Additionally, EMMA includes data on the municipal securities' interest rates and information on general market trends—including transportation trends. The gathered information on bond issuances, including on how the municipality backs the bond, demonstrates a municipality's funding stream for transportation infrastructure.

After identifying the major sources of transportation financial statistics participants use or are familiar with, the forum participants identified the questions they need or would like transportation financial statistics to answer:

- How much is spent on transportation (by mode, region, and purpose)?
- What are the national trends in transportation investment and transportation costs (by mode and type of cost)?
- What is the accurate level of investment (public versus private) in public-private partnerships (P3s)?
- What are the sources of investment capital?
- Who incurs costs by the type of cost?
- What are the impacts of transportation investments?
- How can costs be linked to project outcomes?
- What is the user cost versus benefit?

In the Phase II research, the study team spoke to interviewees about which specific government data sources they use for transportation financial statistics:

Government Sources
- [Bureau of Economic Analysis National Income accounts and other data](#) – BEA publishes data related to government expenditures and investments.
- [FHWA Grant Anticipation Revenue Vehicles (GARVEEs)](#) – FHWA publishes data on GARVEEs, which are securities issued when a project's funding is anticipated in the form of a federal-aid grant.
- [Transportation Research Board (TRB) Standing Committee on Managed Lanes](#) – the TRB standing committee releases data on preferential lane facilities, including managed lane and high-occupancy vehicle tolls.
- [TRB Joint Subcommittee on Public Private Partnerships](#) – this Transportation Research Board subcommittee will occasionally publish data related to the topics it covers, including public-private partnerships, the economics of pricing, parking pricing, and risk and resilience assessment and planning.
- [TRB Standing Committee on Economics, Revenue, and Finance](#) – the Transportation Research Board will publish financial data in its [Transportation Research Database](#) (TRID).

The study team found that many of those interviewees, particularly from the private sector, utilize private sector sources (some of which are provided by paid subscription services):

Private Sector Sources
- [Moody's and S&P (private data)](#) – Moody's Global Infrastructure Finance Group assesses credit risk and rates debt issued by both private and public financiers.
- Data held by [KPMG](#), [Deloitte](#), and similar financial market participants/consultants – Private sector financial firms may occasionally highlight select financial data in their reports.

- [Inframation News](#) – The Inframation Group offers a paid service that provides quarterly transactional information on transportation infrastructure projects. This information may be used to compare projects.

Chapter 3: Data Gaps

The Academy study team's research identified multiple gaps in transportation financial statistics that could limit the ability of decision makers to make informed decisions. Based on the findings from the workshop, interviews, and documentary research, the Academy study team found there are two major categories of data gaps: qualitative data gaps and data point gaps.

These gaps, as well as other findings from the study team's research, were used to inform the development of the recommendations for BTS. Those recommendations are found in Chapter 4: Recommended Actions for Moving Forward.

Lack of P3 Data

Forum participants and interviewees highlighted the lack of data on public-private partnership (P3) investment, though there was no consensus about the need for BTS to report transportation financial statistics on such investment arrangements. Regardless, P3s are a funding arrangement for some transportation infrastructure and therefore warrant merit. P3s play an important role in transportation financing because they present an opportunity for governments to involve private entities in financing an infrastructure project that expands their capacity to improve existing infrastructure or build new infrastructure.

Not surprisingly, the prevalence of P3 arrangements varies by mode of transportation given their different funding structures:

- Some modes of transportation, such as highways, are built and maintained almost entirely by state and local governments. Transit systems are largely owned and operated by local government agencies.
- Other modes, such as pipelines and railroads, are almost entirely privately funded. Freight transportation is privately funded, while passenger trains such as a commuter rail are publicly funded. Amtrak trains, such as the Northeast Corridor train, are quasi-public meaning that there is a mix of public and private funding.
- Other modes are a combination of public and private funding. Airports, for example, are funded by both public and private funding for investment and operations, while aircraft are privately funded and operated and air traffic control is entirely federally funded and operated.
- Ports are also funded by a mix of public and private investment, but most waterways are publicly funded, and vessels are mostly all privately funded.

Across all modes, the number of transportation infrastructure P3s is still small relative to all transportation projects funded by the government. It may be important for some users of BTS statistics to have reliable, systematic P3 data, but the importance of that data likely depends upon the mode of transportation.

Statistics on P3s may allow policymakers to allocate resources more effectively, but perhaps only if the data is presented at the aggregate level for certain modes of transportation. Conversely,

some private sector groups and possibly some states may desire project-level P3 data, yet they may seek that data from niche paid sources that provide usable comparisons on similar projects.

There is a lack of data in the extent of both public and private investment in P3s and the breakdown of the investment by the types of P3s, modes, and financial sources. This data gap is a gap in actual data points, as a comprehensive picture of P3 data is not presently available. Some of the key questions related to the P3 investment data gap include:

- How big are the P3 expenditures, investments, and revenues and how fast are they growing?
- What types of P3s are growing the most and in what modes?
- How could BTS incorporate P3s in its current data structure without double counting?

Just as there is variation in definitions for revenues and expenditures, definitions vary in the data that sources report on P3s. These arrangements can vary by what activities are included. Two of the main arrangements are the design-build-finance-operate-maintain (DBFOM) agreement and the long-term lease.[10] As different arrangements, the components vary as well, but when sources present statistics, it is not always clear what P3 arrangement is involved.

