

Transportation Research Board
Special Report 304

How We Travel

A Sustainable National Program for Travel Data

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NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES

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How We Travel

A Sustainable National Program for Travel Data

Committee on Strategies for Improved Passenger and Freight Travel Data

Transportation Research Board

Committee on National Statistics

NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES

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This report has been reviewed by a group other than the authors according to the procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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Preface

Today's transportation system poses a host of complex problems for policy analysis and decision making that have broad implications for travel data requirements and funding. Travel data are used for a wide range of purposes—as a way to track travel trends and plan for facility investments, as a key component of apportionment formulas for federal funding, as input for state and regional transportation planning models, and as the denominator in calculating crash rates for many transportation modes. In addition, decision makers at all governmental levels are being asked to take on new responsibilities, such as tracking the energy use and greenhouse gas emissions from motor vehicle travel. Moreover, the next reauthorization of surface transportation programs is likely to place significant emphasis on performance management that will require new metrics with which to measure and monitor the performance of the transportation system. Reliable travel data will be essential to meet these new needs as well. At present, however, travel data collection activities are scattered throughout the U.S. Department of Transportation, other federal agencies, state and local governments, and the private sector, while funding for existing travel data programs and key travel surveys is uneven and often unpredictable.

These concerns motivated the Executive Committee of the Transportation Research Board (TRB) to initiate the study documented in this report. The study charge was to assess the state of passenger and freight travel data at the federal, state, and local levels and to make recommendations for an achievable and sustainable system for estimating personal and freight travel to support public and private transportation planning and decision making. To carry out this charge, TRB and the Committee on National Statistics (CNSTAT), both of the National Research Council (NRC), formed a committee of 14 experts. The committee was chaired by Joseph L. Schofer, Professor of Civil and Environmental Engineering and Associate Dean of the Robert R. McCormick School of Engineering and Applied Science at Northwestern University. The committee included members with expertise in passenger and freight travel data and analysis, data collection methods and statistics, data management and use, public policy, and performance measurement. TRB, together with the U.S. Department of Transportation¹ and the American Association of State Highway and Transportation Officials, through the National Highway Cooperative Research Program, provided the funding for the study.

The committee approached its task by reviewing earlier studies of transportation data needs, holding informational briefings at its meetings, and drawing on the expertise of its members. The briefings were a primary source of input. At its first and second meetings, the committee heard from travel data providers and users about the state of travel data, key gaps in data content, and suggestions for improving the management and funding of travel data programs. At its third meeting, the committee was briefed by experts on new technologies and alternative methods for collecting data, who drew on domestic and foreign experience to examine opportunities for gathering data differently and more cost-effectively. The committee would like to thank all those who provided these briefings, whose names are listed in Appendix B. The committee would also like to thank Rolf Schmitt of the Federal Highway Administration,

¹ Both the Office of Highway Policy Information of the Federal Highway Administration and the Research and Innovative Technology Administration, which is responsible for the Bureau of Transportation Statistics, provided funding.

Thomas Bolle of the Research and Innovative Technology Administration, and Thomas Palmerlee and Nanda Srinivasan of TRB for sharing their knowledge and providing assistance throughout the study.

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the NRC's Report Review Committee. The purpose of this independent review is to provide candid and critical comments that assist the authors and the NRC in making the published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The content of the review comments and draft manuscript remain confidential to protect the integrity of the deliberative process. The committee wishes to thank the following individuals for their participation in the review of this report: Paul H. Bingham, Wilbur Smith Associates, McLean, Virginia; Alan C. Clark, Houston Galveston Area Council, Houston, Texas; Janet F. Kavinoky, U.S. Chamber of Commerce, Washington, D.C.; Timothy J. Lomax, Texas A&M University, College Station, Texas; Michael D. Meyer, Georgia Institute of Technology, Atlanta, Georgia; Debra L. Miller, Kansas Department of Transportation, Topeka, Kansas; and Edward J. Spar, Council of Professional Associations on Federal Statistics, Alexandria, Virginia.

Although the reviewers listed above provided many constructive comments and suggestions, they were not asked to endorse the committee's conclusions or recommendations, nor did they see the final draft of the report before its release. The review of this report was overseen by Susan Hanson, Clark University, Worcester, Massachusetts, and C. Michael Walton, The University of Texas at Austin. Appointed by the NRC, they were responsible for making certain that an independent examination of the report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the authoring committee and the institution.

Stephen R. Godwin, Director of the Studies and Special Programs Division at TRB, and Nancy P. Humphrey of TRB managed the study. Ms. Humphrey drafted the final report under the guidance of the committee and the supervision of Stephen Godwin. Thomas Plewes, Senior Program Officer of CNSTAT, served as liaison to the committee and provided briefings on several CNSTAT reports germane to the committee's charge. Suzanne Schneider, Associate Executive Director of TRB, managed the report review process. Special appreciation is expressed to Rona Briere, who edited the report; and to Jennifer J. Weeks, who prepared the manuscript for prepublication web posting, under the supervision of Javy Awan, Director of Publications. Nikisha Turman and Amelia Mathis assisted with meeting arrangements and communications with committee members. Alisa Decatur provided word processing support for preparation of the final manuscript.

Contents

Executive Summary	1
1 Introduction.....	5
Study Charge, Scope, and Audience.....	5
Role and Value of Travel Data	7
The Changing Context for Travel Data	10
Key Issues for Study	13
Organization of the Report.....	14
2 Overview of Current Travel Data Programs and Gaps.....	17
Elements of a Comprehensive Data Program	17
Overview of Current Travel Data Programs	18
Major Gaps in Current Travel Data Programs	27
Findings.....	32
3 New Approaches for Meeting Travel Data Needs.....	35
Barriers to Survey Data Collection.....	35
Overcoming the Barriers.....	38
Findings.....	52
4 Designing a National Travel Data Program	57
Concept and Content of a National Travel Data Program	57
Cost of the Program	71
Program Management.....	72
Program Funding	76
Constituent Support and Accountability.....	78
Findings.....	79
5 A Strategy for Improved Travel Data.....	81
A National Travel Data Program: The Concept	81
Collaborations and Partnerships	82
Organization and Leadership	83
New Data Collection, Integration, and Analysis Approaches	84
Sufficient and Sustained Funding.....	85
Constituent Support	86
Management and Accountability	86

Appendices

A Study on Strategies for Improved Passenger and Freight Travel Data: Statement of Task	89
B List of Briefings at Committee Meetings	91
C Bibliography of Selected Studies on Passenger and Freight Travel Data and Related Topics	93
D Legislation Establishing the Bureau of Transportation Statistics.....	95
E Current Data Programs for Monitoring Passenger Travel and Freight Movement	101
Study Committee Biographical Information.....	119

Executive Summary

The U.S. transportation system serves hundreds of millions of travelers and handles millions of tons of freight each day to help ensure the efficient movement of people and goods in support of personal goals and domestic and international commerce. A well functioning transportation system is essential for business travel and tourism, yet no national data have been collected on long-distance, intercity passenger travel by surface transportation modes since 1995. A strong economy depends on state and regional investments in freight corridors to keep freight moving, but industry-based data on freight shipments, focused on supply chain linkages and local goods movement, are not collected. Only coarse national-level data are available on intercity commodity flows. Increased energy efficiency and reductions in greenhouse gas emissions from vehicular travel are being sought to reduce the transportation sector's adverse environmental impacts, but data on vehicle use necessary to monitor progress are no longer being collected.

Good travel data¹ are essential to support critical policy choices and multimillion dollar investments facing decision makers. Unfortunately, as the previous examples demonstrate, the travel data available today are inadequate to meet this demand. The most comprehensive data are collected by the federal government in periodic surveys. However, coverage of these surveys is incomplete, sample sizes frequently are insufficient to support meaningful analyses, and the results often are not timely. Moreover, funding for these surveys is subject to shifting political priorities, not infrequently putting them at risk for cancellation.

This study assesses the current state of travel data at the federal, state, and local levels and defines an achievable and sustainable travel data system that can support public and private transportation decision making. The primary goal is to develop a strategy for structuring, conducting, and funding the collection of critical travel data. The study is national in scope, recognizing that travel data are collected and used at multiple geographic levels and by multiple sectors. It covers all travel modes, with a focus on measuring the performance of the transportation system as a whole. The results are directed to Congress; senior leaders and data program managers at the U.S. Department of Transportation (U.S. DOT) and other federal agencies; states; metropolitan planning organizations (MPOs); other transportation authorities; and firms that collect, analyze, and disseminate travel data.

Collection of travel data is a shared responsibility among various administrations within U.S. DOT and other federal agencies. The states, MPOs, and the private sector also collect travel data, primarily for their own uses. These disparate data collection activities do not constitute a coherent national program to meet decision-making needs. A well-integrated National Travel Data Program is needed to guide transportation policies and investments at all levels. The following paragraphs provide a brief overview of the committee's recommendations for achieving such a program; details are presented in the concluding chapter of this report.