In addition, there is a major gap in understanding P3 financing issues beyond those involving federal funding. Private-sector data is not always publicly available as private entities have a proprietary interest to protect their financial data that they are not required to share. By making all relevant financial information publicly available, companies may lose their competitive advantage and lose business to a competitor, and therefore may not be willing to share that information.

No singular data source compiles either aggregate or all P3 project-level data; however, there are some paid subscription sources that offer selected project information. BTS' GTFS only reflects financial flows to and from government entities and does not include transportation expenditures or revenues from the private sector. BEA captures private sector transportation financial flows in the national income accounts, but with much less detail. There is also uncertainty about how the BEA data treats public-private partnerships and other forms of alternative funding and financing for transportation.

Lack of Data Uniformity and Consistency

Data uniformity and consistency become a significant concern especially when data are collected from multiple sources. A number of workshop participants and interviewees emphasized the challenges related to the lack of data uniformity and consistency, which is a qualitative data gap in nature. For example, there is a lack of uniformity in:

- Spending data by stages of the spending process;
- Sub-state geographic area data reporting;

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10. Mallet, William J., *Public Private Partnerships (P3s) in Transportation*, Congressional Research Service, November 2017.

- Calendar year versus fiscal year data;
- Historical inflation measures; and
- Economic impact analysis (by mode).

Participants also highlighted the lack of consistency in output metrics (for example, $ per mile, vehicle rides, and so on), treatment, and the definitions of funding versus finance across tables and series. While inconsistency in definitions may affect BTS' ability to uniformly define terms across the public and private sectors, BTS is not alone in facing this problem. At the point in the data supply chain where BTS receives the transportation financial data from other sources, the data has likely been collected from 50 state departments of transportation, all of whom likely have varying definitions to a degree. Reconciling these differences in transportation financial statistics poses a challenge to BTS, although, with the release of GTFS, BTS publishes a document outlining their methodology, which includes a glossary of terms as BTS defines them.[11]

Timeliness of Data

Timeliness of data is critical in policymaking because data that is not current is not useful in assessing the current financial state of transportation infrastructure or government spending and revenues. BTS officials and other stakeholders involved with this study expressed concerns about the timeliness of transportation financial statistics. BTS compiles data that originates in other entities and is at the end of a long supply chain of information. For example, most highway revenue statistics come from the Federal Highway Administration (FHWA), the Office of Management and Budget, the U.S. Census Bureau, and the Bureau of Economic Analysis, all of which collect data from various sources. Each participant in this data supply chain ultimately operates on their own timelines because they collect their data from other entities and sources such as state departments of transportation, reports, and tax information, and then process the data before the data is accessible to BTS. Any delay along this supply chain will postpone progress being made towards BTS releasing more current transportation financial statistics compromising data from state-level departments of transportation.

This data gap is qualitative in nature, as it is a systemic issue affecting many statistical partners in the data supply chain. BTS officials noted that it is critical to speed up the process by going more directly to the sources of information; however, BTS currently does not have significant relationships established with source organizations.

Other Data Gaps

Other data gaps identified by forum participants and the study team's research include:

- Lack of capital expenditure statistics;
- Lack of connections between financial data and other types of transportation data; and
- Lack of statistics on return on investment.

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11. *Measurement of Government Transportation Financial Statistics 2012.*

Some of these data gaps are systematic, such as return on investment, because no singular entity puts forth the statistics as it may not be useful to most when presented at the aggregate level. However, the data gap of a lack of capital expenditure statistics was mentioned frequently by interviewees because the expenditure statistics currently published do not make the distinction between capital expenditures and operating and maintenance expenditures. Additionally, the many data sources early on in the data supply chain, such as states' departments of transportation, may vary in their inclusion of certain activities in operating expenditures versus capital expenditures. However, states define disbursement the same way.

Some interviewees noted that there are statistics not currently published that may contribute to a gap in the full picture of transportation finance. Two of the missing statistics mentioned by interviewees and workshop participants include the subsidy associated with the cost of a passenger mile by mode of transportation and the breakdown of revenue and expenditure data by passenger rail and freight rail.

Data Gaps Related to COVID-19

Transportation as an industry is altered by national emergencies, as has been seen throughout recent decades. In addition to drastically changing the way of life in the United States, COVID-19 has altered normally predictable trends in transportation, such as miles flown or revenue earned by gas taxes and tolls, as peoples' behavior has been altered by the pandemic. The demands for certain financial statistics may change, especially as entities involved in transportation financing may find themselves reporting different revenues and expenditures than in the past.

While revenues from travel have decreased, there has been a surge of spending from the federal government into the transportation industry. Signed into law on March 27, 2020, the Coronavirus Aid, Relief and Economic Security (CARES) Act contains billions of dollars for transportation-related areas, including $25 billion for public transit agencies and $10 billion for the Airport Improvement Program.[12] With the outlays that result from the CARES Act comes a need to understand the financial health of transportation industries. In the recovery effort, policymakers may request statistics that demonstrate the financial standing of entities that received financial support from the government.

While COVID-19 has altered the transportation industries' financial standing in the short-term, these industries will likely continue to see changes in both people's behavior and financing over the long-term. Modes of transportation that are largely reliant on passengers for revenue, such as public transit and air, may see a decline in the number of passengers traveling until there is a significant improvement in the country's ability to handle the pandemic. Additionally, COVID-19 may cause governments to consider innovative financing mechanisms, such as public-private partnerships, as they feel the financial strain of the pandemic. Going forward, the United States may see an increased desire to understand how COVID-19 impacted transportation industries,

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12. "Coronavirus Aid, Relief, and Economic Security (CARES) Act," Federal Transit Administration, https://www.transit.dot.gov/cares-act; "2020 CARES Act Grants, Airports," Federal Aviation Administration, https://www.faa.gov/airports/cares_act/

how funding from the government contributes to those industries' recovery, and how the revenues and expenditures of these industries change.

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Chapter 4: Recommended Actions for Moving Forward

This chapter highlights a number of short-term and long-term strategies to further build the BTS capacity to provide reliable, relevant transportation financial statistics to inform policy decision making. These strategies were developed based on input from transportation finance experts during the one-day forum and the study team's interviews with knowledgeable individuals.

Guided by the Federal Data Strategy and best practice literature,[13] the study team identified a set of principles that are critical for an effective federal statistical agency. These principles provide an analytical framework that guides the study team's research and development of recommendations (see Table 4-1 below).

Table 4-1. Analytical Framework

Principles	BTS Roadmap Strategies Moving Forward
1. **Serve as a reliable and credible data source for policymakers and other data users**	• Develop and publish explanatory material to assist users with interpretation and highlight inconsistencies to increase transparency. • Accelerate data release process by enhancing relationships with data source agencies. • Provide guidance on statistical products.
2. **Understand the needs of data users and provide relevant statistical products or services**	• Provide statistics relevant to policymakers at all levels of government. • Improve communication with data users. • Keep up with new technological development and understand their implications on data needs. • Increase geographic granularity.
3. **Promote efficient and effective data management and data use**	• Increase linkages with other data sources. • Report P3 data. • Use nontraditional data sources.

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13. *Principles and Practices for a Federal Statistical Agency*, Sixth Edition, National Academies of Sciences; GAO reports

Given BTS' relatively small staff and limited resources, it is important to identify the strategies that are critical to the agency's ability to carry out its mission and require immediate actions. Among the recommended strategies, BTS' immediate priorities should be: (1) providing statistics relevant to policymakers; (2) developing explanatory materials to increase the transparency of inconsistencies; and (3) accelerating the data release process by enhancing relationships with data source agencies. In addition, the Academy study team identifies some "quick win" opportunities that are relatively easy to implement and have visible impacts, including improving communication with data users and increasing data geographic granularity.

Each of these recommendations is described in more detail below.

4.1 Recommendations for Improving the Quality of Transportation Financial Statistics

Develop and Publish Explanatory Material to Assist Users with Interpretation & Highlight Inconsistencies to Increase Transparency

As discussed in Chapter 3, the lack of data consistency is one of the major gaps identified by the Academy's research. According to interviewees, data inconsistency is a common challenge in the federal statistical community, as many agencies rely on data from multiple external sources and therefore do not have much direct control over data design and collection. As some interviewees described, the root cause of data inconsistency is the "definition gap." Each data source has its own collection model with different rules, formats, data definitions, and categories. One example mentioned by several interviewees is that the transportation expenditure estimates from different sources do not match because they define "capital expenditures" in different ways.

Other statistical agencies have taken actions to address this inconsistency challenge. For instance, the Census Bureau collects transportation financial statistics from state governments, each of which has its own data collection system. As part of its data collection process, the Census reviews the definitions used by each and reconciles differences based on Census' standards. Interviewees emphasized the importance of setting up internal data standards for a statistical agency. While it may require some initial investment to establish such a system, it does not require much effort to maintain it.

Given the decentralized nature of the federal statistical community, there are no silver bullet solutions to data standardization. As the "integrator of diverse information sources"[14] in the transportation community, BTS has the responsibility to improve data consistency and ensure data quality. There are some efforts underway within BTS/DOT to improve data consistency. For example, BTS is working with the DOT Office of Chief Information Officer, under the Foundations for Evidence-Based Policymaking Act, to form a DOT-wide data committee to increase collaboration across the department and strengthen the connections among various DOT datasets. Several interviewees emphasized the value of government-wide and/or department-

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14. *BTS Strategic Plan.* Page 6.

wide data standards and guidelines. While BTS has the authority to issue guidance,[15] the Academy study team recognizes that it is a challenging task that requires long-term efforts and the cooperation of the operating administrations of the Department/other government agencies.

Moving forward, in the short term, BTS should:

- Further develop BTS methodology documentation to include clear and complete explanatory material that helps users understand the agency's data definitions, terminology, and data collection assumptions, and highlight the definition inconsistencies among major data sources (e.g., crosswalks/equivalency tables).
- Ensure explanatory material is available to all users in easily accessible and user-friendly formats.
- Establish policies and procedures to review and update the methodology documentation/explanatory material on a regular basis.

In the long-term, BTS should build on existing initiatives and work with key stakeholders—for example, other DOT agencies, other statistical agencies, and the U.S. Office of Management and Budget (OMB)—to establish comprehensive centralized data guidance and further promote data standardization.

Accelerate Data Release Process by Enhancing Relationships with Data Source Agencies

Multiple interviewees expressed frustration with the timeliness of BTS data. BTS officials explained that it often takes so long to produce data largely due to the agency's data collection process. The agency is at the end of a long supply chain of information—that is, BTS collects data and statistics that originates from various sources, including other modal administrations and statistical agencies, each of which has its own procedures and schedules. The data can be years old by the time they reach BTS from other sources, which is not always the most suitable to policymaking.