To support the wise use of public resources for transportation, particularly in a time of slow growth and massive budget deficits, a National Travel Data Program should be organized

¹ Travel data are defined broadly to include origin-to-destination flows, their characteristics—purpose of passenger and freight movements, attributes of travelers and commodities being moved, costs and travel times, and impacts (e.g., on congestion and the environment)—and the characteristics of the infrastructure on which these flows take place.

and sustained; built on a core of essential travel data whose collection is sponsored at the federal level; and well coordinated with travel data collected by states, MPOs, transit agencies, and the private sector (see [Figure ES-1](#)). Logically, the responsibility for leading this effort must reside with U.S. DOT, despite its past failures to develop a comprehensive and effective travel data program, because these data are essential to its mission. The Secretary of Transportation should assume a strong leadership role, with program design and coordination being carried out by the Research and Innovative Technology Administration (RITA) and its Bureau of Transportation Statistics (BTS), the federal statistical agency for transportation, which already has a data collection and coordination mandate.

If this effort is to be successful, the committee estimates that sustained funding on the order of \$150–200 million is needed over the next decade to support the core National Travel Data Program data collection activities across U.S. DOT. The proposed funding—\$15–20 million annually, on average—represents a sustained annual increase of about \$9–14 million over current annual federal spending of about \$6 million on travel data. Additional funds are needed for BTS to fulfill its data coordination role, and increased set-asides for data collection by states and MPOs are essential to ensure effective collaboration among these partners. The next reauthorization of the surface transportation legislation offers the opportunity to secure the funding, building on the need for better data to support performance-based decision making. With billions of dollars at stake, the investment of this modest increment in funding to ensure better outcomes is both necessary and prudent.

A national travel data program cannot continue to rely solely on traditional, periodic, large-scale surveys. Declining rates of response to voluntary surveys threaten their validity, and conducting large, periodic surveys makes data collection less efficient and creates cost spikes that can become targets for budget cutting. RITA, in collaboration with its data partners, should invest aggressively in research and testing of new methods—including continuous data collection and greater use of technology—for data collection, integration, management, and dissemination.

Current federal travel data programs do not adequately meet the needs of their customers, who are widely dispersed and lack a systematic mechanism for voicing their needs. This situation undermines the development of a strong constituency to support a National Travel Data Program. A National Travel Data Program Advisory Council, broadly representing major travel data constituencies, should be formed to provide strategic advice directly to the Secretary of Transportation.

U.S. DOT, in collaboration with its partners, should move quickly to develop a multiyear plan defining action steps, roles and responsibilities, and milestones to manage and track the development and implementation of the program, and report biennially to Congress on the progress of the effort. Such a plan is critical to assure Congress, U.S. DOT's data partners, and constituents that the National Travel Data Program is moving ahead.

The nation depends on its transportation system. Managing the performance of this system depends on good data, the foundation for prudent and sound decisions. U.S. DOT should seize the opportunity to make substantial improvements in national travel data to support more effective management of the transportation system.

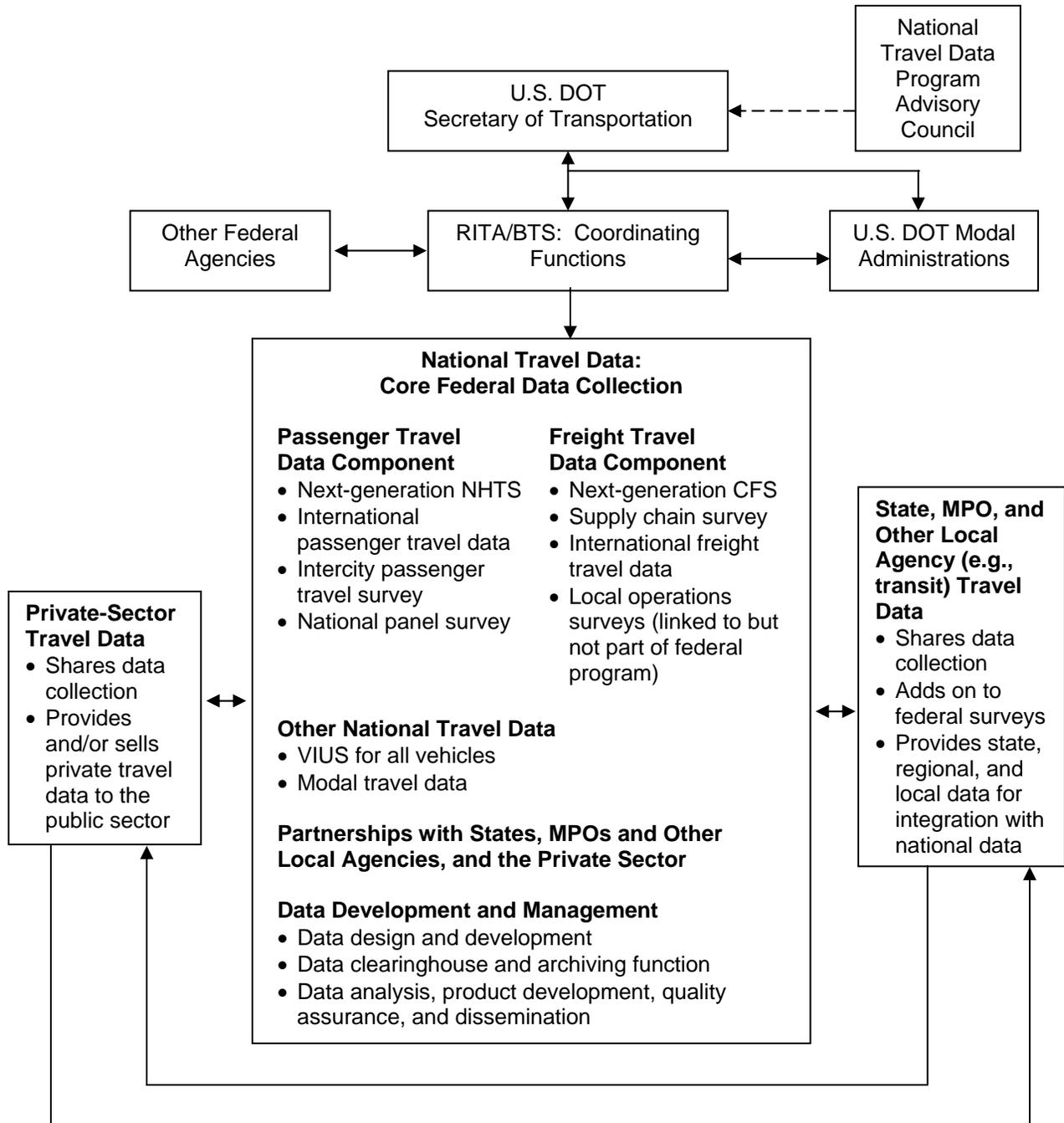


FIGURE ES-1 Schematic of a national travel data program.

(NOTE: BTS = Bureau of Transportation Statistics; CFS = Commodity Flow Survey; MPO = metropolitan planning organization; NHTS = National Household Travel Survey; RITA = Research and Innovative Technology Administration; U.S. DOT = U.S. Department of Transportation; VIUS = Vehicle Inventory and Use Survey.)

Introduction

The U.S. transportation system moves some 5.5 trillion passenger-miles of traffic each year, mainly on the nation's highways, and approximately 4.6 trillion ton-miles of freight (BTS 2010).¹ Transportation is a major industry in its own right, but its primary purpose is to provide mobility and access to millions of travelers and to move goods rapidly and reliably in support of economic activity. Policy and decision makers in both the public and private sectors need to know how well the system is performing; what changes in travel patterns can be expected with changes in demographics and logistics; how travelers and shippers respond to changes in the system and external factors; and what impact travel patterns have on safety, congestion, energy use, and the environment.

Unfortunately, many of the policy and investment decisions facing transportation decision makers in such crucial areas as improving travel safety, alleviating congestion, increasing the energy efficiency of travel, and reducing transportation-related air pollution and greenhouse gas emissions often are made on the basis of travel data that are lacking in modal coverage, timeliness, and geographic detail. Moreover, the most comprehensive passenger and freight travel data are collected in periodic federal surveys that are highly contingent upon shifting political and funding priorities and not infrequently in danger of cancellation.

STUDY CHARGE, SCOPE, AND AUDIENCE

The purpose of this study is to assess the state of passenger and freight travel data at the federal, state, and local levels and to make recommendations for an achievable and sustainable system for estimating personal and freight travel to support public and private transportation planning and decision making. (See Appendix A for the study's full statement of task.) In particular, the study:

- Examines user needs for travel data, that is, what passenger and freight travel data are essential for policy and decision making;
- Explores how these data might be collected more cost-effectively through such techniques as continuous longitudinal surveys, web surveys, and methods for capturing data from automated sources (e.g., instrumented vehicles, passive cellular telephone probes);
- Investigates how data programs could be better managed and coordinated; and
- Considers how these data programs should be funded on a consistent and continuing basis.