Several interviewees shared their experiences in developing collaborative relationships with source entities to speed up the data release process. For example, BEA used to receive Census' Quarterly Service Survey (QSS) results when they put out the third version of gross domestic product (GDP) estimates, which is too late for many data users. To accelerate the process, BEA worked with the Census to receive an advanced report of QSS, which allows BEA to revise its GDP estimates in a timelier manner.

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15. 49 U.S. Code § 6302. Bureau of Transportation Statistics

Bureau of Economic Analysis (BEA) and the U.S. Census
BEA has taken actions to collaborate with other statistical agencies that serve as its data intermediaries. For example, in order to improve the quality of its advance GDP estimates, BEA collaborated the Census Bureau (the Census) to accelerate the release of the Census' business inventory data and international trade data. Additionally, BEA and Census are exploring the opportunities to accelerate the release of the Census' quarterly service survey data to improve the accuracy of early consumer spending estimates. The BEA's strategic plan highlights the importance of strengthening BEA-Census relationships and identifies a number of ways to further build relationships, such as providing BEA/Census employees formal opportunities to share information (e.g., briefings, training) and hosting regular meetings between BEA and Census. (Source: *BEA Strategic Plan*)

Bureau of Labor Statistics (BLS) and U.S. Census
The Census Bureau, in collaboration with the Bureau of Labor Statistics (BLS), produces the Supplemental Poverty Measure (SPM) to expand the official poverty measure. The initial set of SPM was issued in 2011 based on a series of recommendations from an Interagency Technical Working Group, consisting of representatives from BLS, the Census, the Economics and Statistics Administration, the Council of Economic Advisers, the U.S. Department of Health and Human Services, and OMB. The Census and BLS updates the SPM annually, and the ninth SPM report was published on the Census' website in October 2019.

Some interviewees suggested that BTS establish interagency agreements or memoranda of understanding (MOUs) with its data source agencies to institutionalize and strengthen collaborations. In response, BTS officials noted that the agency currently has three interagency agreements with the Census and an interagency agreement with BEA on the use of BTS data (transportation satellite accounts). In addition, there are some ongoing efforts within the department to coordinate data activities across all modes of transportation. For instance, DOT is in the process of establishing a transportation data council in response to the Foundations for Evidence-Based Policymaking Act of 2018.

Moving forward, to enhance the timeliness of its transportation financial statistics, BTS should:

- Establish regular communication with its current major data source agencies, such as FHWA, Census, and BEA, to build productive working relationships, streamline data collection processes, and identify opportunities to release preliminary data.
- Collaborate with other agencies—such as the Federal Aviation Administration (FAA) and the Federal Transit Administration (FTA)—and the broader statistical community (such as the American Association of State Highway and Transportation Officials (AASHTO)) to explore potential alternative data sources.
- Develop interagency agreements/MOU with its data sources as appropriate to formalize their partnerships.

- Become part of the DOT-wide data coordinating efforts and leverage the department-wide committee to help reinforce the relationships between BTS and other DOT agencies.

Provide Guidance On Statistical Products

Effective practices research suggests that statistical agencies should provide up-to-date, complete information about the main concepts and definitions, data limitations, data sources, data collection methods, and assumptions, and planned and potential uses of data.[16] Similarly, forum participants and interviewees noted that it is useful for statistical agencies to explain not only how their statistics are collected and compiled, but also how the statistics are valuable to data users. For example, some interviewees suggested that BTS provides guidance on how users can take BTS transportation financial statistics as a starting point and develop their own models. It is helpful to develop use cases that provide real-life examples of how to use the statistics/data to make data-driven decisions and solve problems.[17]

Moving forward, BTS should:

- Develop guidance and use cases to help data users understand and effectively use BTS' current statistical products.
- Provide user guidance through multiple channels, such as instruction manuals, training videos, webinars, and in-person user training sessions made available on the BTS website.[18]

4.2 Strategies for Providing Relevant Statistical Products and Services

Provide Statistics Relevant to Policymakers at All Levels of Government

Relevant statistics and data serve as the foundation for effective policy decisions. Understanding which financial statistics are useful to the DOT leadership would help BTS produce more relevant statistical products. It is important for BTS to maintain effective and regular meetings with DOT leaders to ensure that BTS' products align with the priorities of the Department and promote an organizational culture that values data. In an earlier Academy study for DOT's Office of the Assistant Secretary for Research and Technology (OST-R), an Academy Panel recommended that

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16. *Principles and Practices for a Federal Statistical Agency.*

17. For example, the Census Bureau Economic Programs provide use cases to demonstrate how industries and organizations can use Census statistics. https://www.census.gov/programs-surveys/economic-census/guidance/data-uses.html

18. For example, the Bureau of Labor Statistics conducts various conferences for data users and other outreach to promote BLS products. BEA hosts webinars and provides videos to help users better understand BEA data products.

BTS develop a communication strategy/plan to ensure that OST-R leaders are informed of the status of all BTS programs and products,[19] and this recommendation remains relevant.

Moving forward, BTS should:

- Implement the previous Academy Panel's recommendation to develop a communication strategy/plan.
- Establish regular meetings with DOT leaders and other policymakers (including leaders at the state and local levels) to gain insight into their data needs. BTS should utilize these meetings to provide information on its current data and statistics, give policymakers the opportunity to ask questions and offer feedback, and use the feedback to inform the development of data products in the future.
- Provide data and statistics in a form that can be used by policymakers who usually do not have a statistical background;
- Provide on-demand consultative support and assistance to ensure that the policymakers understand how to correctly interpret and use the data to guide their decision making.
- Take steps to ensure that the latest data is both available and utilized for policymakers.[20]

Improve Communication with Data Users

In addition to policymakers, BTS has a broader mission to serve the transportation community, including researchers, industries, and the public. A number of interviewees mentioned they are not familiar with BTS data and desire more regular communications from the agency.