¹ Bureau of Transportation Statistics, *National Transportation Statistics*, Section D: Travel and Goods Movement, Table 1-37 for U.S. passenger-mile data (updated April 2010) and Table 1-46b for U.S. ton-miles of freight (special tabulation dated September 2009).

The study builds on a long history of prior studies of data needs. Over a span of nearly two decades, starting with *Data for Decisions* in 1992 (TRB 1992), the National Research Council published four special reports and numerous other studies (referenced in Appendix C of this report) supporting the need for a more integrated data structure that has yet to materialize.² The present study takes a strategic look at data issues as a basis for recommending ways to provide a sustainable system for essential travel data.

The study is national in scope and recognizes the multiple geographic levels—federal, state, regional, and local—and the multiple sectors—public, private, nonprofit—in which travel data are collected and used. The breadth of data needs—from national trends to project-level detail—and the diversity of users pose a major challenge. No single data collection model is appropriate. Moreover, building support for essential data programs is complicated by the number of disparate user constituencies.

The study covers all travel modes—surface (i.e., highways, rail, public transit, pipeline, bicycle, and pedestrian), air, and marine transportation. The focus, however, is on the transportation system as a whole and how it performs as an integrated network, rather than on the individual modes. The committee defines travel data broadly to include origin-to-destination flows, their characteristics (purpose of passenger and freight movements; attributes of travelers and commodities being moved; costs and travel times; and impacts, such as those on congestion, energy use, and the environment), and the characteristics of the infrastructure on which these flows take place.

An important issue motivating this study is the growing interest in performance-based management and the opportunity to focus greater attention on and provide resources for the necessary supporting data in the next authorization of surface transportation legislation. Preliminary bills reauthorizing surface transportation legislation and reauthorization principles released by the current administration,³ for example, place significant emphasis on performance-based decision making, outcomes, and accountability. This strategy for transportation management rests solidly on good performance measures and, in turn, on having the right data to drive those measures.

More generally, faced with increasingly complex transportation problems, users are demanding more varied and more detailed transportation data. Addressing transportation demand, for example, is a matter not only of adding more capacity, but also of modifying demand and optimizing the operation of existing systems while at the same time minimizing adverse impacts on air quality, energy use, and climate. All of these strategies would benefit from a richer understanding of travel behavior and travel demand, often at a level of detail not currently available. Responding to these data needs is complicated by heightened sensitivities with respect to privacy, concern for the protection of proprietary data made available for public use, rapid adoption of technology (e.g., cellular telephone—only households) that makes many current survey methods outdated (e.g., sampling of only landline telephone users), and budgetary pressures that put a premium on using scarce resources productively.

² See, for example, special reports on data by the National Research Council (NRC 1997) and, more recently, by the Transportation Research Board (TRB 2003a,b).

³ See *The Surface Transportation Authorization Act of 2009: A Blueprint for Investment and Reform, Executive Summary*, presented by Chairman James L. Oberstar, Ranking Member John L. Mica, Chairman Peter A. DeFazio, and Ranking Member John J. Duncan, Jr., Committee on Transportation and Infrastructure, U.S. House of Representatives, June 18, 2009; “Fact Sheet: Renewing and Expanding America’s Roads, Railways, and Runways,” The White House (Office of the Press Secretary), September 6, 2010; and “Obama Administration Releases Principles for 18-month Surface Transportation Extension,” *Transportation Weekly*, July 1, 2009.

The situation facing data managers is challenging but provides many opportunities for improvement. Members of Congress, who provide for program funding, and senior leadership and managers of key travel data programs at the U.S. Department of Transportation (U.S. DOT) and other federal agencies, are the primary audiences for this study's findings and recommendations. The study is intended to have a wider audience, however, including planners and decision makers at state departments of transportation (DOTs), metropolitan planning organizations, transit agencies, universities, and private businesses that use—and in some cases provide—travel data.

The sections that follow examine the role and value of travel data in transportation decision making; fulfilling this role and providing real value are likely to be essential for securing user support for a comprehensive travel data program. Changes in the context in which transportation operates that affect both data needs and the ability to meet those needs are considered next. Finally, looking forward, key issues that affect data relevance and thereby user support are discussed. The chapter ends with a brief overview of the remaining chapters of the report.

ROLE AND VALUE OF TRAVEL DATA

Along with experience and judgment, good data are a critical component of good decision making. Travel data are used at many different levels and for many different purposes. They provide the basis for trend analyses and inputs to forecasting models, enabling “what if” analyses and providing early warning of changes in trends. They enable analysts to discern how travelers and shippers respond to various factors that influence travel decisions. They also help shape policy decisions that affect travel, and once a policy has been implemented, provide a basis for measuring and monitoring performance and outcomes. Travel data can help inform investment decisions, enabling analysis of program and project alternatives and trade-offs. For example, they provide the basis for highway and bridge capacity enhancements and pavement design. Travel data also are integral to environmental review for air quality, noise, and water quality analyses, and they are used extensively in transit planning and assessment of other modal investment opportunities. Real-time travel data are critical as well for operational decisions, such as traffic control and incident and emergency management and high-efficiency supply chains.

Because of these important roles, travel data have been characterized as a national asset (Schofer et al. 2006). Like any asset, data cost money to acquire and maintain, to turn into useful information, and to be made readily accessible to users. To justify the necessary expenditures, particularly on a sustained basis, funders must be able to see the value of data for planning and decision making as constituting a sufficient return on their investment.

Today, however, some of the key national travel data programs are threatened, and others have been terminated, because of a lack of funding. If good transportation data are essential for good decision making, why are travel data programs struggling to identify champions and funding? The answer is not straightforward. First, it could be argued that transportation decision makers do recognize the value of good data. When a decision must be made, however, they tend to use whatever data are available “on the shelf”—good or indifferent—to inform it. Moreover, while data are important, they are but one of many factors, such as the political context and available resources, considered in decision making.

Second, some decision makers, particularly highly placed transportation policy makers and agency administrators who influence budgets as well as policy and investment choices, may indeed be unaware of or overlook the importance of data. The data and analysis that lie behind a summary cost/benefit ratio or a rating score, for example, remain largely unseen and could easily be taken for granted. In other cases, data may be perceived as highly technical—a black box whose utility for supporting policy and decision making is not readily apparent. Even for the more technically savvy user, the sheer volume of data available through the Internet and search engines that have not been translated into usable information can be overwhelming. Finally, and related to the issue of data utility, providers of transportation data often are removed from users and sometimes are poorly coordinated among themselves, dispersed across federal agencies, agencies at other governmental levels (e.g., state DOTs), and private companies, as described in more detail in Chapter 2. Without adequate user feedback mechanisms, data programs risk becoming disconnected from the decisions facing policy makers and managers. Transportation data users themselves tend to be widely dispersed and often (appropriately) focused at a technical level, increasing the difficulty of obtaining needed feedback and building constituency support for data programs.

The wealth of data on the Internet creates another insidious problem: it leads users to expect that data are free for the asking, sometimes masking the sources of the data. Often, those sources are second or third hand, and users have no knowledge of the primary source, much less the quality or accuracy of its coverage. Thus, the easy availability of data on line may make it even more difficult to garner support for investments in travel data programs.

The demise of the planned 2007 Vehicle Inventory and Use Survey (VIUS), which can be contrasted with the saving of the 2009 National Household Travel Survey (NHTS), illustrates many of these points, in particular the importance of a lead sponsor and strong user support (see [Box 1-1](#) for detail). The VIUS was a national survey of commercial vehicle characteristics and use; the NHTS is a national survey of household personal travel. Although the VIUS was valued by several federal agencies (e.g., U.S. DOT, the Department of Energy) and the motor vehicle manufacturing industry, its uses were often indirect. When the Census Bureau, which both conducted and funded the survey, announced its termination in early 2006 to close a budgetary gap, there was no strong and credible transportation advocate at U.S. DOT working with the Census Bureau to defend the survey. In contrast, when the Bureau of Transportation Statistics (BTS), the federal statistical agency for transportation, announced that it was unable to commit its share of funding for the planned 2009 NHTS, data users at the state and regional levels, along with such organizations as the American Association of State Highway and Transportation Officials, the American Highway Users Alliance, AAA, the Institute of Transportation Engineers, and AARP, recognizing how essential the NHTS was to travel models and investment decisions, lobbied U.S. DOT to defend the survey. The Federal Highway Administration (FHWA), which historically had sponsored the survey, reassumed full responsibility, although other user agencies provided the majority of the funding.

Box 1-1

A Tale of Two Data Sets

A comparison of the recent history of two data surveys—the Vehicle Inventory and Use Survey (VIUS) and the National Household Travel Survey (NHTS)—provides a good illustration of the importance of leadership, user support, and sustained funding for data program continuity.

The Truck Inventory and Use Survey (retitled the VIUS in 1992 based on the expectation that the survey would be expanded to cover automobiles and buses and obtain comparable information for all vehicles on patterns of use, energy consumption, and economic activity served) had been conducted continuously at 5-year intervals since 1963 by the U.S. Bureau of the Census until it was abruptly canceled in February 2006. Based on a sample of vehicle registration files taken from R.L. Polk and Co., this mandatory survey provided national and state-level data on heavy-duty and light-duty trucks, including vehicle size, weight, engine type, fuel economy, miles driven, commodities carried, and operation type (e.g., for-hire transportation), among other items. Its uses were many, but often indirect, thus likely contributing to its lack of visibility and champions. For example, the VIUS was used to help calculate the size of the for-hire trucking component of the Transportation Services Index—an economic measure of freight and passenger services—and to apportion vehicle-miles traveled (VMT) among vehicle types on the nation’s highways as part of the Federal Highway Administration’s (FHWA) *Highway Statistics* series. It was also used as input to various freight forecasting models and for truck size and weight regulatory studies. At the time it was canceled in response to a governmentwide federal budget rescission, there were no strong sponsors within the U.S. Department of Transportation (U.S. DOT) or the broader transportation community working with the Census Bureau to defend the survey.

The NHTS, which had been conducted since 1969 on a less regular schedule than the VIUS, was also in danger of cancellation when the Bureau of Transportation Statistics at U.S. DOT announced that it was unable to provide its share of the funding for the planned 2009 survey. In contrast with the VIUS, however, FHWA, which historically had administered the survey, reassumed full responsibility. Some 20 states and metropolitan planning organizations (MPOs), as well as associations representing transportation interests, which count on the data as input for travel models and for policy and investment analyses, provided the bulk of the funding and expanded the survey’s coverage, and the survey went forward. The experience proved the need for a lead sponsor, in this case FHWA; strong user support; and a product that is both visible and valuable to users.

The NHTS experience, however, with the possible exception of the strong partnership among the federal government, the states, and MPOs, is not a sustainable model going forward. Despite FHWA’s role in stepping in to save the survey, the “pass-the-hat” approach to funding resulted in a small federal contribution to a national-level survey that paled in comparison with the size of the state and MPO add-ons, resulting in a skewed sample when viewed from a national perspective. When U.S. DOT staff were questioned about plans and a date for the next survey, the answers given were tentative.

THE CHANGING CONTEXT FOR TRAVEL DATA

Linking data and data providers more closely with users is becoming even more important with increasing interest in the performance management, outcomes, and accountability of the transportation system. Travel data are essential both to measure and to monitor system performance. Yet some travel data programs are still rooted in measuring the “what” and “how” of passenger and freight movement rather than extending to address “why,” including the motivations for travel, its efficiency, and its impacts. Massive changes in the context in which transportation operates have implications for both the content of travel data and the way they are collected. Some data programs have been slow to adapt to these changes and the needs they generate; as a result, these programs risk a decline in their salience to the point where their support is threatened. To illustrate, the following changes have occurred in just the past 20 years:

- *Policy focus*—Policy concerns have shifted from a narrow focus on the rehabilitation and construction of transportation infrastructure; to a broader interest in system performance and efficiency in moving people and goods; to more recent concerns about travel impacts on the environment, energy use, the economy, and equity.^{4,5} In general, travel data programs are not well designed to measure system performance or travel impacts. [Box 1-2](#) provides examples of current policy issues that require good travel data but for which current data fall short.
- *Regulation*—Continued deregulation of the economy has reduced the primary justification for many data collection activities and resulted in the loss of data sets. For example, the demise of the Interstate Commerce Commission in 1995 marked the end of economic regulation of railroads and trucking and of the supporting data on operations and finances of individual firms, geared to ensuring fair pricing and eliminating rate discrimination, among other regulatory requirements. As discussed in Chapter 2, broad industry data continue to be collected by various federal agencies (e.g., the rail Carload Waybill Sample, the Air Carrier Traffic Statistics, the Waterborne Commerce Statistics). In addition, safety and environmental regulations have often supplanted economic regulations, but not always with associated data capabilities (e.g., limited data exist on the safety of public transit systems).
- *Technology*—More widespread use of technology has increased the ability to collect real-time data at micro levels of detail (e.g., inexpensive fixed sensors, wireless communications, passive cellular telephone probes) and with geographic precision (e.g., the Global Positioning System [GPS]). As noted earlier, broader penetration of the Internet has enabled increased accessibility of data.
- *Privacy and trust*—Increasing concerns about the disclosure of personal information—one consequence of technological advances—have constrained the ability to acquire data at levels of detail desired by users for modeling, planning, and policy analysis. Privacy concerns and uncertainty about the use of data, particularly by government, as well as distrust of government generally, have eroded the willingness of both individuals and businesses to respond to surveys. In a recent survey by the Pew Research Center, for example, only 22

⁴ The focus on travel impacts can be traced back to the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991, with its emphasis on the impact of travel on air quality and its link with the Clean Air Act Amendments of 1990.

⁵ Equity impacts include disproportionate cost burdens of various transportation financing mechanisms (e.g., dedicated sales taxes, congestion pricing, tolling) on the poor.

percent of respondents said they could trust the government in Washington almost always or most of the time—an attitude that has affected response rates for the U.S. census and other, less visible surveys (Pew Research Center 2010 in Billitteri 2010). Measures to improve survey response rates also have driven up the cost of data collection. Moreover, businesses are particularly concerned about protecting proprietary data, especially with respect to making data available for public use.

Box 1-2

Examples of Current Policy Issues for Which Travel Data Are Lacking

Transportation and the Economy

Recent attention focused on the economy and economic performance has resulted in increased interest in the role of the transportation sector in the economy and productivity. The Transportation Services Index (TSI) was developed in 2002 and first reported in 2005 as a measure of the economic activity of the transportation sector, both passenger and freight. Many of its components are weak, however, and others are missing entirely. For example, the TSI covers only domestic for-hire transportation services (i.e., services provided by an external company for a fee), although estimates suggest that such services across all modes account for only about half of all transportation services; many private firms have their own fleets (Young et al. 2007). Because of these omissions and the lack of timeliness of some of the data inputs, the TSI is generally a poor real-time indicator of economic changes.

Travel Patterns of an Aging Population

The United States is facing a potential sea change in housing and travel patterns over the next several decades as the Baby Boom generation retires and downsizes from its suburban housing. Detailed data are needed on the travel patterns of older households and individuals—how and where they travel and how much—as well as their access to transportation, particularly nonautomobile modes (e.g., transit). These data are important for providing services to an aging population to help maintain mobility. The National Household Travel Survey (NHTS) is a rich source for these data, but is conducted too infrequently to capture useful trends and does not include data on transportation services.

High-Speed Intercity Rail

The current administration has made available \$10.5 billion for high-speed rail projects, a downpayment on a potentially much larger program. The decision to go forward was made in the absence of any current data on intercity passenger travel, which were last collected in 1995. Although good origin–destination data are available for airline passenger travel, most high-speed rail trips are likely to be substitutes for motor vehicle travel. As high-speed rail projects seek federal funding, data on long-distance travel by automobile and air will be critical for analyzing potential travel markets and evaluating proposals. The U.S. Department of Transportation (U.S. DOT) is patching together numerous data sources to help fill the void, but without a major new survey, the necessary data are unlikely to be available.

(continued)

Box 1-2 (continued)**Energy Efficiency**

Transportation is a key contributor to both energy use and greenhouse gas (GHG) emissions. Data are needed to track the kinds of vehicles on the road (including alternative-fueled vehicles), fleet turnover, and vehicle use to determine whether policies to encourage lower energy use (e.g., higher Corporate Average Fuel Economy standards for passenger vehicles and light-duty trucks, soon to be extended to heavy-duty trucks) are having the desired effect and to what extent. The NHTS collects some data on household vehicles, but as noted, is conducted infrequently. With the demise of the Vehicle Inventory and Use Survey in advance of the 2007 NHTS, no data are available on heavy trucks and their travel.

Climate Change and Greenhouse Gas Emissions

As the U.S. Environmental Protection Agency moves to regulate GHG emissions, one strategy is to reduce the demand for driving by increasing the density of land use and by mixing residential and commercial uses to provide an environment that encourages nonmotorized travel (e.g., walking and bicycling, as well as transit use). Regulations requiring such land use policies are already in effect in California, and many other communities are experimenting with similar development strategies that go under various names, such as smart growth, transit-oriented development, and livable communities. The current administration has created a \$527 million grant program for livable communities to encourage such initiatives. To evaluate proposed projects and properly monitor and measure outcomes, community-level data are needed on travel patterns (number and length of trips) by purpose and mode. Data for small areas are weak, particularly spatial data on where residents work, shop, and attend school, which are critical to improving transit accessibility and service.