Moving forward, to increase the awareness of BTS statistics and understand their data needs, BTS should:

- Connect with its data users on a regular basis through multiple mechanisms, such as advisory committees, meetings with data users, workshops and conferences, industry events, newsletters/emails, and social media messages. For example, a number of forum participants emphasized the value of developing models to show the financial impacts of transportation (e.g., return on investment (ROI)). BTS should engage in regular conversations with public, private, and nonprofit organizations to understand what foundational statistics are needed for stakeholders to build their own models and financial projections.

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19. *Organizational Assessment of the Department of Transportation's Office of the Assistant Secretary for Research and Technology*, National Academy of Public Administration, October 2018, p. 29,
https://www.napawash.org/uploads/Organizational_Assessment_of_OSTR.pdf.
20. This ties into the timely data recommendations in the previous section. Policymakers typically operate under short time constraints and do not find outdated data useful.

The BTS website is an important communication channel for agencies to present information and raise awareness of their services. Several interviewees and forum participants expressed their concerns that the BTS website is difficult to navigate, and the search function is less intuitive. It is difficult for users, especially those who are not familiar with BTS, to find the information they need.

Moving forward, BTS should:

- Redesign its website to present data in a more accessible way to different users.
- Consider upgrading the search engine optimization (SEO) strategy for its statistical products so that people are more likely to come across the BTS website and statistics.
- Expand its website functionality to include report customization features that allow users to filter the agency's statistical products and tailor datasets to the categories (e.g., certain years or modes of transportation) they need.
- Add functionality to its website that allows users to craft data visualizations, such as charts, graphs, and maps, from the existing statistical products to further illustrate the statistics.

Although adding new website functions would require some reallocation of internal resources, it would increase the website's user-friendliness and could be a model for non-financial statistics provided by BTS. In the release of 2017 GTFS data tables, BTS unveiled a few maps and charts to visually represent some of the transportation financial statistics they collect.[21] Some of these visualizations allow the user to select which modes of transportation or which year of GTFS data to include. While the inclusion of these 2017 GTFS visualizations has been a significant improvement over the 2016 GTFS publication, additional visualizations with greater customization, such as by the level of government or the states included in the visualization, would strengthen the presentation of BTS data and statistics. BTS already uses the Tableau software in varying capacities and should consider expanding the use of this software to provide data visual representations.

To address the resource issue, BTS should utilize fellows and interns with data science backgrounds to build out visualization tools. This recommendation is not limited to just

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21. Government Transportation Financial Statistics 2020 Release.

transportation financial statistics but could be a good pilot to determine how the usefulness of all statistical products that BTS publishes could be improved over the long-term.

EXAMPLE OF WEBSITE FUNCTIONALITY

Statistics Canada
Statistics Canada, releases similar tables to those contained in the Government Transportation Financial Statistics (GTFS) tables released by BTS. Their table of transportation expenditures by mode of transportation (Table 23-10-0264-01, for example), similar to the BTS GTFS *Table 4A- Federal Transportation Expenditure by Mode*, allows users to customize the table to include only the level of geography (province or territory), mode, type of expenditures, and reference period they choose. This high level of customization allows users to create the time series table to suit their needs by only including the statistics they seek. Statistics Canada has similar customization tools on many of its other statistical tables.

Census Bureau
The Census Bureau's website provides a variety of interactive applications to facilitate data access. For example, the *2010 Census: Redistricting Data Map* provides an interactive map widget that shows 2010 census data by state. In addition, the Census also provides various data tools, such as the American Housing Survey Table Creator, that allow users to filter the agency's statistics and create customized tables based on their own needs.

Keep up with New Technological Development and Understand Their Implications on Data Needs

To provide relevant transportation financial statistics, it is critical for BTS to keep up with the major changes in emerging areas of transportation—for example, autonomous vehicles, charging stations, and electric cars—and anticipate and prepare for changes in financial data needs. Monitoring the development of new technologies and practices and understanding their implications on data needs should become part of the agency's regular process. The private sector tends to move faster than the government in adopting technology innovations, and BTS should collaborate with the private sector companies/organizations to leverage their expertise to enable more rapid response to changing data needs. For example, some interviewees suggested that BTS reach out to companies developing autonomous vehicles to understand their perspective on future financial data needs.

Moving forward, BTS should:

- Identify its key partners in the private sector (e.g., private firms, nonprofit organizations, trade associations) in the next five years and have a strategy in place to develop relationships/collaborations with these partners.
- Form an advisory group composed of experts from academia and the transportation industry to enhance the agency's ability to anticipate major challenges and identify emerging trends in the transportation field.
- Utilize existing resources and mechanisms to monitor emerging areas and understand their implications on financial statistics. For example, BTS has good working relationships

with TRB data committees and should explore the opportunity to build connections with other TRB committees (such as the technology committees), to leverage their expertise.

- Develop and maintain a flexible system allowing the agency to adjust its statistical products and services based on its analysis of major trends and significant technological advancements.

Increase Geographic Granularity

Many workshop participants and interviewees from both the public and private sectors expressed an interest in greater geographic granularity in BTS financial statistical products. Breaking statistics down into smaller geographic levels, such as the state, county, or local level, would improve the usability of BTS statistical products. Some interviewees point out that gathering data from localities (counties, cities, and towns) is not as straightforward, and it is difficult to produce statistics that are usable and also make geographical sense, as the geographical boundaries of localities and special districts vary by state.

BTS currently provides some state-level revenue and expenditure data based on Census information on state and local transportation finance. Moving forward, to further improve the usability of its products, BTS should expand its aggregate national statistics to include more detailed information at the state level.

4.3 Strategies to Develop Partnerships

Increase Linkages with other Data Sources

It takes continuous efforts to build effective collaborations, BTS needs to strengthen its collaboration with the data functions of other modal agencies and federal statistical agencies to improve the quality and usefulness of BTS' statistical products, share practices and lessons learned, and avoid unnecessary duplication. While each modal administration offers mission-specific statistics, BTS was established to provide transportation data and statistics from a more holistic perspective.[22] This recommendation aligns with the President's Management Agenda: "*Connect Data Functions Across Agencies: Establish communities of practice for common agency data functions (e.g., data management, access, analytics, informatics, and user support) to promote efficiency, collaboration, and coordination.*"[23]

Moving forward, BTS should:

- Establish MOU/interagency agreements with its data source agencies to institutionalize their partnerships.
- Leverage existing mechanisms to enhance its relationships with other data sources by playing an active role on the Federal Interagency Council on Statistical Policy and the

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22. *Organizational Assessment of the Department of Transportation's OST-R*, National Academy of Public Administration.
23. *Federal Data Strategy 2020 Action Plan*, Office of Management and Budget, 2020.

Economic Classification Policy Committee to raise the profile of BTS statistics, build relationships, and strengthen the federal statistical system.

- Actively participate in the National Cooperative Highway Research Program (NCHRP)'s data standardization project.[24]
- Form and enhance its connection with the broader community such as the U.S. Chamber of Commerce, AASHTO, TRB, Aviation for America, American Statistical Association, Public Transportation Association, Build America Bureau, and so on.

Report P3 Data

As discussed in Chapter 3, there is a major gap in understanding the extent of P3 investment. The Academy study team heard different views on the role of BTS in reporting P3 data. While some interviewees highlighted the lack of information on P3 investment and indicated that BTS should expand its statistics to fill this gap, some asserted that P3 investment has a growing role in the area of transportation but only accounts for a small portion of the total transportation investment, so BTS should not dedicate resources to expanding its statistics to include P3s in the short term.

P3 arrangements are currently in focus given the ability to stretch public funds further, and they could become even more common in the midst of the fiscal challenges facing governments at all levels in the midst of the COVID-19 pandemic. The P3 arrangement represents an innovative funding mechanism that expands the capacity of governments. In 2017, public investment in new transportation infrastructure private investment ($105.5 billion) was 25.5 percent less than it was in 2002 ($142.2 billion).[25] Conversely, private investment in new infrastructure has grown. In 2018, a number of states introduced statutes (24 states enacted broad statutes and 13 states and 2 U.S. territories enacted limited statutes) that authorized public-private partnerships to carry out transportation infrastructure projects.[26] With COVID-19 straining government budgets, there is a stronger case than ever before that BTS provides information on P3s, as policymakers will likely want them to play a more active role in supporting transportation infrastructure projects.

Interviewees noted that there are some data sources that provide project-level P3 data (e.g., TIFIA), and there is a major gap in understanding P3 financing issues at a more aggregate level. It is critical for policymakers to access aggregate P3 data in order to assess the effectiveness of P3 investments and take action when necessary. As the DOT's statistical agency, BTS has the responsibility to provide data and information that enable policymakers at all levels of government to make more informed decisions.

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24. The purpose of this initiative is to develop tools and guidance for improving transportation data integration and sharing. TRB, AASHTO, and DOT are involved in this project, and as some interviewees suggested, BTS could consider participating in this effort to define transportation data standards.

25. "Transportation Economic Trends 2018 – Value of Investment in Transportation Infrastructure and Other Assets," Bureau of Transportation Statistics, 2018, https://www.bts.gov/transportation-economic-trends/tet-2018-chapter-8-infrastructure-assets.

26. *Government Transportation Financial Statistics 2020 Release.*

As a starting point, BTS should coordinate with other agencies and organizations that provide P3 data to learn what information and data they provide and build on their existing efforts/initiatives. For example, AASHTO focuses primarily on surface transportation, and BTS could open another channel and build a similar P3 data collection in other modes of transportation.

Use Nontraditional Data Sources

Leading practices research highlights the value of using nontraditional data sources to supplement traditional survey data, such as administrative records and private sector data sources (i.e., "big data"). Leveraging administrative data and private sector data allows agencies to increase their data collection efficiency, improve data quality, and minimize respondent burden.[27] Many statistical agencies, such as Census and BEA, have taken actions to leverage alternative data sources to strengthen data quality, improve the cost-efficiency of federal statistical products, and meet the demand for more timely information.

Some interviewees noted that state transportation departments are a potential source for BTS to access administrative data (for example, the Census Bureau relies on the administrative records from the state governments). Another potential source is the Build America Bureau whose administrative records could be used by BTS.