Congestion

Congestion continues to be a major barrier to efficient goods movement and traveler mobility for most travel modes. Given forecasts of significant increases in freight movements and, to a lesser extent, passenger travel, good data on major bottlenecks, as well as peak period traffic congestion, are important. Congressional leaders and program managers at U.S. DOT need these data to help ensure adequate funding of transportation programs at the national level. State DOTs and local transportation managers also need these data for investment planning, traffic management and incident control, and emergency evacuation planning. Despite its importance, there are no detailed measures of congestion. The well-known travel-time index of the Texas Transportation Institute (TTI) provides trend data on congestion for large metropolitan areas, but travel time measurements are based on average annual daily traffic. The private sector has begun to capture automated data on vehicle movements from passive probes (e.g., cellular telephones) and vehicles instrumented with Global Positioning System devices to provide timely traffic information to individual travelers and fleet managers. A few firms are partnering with the federal government and universities, TTI among them, so that these data can be integrated and aggregated to enable reporting on nationwide congestion trends and major traffic bottlenecks for policy analysis and investment purposes.

- *Globalization and logistics*—Increased globalization and continued growth of the service economy have changed shipping, logistics, and supply chain patterns in ways that are not captured by current freight data surveys or at geographic levels (i.e., market areas) useful for network planning and management and economic analysis.
- *Resources*—Resources have always been a constraint, but increased competition for funds has made it more important than ever to be strategic and selective in defining data needs, to identify ways of collecting data more cost-effectively, and to demonstrate the value per dollar invested in data.

The above changes pose considerable challenges for travel data program managers. At the same time, however, they provide an opportunity to reorient and adapt data programs in ways that are more responsive and useful to policy and decision makers.

KEY ISSUES FOR STUDY

Looking forward, improving passenger and freight travel data will require addressing several key issues. Defining essential travel data is an important first step. The range of different users and the breadth of their data needs, however, make this a difficult task. Core data organized around a few key surveys may prove valuable to all data users, but a more distributed system of data collection may be needed to meet specific user needs. In addition, being more strategic in defining essential data requires being selective and considering what can be discarded.

Second, developing a more policy-relevant and enduring travel data system requires leadership, particularly at the federal level, and greater coordination with data partners, such as states and metropolitan planning organizations. What often exist now as disparate surveys with a myriad of different uses need to be integrated into a more logical and well-focused system of travel data programs, directed toward users and decision making.

Third, data program managers need to address the growing conflict between the expressed desire of many users for more small-area data with which to examine regional and local policies, such as encouraging bicycling to work or greater transit use, and growing privacy concerns among those individuals and businesses that provide the data, particularly as the feasibility of collecting small-area data grows. What mechanisms are available to ensure confidentiality while meeting legitimate needs for detailed data? What are reasonable limits, and who should be responsible for negotiating these arrangements?

Fourth, the timeliness of data is an increasing concern. Periodic surveys whose results can take up to 2 years to release after completion of the data collection are simply too little, too late for many decision makers. Continuous annual surveys are becoming more commonplace but have their own problems. Interpreting annual data for trend analysis, accumulating sufficient annual data to provide reliable information for small geographic areas, and accommodating greater data variability in return for better timeliness are just some of the issues that need to be addressed.

Fifth, providing sustained resources to support travel data programs is a perennial concern. Finding partners to share the burden is part of the answer, but in the long run, it is no substitute for leadership and the building of strong user constituencies. As discussed in this report, neither of these elements has been much in evidence.

Finally, improving access to data—particularly making available data that have been transformed into useful products—is a necessary step toward meeting user needs and thereby building support for data programs. Modelers and researchers need detailed data with accompanying statistical information. Policy makers require timely summary products, tailored to particular policy uses and users, which should boost both the visibility and the value of the data.

ORGANIZATION OF THE REPORT

The remainder of the report addresses the key elements of the committee’s charge. Chapter 2 provides an overview of current travel data programs and critical gaps in coverage and characteristics, drawing on prior studies, as well as briefings to the committee from data providers and users (see Appendix B for a full listing of these briefings and Appendix C for a list of selected references; Appendix E provides a more detailed discussion of these programs). Chapter 3 examines barriers to data collection and opportunities for overcoming these barriers—from using technology more effectively to employing alternative methods for data collection. Chapter 4 introduces the committee’s proposal for a National Travel Data Program to better meet the travel data needs of policy and decision makers and details how the program should be managed and funded. The final chapter presents the committee’s key findings and recommendations for a strategy for improved passenger and freight travel data.

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Abbreviations

BTS	Bureau of Transportation Statistics
NRC	National Research Council
TRB	Transportation Research Board

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Overview of Current Travel Data Programs and Gaps

This chapter presents an introduction to the major travel data programs and the current gaps in the data they produce, responding to the committee's charge to assess the state of passenger and freight travel data at the federal, state, and local levels. The chapter starts with a discussion of what constitutes a comprehensive data program. Gaps in current passenger and freight travel data are then examined, drawing on informational briefings presented to the committee by data providers and users at its early meetings, as well as on prior studies. The chapter concludes with findings on the current state of travel data.

ELEMENTS OF A COMPREHENSIVE DATA PROGRAM

Data programs are typically built around a core set of data collection activities, including surveys, data drawn from administrative records, and/or direct data sources (e.g., road sensors). A well-functioning data program, however, includes a much broader range of activities:

- Trained staff to oversee data collection, provide quality control, and turn data into useful information and products for users;
- Staff development, with clear career paths;
- Systematic mechanisms for involving users and obtaining user feedback on a wide range of issues, from the design of data collection, to data products, to data access and dissemination;
- Continuing outreach to identify opportunities for partnering in data collection, appropriate cost-sharing arrangements, and effective methods for ensuring data integrity and confidentiality;
- A continuing program of research on improved methods of data collection, with sufficient funds for pilot testing of new methods; and
- Dissemination activities to increase the visibility and value of the data to users and help build strong constituency and sustained funding support.

Core data collection activities are at the heart of data programs. At a minimum, essential data must be identified and maintained over time to provide continuity for trend analyses. Data must be sufficiently granular (detailed) to support user needs for planning and policy studies. Also desirable is for data elements to be flexible and scalable so they can be organized in different ways to meet different user needs. Finally, the data must be timely and of sufficient frequency to provide an accurate portrayal of the phenomena being represented. Comprehensive travel data programs with all these characteristics do not currently exist. Indeed, meeting all these needs may not be possible, particularly with a single survey or other data collection method. Issues of cost and confidentiality, for example, must be balanced against user needs for detailed data in program design and management.

OVERVIEW OF CURRENT TRAVEL DATA PROGRAMS

Responsibility for Travel Data Collection

Travel data are collected by various government agencies and the private sector. The most comprehensive sources of travel data—the flagship multimodal National Household Travel Survey (NHTS) and the Commodity Flow Survey (CFS), which provide a national picture of U.S. passenger and freight travel, respectively—are administered by the federal government. The U.S. Department of Transportation (U.S. DOT) is responsible for the NHTS, but shares this responsibility with the U.S. Bureau of the Census for the CFS (Table 2-1). The Census Bureau serves as the lead in collecting data on the Journey to Work, once part of the long form of the decennial census but now part of the Census Bureau’s continuous American Community Survey (ACS).

Within U.S. DOT, responsibility for the flagship surveys is divided: the Federal Highway Administration (FHWA) is responsible for the NHTS and the Bureau of Transportation Statistics (BTS) (with the Census Bureau) for the CFS. When BTS was created as the federal statistical agency for transportation by the Intermodal Surface Transportation Efficiency Act of 1991, it was expected to develop a comprehensive set of transportation statistics, including data on travel, to support decision making on broad transportation problems that crossed traditional modal boundaries (see Appendix D).¹ The new agency also was expected to work with the operating administrations of U.S. DOT, which had their own modal data programs, to help coordinate, harmonize, and modernize data collection activities. Indeed, BTS restarted the CFS with the Census Bureau in 1993, conducted the American Travel Survey on intercity passenger travel in 1995, and worked with FHWA to conduct and fund the NHTS.² The agency, however, has lacked the sustained leadership, resources, and staffing to carry out its intended mission. Of the flagship surveys, BTS currently retains responsibility only for the CFS, a responsibility it shares with the Census Bureau.

In addition to the multimodal travel surveys, modal travel data are collected by several of the operating administrations of U.S. DOT, as well as other federal agencies that collect transportation information. For example, FHWA and the Federal Transit Administration (FTA) collect data on highway and transit travel, respectively. Responsibility for airline travel data, which had been collected by the Civil Aeronautics Board before deregulation, was transferred by Congress to U.S. DOT and assigned by Secretarial order to BTS. The railroad industry reports data on rail freight shipments to the Surface Transportation Board (STB), which replaced the Interstate Commerce Commission in 1995 as part of the continuing deregulation of the railroad industry. Finally, waterborne freight travel data are provided by the U.S. Army Corps of Engineers (USACE). These modal data sources can be quite comprehensive (e.g., the Origin and Destination Survey of air travelers), and they often serve other purposes (e.g., regulatory oversight) in addition to providing travel data.

States conduct substantial travel monitoring programs, collecting data on traffic volumes and travel speeds, for a wide range of purposes, from safety studies and congestion management to air quality analyses and evacuation planning. Some states also collect origin–destination data to support statewide travel demand models. In some cases, states share the cost of data

¹ *Intermodal Surface Transportation Efficiency Act of 1991*, Public Law 102-240, 105 Stat. 1914 (1991).

² The 2001 NHTS attempted to combine both short- and long-distance travel in a single survey. FHWA had primary responsibility for the former, and BTS for the latter.

TABLE 2-1 Responsibility for Major Travel Data Programs

Data Provider	U.S. DOT	Other Federal Agency	States/MPOs/ Other Local Public Agencies	Private Sector
<i>Multimodal</i>				
NHTS	FHWA		With state and MPO funding support	
JTW		Census Bureau		
CFS	BTS	With Census Bureau		
North American Transborder Freight Data	BTS/FHWA	With data purchased from the Census Bureau		
Transearch				IHS Global Insight
D.K. Shifflet & Associates Survey System				D.K. Shifflet & Associates
Survey of International Air Travelers		OTTI, DOC		
<i>Modal</i>				
HPMS	FHWA		States collect and report data	
NTD	FTA		Transit properties collect and report data	
Rail Carload Waybill Sample	FRA/STB			Railroads collect and report data to STB; STB produces public-use sample
Air Carrier Traffic Statistics	BTS			Certificated air carriers collect and report data
Waterborne Commerce of the U.S.		USACE		Vessel operators report to USACE on domestic commerce
PIERS				UBM Global Trade

NOTE: BTS = Bureau of Transportation Statistics; CFS = Commodity Flow Survey; DOC = Department of Commerce; FHWA = Federal Highway Administration; FRA = Federal Railroad Administration; FTA = Federal Transit Administration; HPMS = Highway Performance Monitoring System; JTW = Journey to Work; MPO = metropolitan planning organization; NHTS = National Household Travel Survey; NTD = National Transit Database; OTTI = Office of Travel & Tourism Industries; PIERS = Port Import Export Reporting Service; STB = Surface Transportation Board; U.S. DOT = U.S. Department of Transportation; USACE = U.S. Army Corps of Engineers.

collection with U.S. DOT—for example, for the NHTS. In fact, as noted in Chapter 1, the willingness of numerous states (and a few metropolitan planning organizations [MPOs]) to pay for larger samples (add-ons to the national sample) prevented the most recent survey from being canceled because of a lack of sufficient federal support. Similarly, states and MPOs, working through the American Association of State Highway and Transportation Officials (AASHTO) and the National Association of Regional Councils, support a small dedicated staff at FHWA, AASHTO, and the Census Bureau to conduct special tabulations of the Journey-to-Work data from the ACS for transportation users through the Census Transportation Planning Products (CTPP) program. States also collect travel data as required by U.S. DOT. The Highway Performance Monitoring System is a good example; states collect and report data on pavement condition, passenger and heavy-truck travel volumes, and other roadway characteristics according to guidelines issued by FHWA. MPOs in large metropolitan areas also conduct travel surveys periodically, primarily to provide detailed data with which to calibrate and update regional travel demand models.

Private firms also collect travel data for their own uses or to sell to other private and public users for forecasting, planning, and operational purposes. One of the best known and most widely used databases—TRANSEARCH[®]—was developed by Reebie Associates to provide timely and geographically detailed data on freight movement. The company has been acquired by IHS Global Insight, which continues to sell the data to private and public clients. *The Journal of Commerce*, now a division of UMB Global Trade, has collected data on foreign waterborne commerce for the Port Import Export Reporting Service (PIERS) database for decades. This database has been purchased by USACE so it can obtain detailed and timely data on waterborne imports, exports, and in-transit freight traffic. Finally, D.K. Shifflet & Associates (DSKA) collects annual data on travel within the United States from a panel of U.S. households for private clients in the tourism industry and public entities, such as state offices of economic development.

Appendix E provides a detailed description of the primary sources of travel data in the United States, highlighting issues and gaps associated specifically with each. Table 2-2 offers a high-level look at key characteristics of a selected set of these programs and activities for which collecting travel data is a major program focus.

Costs of Travel Data Collection

The annual costs of collecting travel data, borne primarily by the federal government, can be estimated from the information provided in Table 2-2. The table also shows staffing levels, in terms of full-time equivalents (FTEs), for some travel data programs. The two flagship multimodal surveys—the NHTS and the CFS—represent the single largest federal expenditure on travel data—nearly \$50 million every 5 years or so, or about \$10 million per year were the survey costs to be spread out over several years. The CTPP plus the other federal modal data programs cost about another \$20 million annually, for a total annual cost of about \$30 million.³ The focus of several of these programs extends beyond the collection of travel data, so it is

³ Annual costs were estimated as follows: \$1.18 million for CTPP; \$0.53 million for North American Transportation Border Freight Data; \$7.42 million for HPMS (\$0.4 million FHWA plus 93,600 hours x \$75/hr fully loaded, or \$7.02 million state); \$6.9 million for the National Transit Database (\$3.5 million FTA plus \$3.4 million transit properties); \$0.322 million for the rail Carload Waybill Sample; \$0.3 million for the Air Carrier Traffic Statistics; and \$4.5 million for Waterborne Commerce Statistics (see Table 2-2).

TABLE 2-2 Characteristics of Selected Travel Data Programs and Data Collection Activities

Program/Data Collection Activity	Category	Cost/Staff Support (FTEs)	Frequency	Data Provider	Content of Data Provided	Level of Geographic Specificity	Status
<i>Data Programs for Monitoring Passenger Travel</i>							
National Household Travel Survey	Passenger, all modes	\$24 M (\$21 M, states and MPOs; \$3 M, FHWA) 1 FTE FHWA + 2.5 FTE on-site contractors	Every 5–8 years	FHWA	<ul style="list-style-type: none"> • Travel characteristics (trip frequency, length, time, and mode) • Household and personal data (household composition, income, age, work characteristics) • Vehicle ownership and use data 	National, limited coverage of states and some large metropolitan areas	Uneven
Journey to Work/ACS + Census Transportation Planning Products	Passenger, all modes	JTW part of much larger annual \$180 M ACS \$5.9 M for 2007–2011 CTPP (mainly by states and MPOs through SP&R and Planning Funds) 0.8 FTE FHWA, 1 FTE AASHTO, 5 FTEs CB paid for by AASHTO/MPOs	Annual/continuous	JTW: CB data; CTPP: AASHTO/FHWA/CB	<ul style="list-style-type: none"> • Mode of transportation to work, time left home, and travel time • CTPP provides special tabulations and products for transportation users 	Traffic Analysis Zones and selected small areas	Stable

(continued)

TABLE 2-2 (continued) Characteristics of Selected Travel Data Programs and Data Collection Activities

National Transit Database	Passenger, public transit	<p>\$3.5 M designation from FTA grant funds</p> <p>229,634 hours and \$3.4 M cost (estimates of transit property data collection burden)</p> <p>4.5 FTE FTA + 20 FTE contractors</p>	Annual; monthly data on unlinked passenger trips are available from urban transit properties	FTA and transit properties	<ul style="list-style-type: none"> • Financial and operating data and service characteristics of transit agencies • Travel data = passenger boardings and passenger-miles traveled 	Data are reported by urbanized area for urban transit properties and by rural area for rural transit properties	Stable
Survey of International Air Travelers	Passenger, all modes, for travel within the United States	\$1.7 M (last manual survey in 2008); electronic survey based on automated records being phased in	Monthly	OTTI/DOC	<ul style="list-style-type: none"> • Travel to states and major U.S. destinations by nationality of visitor, use of transportation facilities, mode of transport within the United States, group size, and length of stay • Focus on top 20 origin countries 	National and selected states	Stable
D.K. Shifflet & Associates Survey System	Passenger, all modes	No cost or staff support data available; database is sold by D.K. Shifflet & Associates	Annual on the basis of monthly panel surveys	D.K. Shifflet & Associates	<ul style="list-style-type: none"> • Traveler volume to location by number of trips, number of travelers, length of stays • Mode of transportation • Purpose of stay and travel activities • Visitor spending and related demographic data 	Region, city, tourist destination	Stable