Moving forward, BTS should:

- Leverage administrative data from state transportation departments, as appropriate;[28]
- Leverage administrative data from the Build America Bureau and other relevant federal entities; and
- Work with other statistical agencies and interagency committees to learn their experiences and lessons learned in this area and identify opportunities for BTS to make greater use of data from alternative sources.

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27. *GAO-12-54 Federal Statistical System: Agency Can Make Greater Use of Existing Data but Continued Progress is Needed on Access and Quality Issues*, GAO, February 2012.

28. The Census Bureau has made effective use of various administrative records from state governments. BTS could work with Census to identify leading practices and lessons learned in this area.

EXAMPLES OF FEDERAL STATISTICAL AGENCIES USING NON-TRADITIONAL DATA SOURCES

Bureau of Economic Analysis (BEA)

BEA has implemented a number of initiatives to leverage private sector data to enhance its statistical products. For example, BEA's Health Care Satellite Account (HCSA) provides two sets of disease-based health care spending data. One set of HCSA statistics relies on the data from the Medical Expenditure Panel Survey,[1] while the other set compiles data from multiple government and private data sources. According to its strategic plan, BEA is exploring opportunities to further collaborate with private sector data sources (e.g., using health care claims data). Additionally, BEA plans to use bank transaction data to improve consumer spending statistics, the Department of Transportation data to improve international trade estimates, private sector housing price data and census bureau data on rents to improve housing services estimates, and automobile registration data to improve motor vehicle purchases statistics. (*Source: BEA Strategic Plan* P.7)

Bureau of Labor Statistics (BLS)

BLS has undertaken several pilot projects to leverage nontraditional data sources to supplement its traditional sample survey data to produce the Consumer Price Index (CPI). For example, BLS uses software to automatically collect prices and products information from various websites. Two examples of the agency's web-scraping data efforts are collecting motor fuel price data from crowd-sourcing websites and collecting web-based airline fares data.[1] To ensure that alternative data meet the requirement of CPI, BLS has developed procedures and standards to evaluate alternative data sources, make methodological adjustments, and determine the best way to incorporate the data into CPI. (Source: https://www.brookings.edu/wp-content/uploads/2019/02/Big-Data-in-the-U.S.-Consumer-Price-Index.pdf)

Appendices

Appendix A: Expert Advisory Group and Study Team Biographies

Expert Advisory Group

Peter (Jack) Basso*. Peter (Jack Basso) Principal of Peter J. Basso and Associates, a transportation financing and government affairs consulting firm. Senior advisor, WSP. Former Chief Operating Officer, AASHTO; former Assistant Secretary for Budget and Programs and Chief Financial Officer, U.S. Department of Transportation (DOT); former Director of Fiscal Services, Federal Highway Administration; Assistant Director for General Management, U.S. Office of Management and Budget; Deputy Chairman for Management, National Endowment for the Arts.

Doug Criscitello*. Managing Director, Grant Thornton LLC, Public Sector; Former Executive Director, Golub Center for Finance & Policy, Massachusetts Institute of Technology; Chief Financial Officer, U.S. Department of Housing & Urban Development; Executive Director, J.P. Morgan Securities.; Director, New York City Independent Budget Office; Chief Financial Officer, U.S. Small Business Administration; Budget Examiner, Housing, U.S. Office of Management and Budget; Budget Analyst, Congressional Budget Office.

Joyce Wilson*. Chief Executive Officer, Workforce Solutions Upper Rio Grande. Former City Manager, City of El Paso, Texas; Deputy County Manager and Chief Operations Officer, Arlington County, Virginia; City Administrator, City of Yuma, Arizona; Assistant City Manager and Chief of Staff, City of Richmond, Virginia.

Study Team

Joseph P. Mitchell, III, *Director of Strategic Initiatives and International Programs; Project Director*. Dr. Mitchell leads the Academy's Grand Challenges in Public Administration initiative, which is working to address the most challenging issues facing government over the next decade. He leads the Agile Government Center along with Academy Fellows from the IBM Center for the Business of Government; advances cutting edge thought leadership; and develops partnerships with other good government groups, American universities, and universities in other countries. He has worked with a wide range of federal cabinet departments and agencies to develop higher-performing organizations, implement organizational change, and strengthen human capital and teams. Previously, he led and managed the Academy's organizational studies program, providing oversight to all of its congressionally-directed and agency-requested reviews and consulting engagements. He holds a Ph.D. from the Virginia Polytechnic Institute and State University, a Master of International Public Policy from the Johns Hopkins University School of Advanced International Studies, a Master of Public Administration from the University of North Carolina at Charlotte, and a B.A. in History from the University of North Carolina at Wilmington.

Chloe Yang, *Senior Research Analyst*. Ms. Yang is a Senior Analyst at the Academy. Since joining the Academy in 2009, Ms. Yang has worked on projects with a range of federal and state

agencies, including the Oklahoma Corporation Commission, the National Science Foundation, Office of Management and Budget, U.S. Coast Guard, and the Government Accountability Office. Before joining the Academy, Ms. Yang was the research intern at the Foundation of Environmental Security and Sustainability. She is a Ph.D. candidate at George Mason University, from which she also holds an MPA degree. She also holds a bachelor's degree in Financial Management from the Renmin University of China.

Elise Johnson, *Research Associate.* Ms. Johnson joined the Academy as a Research Associate in 2019 and has supported projects for the National Oceanic and Atmospheric Administration and the State Chamber of Oklahoma Research Foundation. She is currently also engaged on two independent assessment projects, for the Office of Personnel Management and for the Office of Space Commerce within the Department of Commerce. She graduated in May 2019 from the University of Maryland, earning a B.A. in Public Policy and a B.A. in Government and Politics.