<i>Data Programs for Monitoring Freight Movement</i>							
Commodity Flow Survey	Freight, all modes	\$24.5 M (80% BTS, 20% CB) + \$1.8 M (BTS additional analysis) 3.75 FTEs BTS 9–10 FTEs CB + 2 programmers and 2 statisticians	Every 5 years	BTS/CB	Origin–destination, value, weight, mode of transport, distance transported, commodity type and ton-miles of commodities shipped for domestic freight	National, state, and selected large metropolitan areas within states	Stable for now
North American TransBorder Freight Data Program	Freight, all modes	\$52,575 from BTS to purchase 2010 transborder freight data from the CB; reimbursed by FHWA 0.4 FTE BTS + 1 FTE contractor support + 0.2 CB FTE	Monthly and annual	BTS through contract with the CB	Commodity type, mode of transportation (rail, truck, pipeline, air, and water), and port of entry/exit for U.S. exports to and imports from Canada and Mexico	Port of entry/exit, except for commodity data because of disclosure limitations; state of origin for exports and state of destination for imports	Stable
Carload Waybill Sample	Freight, rail	\$322,000 cost of confidential sample, shared evenly between STB and FRA; public-use file is available without cost from STB	Annual	Railroads terminating $\geq 4,500$ carloads per year for 3 years in a row must report to STB; public-use file is developed by STB/FRA contractor	Origin and destination points, types of commodities shipped, number of cars, tons, revenue, length of haul	Economic areas, with confidentiality restrictions	Stable

(continued)

TABLE 2-2 (continued) Characteristics of Selected Travel Data Programs and Data Collection Activities

Waterborne Commerce of the United States	Freight, domestic and foreign waterborne commerce	\$4,488,660 (2010 appropriation for the Waterborne Commerce Statistics Project) 28 FTEs at USACE	Annual	Vessel operators of record report to USACE for domestic commerce; PIERS database for foreign commerce (purchased by USACE)	<ul style="list-style-type: none"> • Origin and destination by tons by commodity code for domestic commerce, with confidentiality restrictions • Imports, exports, and in-transit traffic between the United States, Puerto Rico, and the Virgin Islands and any foreign county for foreign waterborne commerce 	State and region for domestic commerce; U.S. ports	Stable
TRANSEARCH®	Freight, all modes	No cost or staff support data available; database is sold by IHS Global Insight	Annual	IHS Global Insight	Freight flows by county origin and destination, four-digit commodity, and transport mode	National, state, Economic Area, county, and some zip codes	Stable for now
Port Import Export Reporting Service (PIERS)	Freight, waterborne	No cost or staff support data available	Monthly	UMB Global Trade	Foreign imports and exports—tons, commodity type, and value	U.S. ports	Stable

<i>Data Programs for Monitoring Both Passenger Travel and Freight Movement</i>							
Air Carrier Traffic Statistics	Passenger and freight, air	\$300,000 annual contractor cost 0.5 BTS FTE	Monthly	Reports from certificated air carriers in scheduled domestic passenger service to BTS (Office of Airline Information); public-use database is made available by BTS	<ul style="list-style-type: none"> Point of origin, destination, airline, class of service, and fare for air passengers Number of passengers and weight of cargo (mail and freight) by nonstop flight segment and by market segment or leg 	Airports, domestic and international travel (i.e., between the United States and a foreign point); the latter are restricted for 6 months after the report date	Stable
Highway Performance Monitoring System	Passenger and freight, highways	93,600 hours (estimate of state data collection burden; no monetary cost provided, but states generally use SP&R or state funds for data collection); \$400,000 FHWA annual cost for system development and support 5 FTEs FHWA	Annual	FHWA/state DOTs	<ul style="list-style-type: none"> Extent, pavement condition, performance, user, and operating characteristics for all federal-aid highways Travel data = average annual daily traffic by six vehicle classes 	Areawide summary information by state, urbanized, small urban, rural, and air quality nonattainment and maintenance areas	Stable

NOTE: AASHTO = American Association of State Highway and Transportation Officials; ACS = American Community Survey; BTS = Bureau of Transportation Statistics; CB = Census Bureau; CTPP = Census Transportation Planning Products; DOC = Department of Commerce; DOT = department of transportation; FHWA = Federal Highway Administration; FRA = Federal Railroad Administration; FTA = Federal Transit Administration; FTE = full-time equivalent; JTW = Journey to Work; MPO = metropolitan planning organization; OTTI = Office of Travel & Tourism; PIERS = Port Import Export Reporting Service; SP&R = State Planning and Research; STB = Surface Transportation Board; USACE = U.S. Army Corps of Engineers.

difficult to apportion the costs. In addition, many of the costs are unknown, particularly for private travel data providers. Furthermore, the estimates, for the most part, do not include the costs of travel data collected at the state and local levels, which can be significant.⁴ The annual costs for household travel data collection by large MPOs, for example, have been projected at more than \$200 million.⁵ Nevertheless, even if these estimates were increased by an order of magnitude, current spending on travel data programs would still represent a tiny fraction of total expenditures for transportation. In 2007, for example, federal, state, and local public expenditures on transportation totaled \$221.7 billion,⁶ and U.S. transportation-related goods and services totaled \$1.38 trillion in 2008 (RITA 2010).⁷

Funding continuity is perhaps even more important than the total expenditures each year for travel data collection. Chapter 1 recounts the abrupt termination of the Vehicle Inventory and Use Survey for budgetary reasons and the threat to the 2009 NHTS resulting from the withdrawal of BTS support. Although FHWA reassumed full responsibility for the NHTS, the federal contribution—\$3 million out of \$24 million—was a tiny fraction of the total cost; the bulk of the funding was provided by state and MPO add-ons. Moreover, the uneven cycle of the NHTS—1990, 1995, 2001, 2009—attests to the difficulty of conducting a survey that depends on a “pass-the-hat” approach to funding. The CFS is conducted on a more regular cycle because it is tied to the 5-year economic survey administered by the Census Bureau. Since it was first conducted in 1993, however, the CFS has been subject to large reductions in sample size to address resource constraints. Because of budget constraints, for example, only 50,000 establishments were sampled in 2002—down from 100,000 in 1997 and 200,000 in 1993—severely limiting the usefulness of the data (Kriger et al. 2010). The sample was restored to 100,000 establishments in the most recent 2007 CFS.

Unpredictable funding also takes its toll on staffing and partnering arrangements. Currently, only 1 FTE at FHWA supports the NHTS with the help of 2.5 FTE on-site contractors, while the CFS has many times that number, particularly at the Census Bureau because of the survey’s ties to the economic census (see Table 2-2). Even when strong user support and cost sharing exist, as was the case with the 2009 NHTS, the lack of a sustained federal funding source makes it difficult to retain and develop experienced data program staff and, for even the most supportive funding partners, to plan and budget for their share of the cost. Sustained funding appears to be easier to secure when a data program is required by statute, which is the case for many of the modal databases (e.g., the National Transit Database [NTD]),

⁴ The exceptions are the estimated costs of data collected by the states and transit properties for FHWA (HPMS) and FTA (National Transit Database [NTD]), respectively, as well as the costs of the state and MPO add-ons to the NHTS.

⁵ A recent estimate of annual data costs for MPOs with better-than-average data collection and modeling programs, for example, indicated that a total of as much as \$210–225 million would be required if all MPOs were to adopt these capabilities (Burbank 2009 in TRB 2009). Of course, these estimates cover activities beyond the collection of travel data.

⁶ Federal expenditures include direct federal spending, excluding grants to state and local governments (RITA 2010, Table 5-12). State and local expenditures encompass outlays from all funding sources, including federal grants. State and local expenditures for rail and pipeline, however, include outlays funded only by federal grants. Local government outlays for highway were not included in 2007 because of a lack of data.

⁷ Transportation-related goods and services accounted for 9.5 percent of gross domestic product in 2008 (RITA 2010, Table 5-1). Goods and services include all consumer and government purchases of goods (e.g., vehicles and fuel), services (e.g., auto insurance), and exports related to transportation.

the rail Carload Waybill Sample, the Waterborne Commerce Statistics).⁸

Summary

The picture that emerges from this brief overview of current travel data programs is the number of agencies involved in travel data collection and the general lack of coordination among them. U.S. DOT has not taken the lead and provided the necessary sustained funding to integrate and develop these disparate data collection activities into a coherent national travel data program to support policy and decision making. This role was envisioned for BTS, but has not been realized to date.

MAJOR GAPS IN CURRENT TRAVEL DATA PROGRAMS

This section reviews the gaps in current travel data content; shortfalls in the areas of data collection methods are examined in Chapter 3. Gaps in both passenger and freight travel data have been enumerated in at least two TRB special reports (TRB 2003a,b), in a host of data needs studies (see Schofer et al. 2006 and Appendix C for an illustrative list), in recent testimony on transportation research and data needs in congressional hearings focused on reauthorization of surface transportation legislation (see, for example, Pisarski 2009 and Skinner 2009), and by selected individuals who briefed the committee at its initial meetings (see Appendix B). This section summarizes the main findings of these sources; the reader is directed to the cited documents for more detail.