James Higgins, *Research Associate.* Mr. Higgins joined the Academy as a Research Associate in March 2020. He currently supports the Academy's strategic initiatives, including its Grand Challenges in Public Administration campaign. He holds a Master's in Global Policy from the University of Maine's School of Policy and International Affairs and a B.A. in International Studies from Dickinson College.

Appendix B: List of Workshop Participants and Interviewees

Workshop Participants

- **Jack Basso,** Academy Fellow and Expert Advisory Group Member
- **Gregg Bucci**, Volpe National Transportation Systems Center, DOT
- **Jason Chute,** National Economic Accounts Directorate, Bureau of Economic Analysis
- **Alex Clegg,** AASHTO
- **Doug Criscitello,** Academy Fellow and Expert Advisory Group Member
- **Jeff Davis,** Eno Center for Transportation
- **Mort Downey,** Mort Downey Consulting, LLC
- **Jonathan Gifford,** George Mason University Center for Transportation Public-Private Partnership Policy
- **Susan Howard,** AASHTO
- **Joung Lee,** AASHTO
- **Daniel Morgan,** Office of the Chief Information Officer, DOT
- **Steve Owens,** U.S. Census Bureau
- **Catherine Reddick,** Mercator Advisors, LLC
- **Clarissa Smith,** Federal Highway Administration
- **Austill Stuart,** Reason Foundation
- **Mark Sullivan,** Center for Innovative Finance Support, DOT
- **Darren Timothy,** Office of the Chief Economist, DOT
- **Liz Willhide,** U.S. Census Bureau
- **Joyce Wilson,** Academy Fellow and Expert Advisory Group Member
- **Bingxin Yu,** Office of Transportation Policy Studies, DOT

Bureau of Transportation Statistics Workshop Participants

- **Patricia Hu,** Director
- **Rolf Schmitt,** Deputy Director
- **Stephanie Lawrence,** Director, Office of Statistical and Economic Analysis
- **Ken Notis,** Economist
- **Bob Armstrong,** Economist

National Academy of Public Administration Workshop Facilitators

- **Terry Gerton,** President and CEO
- **Joe Mitchell,** Director of Strategic Initiatives and International Programs; Project Director
- **Chloe Yang,** Senior Research Analyst
- **Elise Johnson,** Research Associate

Individual Interviews

- **Lillian Borrone***, Academy Fellow
- **Kyle Brown**, U.S. Bureau of Economic Analysis
- **Greg Bucci**, U.S. DOT Volpe Center
- **Jason Chute**, U.S. Bureau of Economic Analysis
- **Patrick DeCorla-Souza,** FHWA Center for Innovative Finance Support
- **Ed DeSeve***, National Academy of Public Administration Fellow
- **Mort Downey***, Academy Fellow
- **Jonathan Gifford**, George Mason University Center for Transportation Public-Private Partnership Policy
- **Bryan Grote**, Mercator Advisors
- **Walter Kemmsies**, JLL
- **Joung Lee**, AASHTO
- **Will Nicolls**, U.S. Bureau of Economic Analysis
- **Steve Owens**, U.S. Census Bureau
- **Alan Pisarski**, Alan E. Pisarski Consultancy
- **Nancy Potok***, Former Chief Statistician of the United States
- **Catherine Reddick**, Mercator Advisors
- **Rolf Schmitt**, Deputy Director of the U.S. Department of Transportation Bureau of Transportation Statistics
- **Steve Van Beek**, Steer Group
- **Penelope Weinberger**, AASHTO

Academy Fellow

Appendix C: List of Transportation Finance Data Tables BTS Publishes

As part of the Government Transportation Financial Statistics (GTFS), the Bureau of Transportation Statistics (BTS) publishes the following data tables:

- Transportation Revenue and Expenditure by Mode (current dollars)
- Real Transportation Revenue and Expenditure by Mode (chained 2012 dollars)
- Transportation Revenue by Level of Government, Type and Mode (current dollars)
- Real Transportation Revenue by Level of Government, Type and Mode (chained 2012 dollars)
- Transportation Expenditures by Level of Government and Mode (current dollars)
- Real Transportation Expenditures by Level of Government and Mode (chained 2012 dollars)
- Federal Transportation Expenditure by Mode, Federal (current dollars)
- Transportation Expenditure by Mode, Federal (chained 2012 dollars)

BTS publishes several visualizations, which include a map and a number of charts. The GTFS publication includes some of the items listed below, while BTS publishes others as an effort to grow the transportation finance statistical products on the website.

- Public Private Partnership Legislation by State
- Revenue Allocated for Transportation Trends, Federal Government by Mode
- Revenue Allocated for Transportation Trends, State and Local Governments by Mode
- State Expenditures Allocated to Transportation
- Total Revenue Allocated for Transportation
- Transportation Expenditure Trends, Federal Direct
- Transportation Expenditure Trends, State and Local Government Including Federal Transfers by Mode
- Transportation Expenditures (total federal, state, and local government using current and chained 2012 dollars)
- Government Transportation Revenue and Expenditures (current dollars)
- Transportation Revenue and Expenditures by State and Local Governments and Mode
- Transportation Trust Fund, Airport Airways
- Transportation Trust Fund, Harbor and Inland Waterways
- Transportation Trust Fund, Highway

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Appendix D: Selected Sources

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