Passenger Travel Data

The greatest gap in data on passenger flows is at the national level (Table 2-3). The NHTS captures household travel but covers mainly local trips (i.e., less than 50 miles). A sufficiently large and comprehensive sample of data on intercity passenger travel by surface modes (i.e., passenger vehicle, rail,⁹ intercity bus) has not been collected since the 1995 American Travel Survey (Pisarski 2009) was conducted.¹⁰ The private D.K. Shifflet & Associates (DKSA) survey collects data on long-distance travel within the United States for U.S. resident households, but the data are proprietary and are licensed to clients with restrictions on disclosure (see Appendix E). The absence of publicly available data on intercity passenger travel by surface transportation modes is keenly felt in light of the renewed interest in and new federal funding available for high-speed intercity rail investments, and FHWA is patching together numerous data sources to help fill the void.¹¹ More generally, data on long-distance travel demand are needed to ensure

⁸ The NTD, for example, is funded by an annual designation of FTA grant funds for data collection. Rail data collection (the Carload Waybill Sample) is funded jointly by the Federal Railroad Administration and the STB to meet regulatory requirements. Funding for collection of the Waterborne Commerce Statistics is provided through annual appropriations to the Navigation Data Center of USACE (see Appendix E for more detail).

⁹ Amtrak provides limited data on passenger travel on its busiest corridors and ridership at its 25 busiest stations (Amtrak Media Relations 2009).

¹⁰ Data on intercity air travel, by comparison, are collected consistently and reliably.

¹¹ As an interim measure, FHWA is developing a model of interregional passenger origins and destinations, similar to the Freight Analysis Framework (FAF) for freight, that relies on extrapolating from existing data (see Appendix E for a more complete description of the FAF). The effort will not involve a new survey, and geographic detail will be

TABLE 2-3 Key Gaps in Passenger and Freight Travel Data

Type of Data Geo-graphic Level	Passenger Travel Data	Freight Travel Data
International	Limited data on international travel to states and specific U.S. destinations	Poor data on inland origins and destinations of freight flows across borders
National/interstate/state	No recent publicly available data on intercity surface passenger travel (last survey in 1995); no geographic flow data.	Absence of industry-based data on freight flows focused on supply chain linkages; incomplete industry coverage; incomplete coverage of motor carriers
Metropolitan area/local	Incomplete data on household travel in metropolitan/local areas	Few or no data on goods movement or commercial traffic in metropolitan/local areas

that surface transportation systems remain competitive and are able to meet the needs of domestic and international business and pleasure travel.

The NHTS provides good data on household travel, but here, too, the data are incomplete. Fourteen states pay for larger sample sizes, but the remaining states are limited by small sample sizes to state-level data that include only basic information on household characteristics and trip purpose (Contrino 2010).¹² With only six MPOs paying for larger sample sizes, moreover, reliable household data at the metropolitan area level are very limited. Most larger MPOs conduct their own travel surveys periodically, as noted previously, but these surveys are costly and conducted infrequently, typically at 10-year or longer intervals, and are not sufficiently standardized for the data to be aggregated for state, regional, or national analysis (Zmud 2009). Smaller MPOs rely mainly on the NHTS, but the small sample sizes result in a paucity of useful detail.

More geographic detail on work trips is available from the ACS by traffic analysis zones—the unit of analysis for travel demand models—and selected small areas (e.g., census blocks). However, the move to more timely continuous data collection with the ACS has resulted in smaller annual sample sizes, greater variability of results, and data suppression to meet disclosure limitations, threatening the availability of the finer-grained geographic information on commuting trips needed for travel demand modeling (Christopher 2009; Kominski 2009; Murakami 2009). The lack of this level of detail limits analysis and evaluation of policies such as those designed to encourage nonautomobile trip making and transit-oriented development to reduce vehicle-miles traveled and carbon dioxide (CO₂) emissions at the regional or neighborhood level.

limited to the 114 National Transportation Analysis Regions (T. Tang, FHWA, personal communication, Feb. 9, 2010).

¹² A minimum sample size of 250 households for each of the remaining states was deemed adequate by the survey design team to provide reliable national results, but only limited state-level analyses can be conducted.

Data on international passenger travel are spotty. National-level data on international air travelers are available from the U.S. Department of Commerce (see Appendix E), but data on travel destinations within the United States are less robust. BTS collects information on incoming border crossings for vehicles, passengers, and pedestrians at land ports on the U.S. border with Canada and Mexico using U.S. Customs and Border Protection data, but this source includes no data on passenger travel within the United States.

Freight Travel Data

In contrast to passenger travel data, freight travel data have critical gaps that can be filled only with a reorientation in approach (see Table 2-3). The CFS captures freight flows, although incompletely, at the national level, and the privately provided TRANSEARCH database fills some of the gaps in the CFS and includes more geographic detail on freight flows (i.e., by state, county, Economic Area, and some zip codes). Nevertheless, national data on freight flows are not well aligned with the supply chain orientation of industry and shippers. Data connecting freight shipments from origin, to intermediate handling and warehousing locations, to final destination are critical to understanding what businesses ship, why, and where, but these data are poorly covered by the CFS. Industry coverage in the CFS, for example, is limited to those shipper establishments surveyed by the Census Bureau, and survey data on shipment coverage are becoming more unreliable as third-party logistics firms rather than surveyed establishments increasingly manage freight shipment mode and routing patterns (TRB 2003a,b). Adequate representation of shipments by motor carrier—the predominant freight mode—is a significant gap (TRB 2003a).¹³ Thus, decision makers are left with a poor understanding of the economic impacts of logistics choices on state and regional economies and of the critical investments necessary to support such activities.

Another major gap is at the metropolitan and local-area levels: virtually no data exist on freight operations flows at the intraregional level, particularly for urban goods movement—a long-standing gap in freight data (see Table 2-3).¹⁴ Few MPOs conduct local freight surveys, and without these data, MPOs and local governments lack important information for modeling freight movements and planning freight corridor improvements or other infrastructure investments to support major freight facilities (e.g., improvements to port access) (Skinner 2009).¹⁵

International data on freight flows, particularly reliable origin and destination data for imports and exports, are also incomplete—a major gap in view of the increasing globalization of the economy. Data on the inland destinations of freight movements are particularly important for ensuring adequate investment in major freight facilities (e.g., ports, warehouses, intermodal

¹³ According to the 2007 CFS, trucks account for 71 percent of the total value and 40 percent of the ton-miles of shipments (Margreta et al. 2009), and forecasts derived from the FAF indicate that trucking is one of the fastest-growing freight modes (FHWA 2009). The FAF estimates missing components of flows among CFS regions and provides annual provisional updates from a variety of data sources and models.

¹⁴ In a white paper, Bronzini (2008) notes the difficulties of obtaining good data on urban goods movement, including data on commercial vehicle travel as well as heavy-truck freight movements, either in-transit through metropolitan areas or for local deliveries.

¹⁵ In the absence of local truck surveys, many MPOs rely on trip tables that estimate truck trips by traffic analysis zones on the basis of establishment type, size, and location. Trip rates are often based on default values from national studies. Growing evidence suggests, however, that truck trip generation does not correlate well with employment (A. Bassok, Puget Sound Regional Council, personal communication, May 21, 2010).

terminals) and infrastructure access. The North American Transborder Freight Database fills part of the gap for freight flows between the United States and Canada and between the United States and Mexico. This database, however, is not intended to capture transportation data on all foreign freight flows, nor does it accurately reflect the physical destinations of many imported commodities.

Finally, with some exceptions, existing data on freight flows do not encompass the performance of the transportation system in terms of transport travel times, shipment costs, or other performance-related factors.¹⁶ Together with the gaps in understanding freight origins and destinations, this lack of data on the performance on the network hampers states that are contemplating making multi-million dollar capacity or facility investments to grow their share of trade and economic development and reduce truck congestion. Without these data, they cannot adequately analyze modal alternatives, such as investing in a parallel rail line rather than in highway capacity expansion, nor can they fully understand the consequences of different investment alternatives for total traffic as well as air quality and CO₂ emissions.

Cross-Cutting Issues

Data needs to support decisions about transportation policies, investments, and operations go beyond flows of people and goods to encompass the availability and service characteristics of competing travel options, the physical and economic context for travel, and the characteristics of people and goods traveling and of passengers and firms making travel choices. These needs cut across both passenger and freight travel data. They include the following:

- *Transportation service and cost measures*—No data source provides detailed measures of transportation services and their costs for particular trips or movements, nor is there easy access to linked data describing the travel options that were available. Without such supply-side data on service quality and costs, it is impossible to understand the decision behaviors of travelers and shippers. While MPOs normally collect both supply and demand data to support the development of regional models, the development and application of policy analysis tools for higher-level state, corridor, and national studies are not feasible because these data are not available in a standardized format that enables them to be integrated and aggregated for the analysis.
- *System reliability*—Very limited data are collected on the reliability of passenger or freight services, a critical element of service quality. The exceptions are on-time performance statistics for passenger air travel and selected performance data on heavy-duty vehicle freight travel and on rail travel by Amtrak.¹⁷ Reliability data are critical to ensuring efficient freight movement, particularly with just-in-time delivery systems. For highway passenger travel, data on congestion are critical, particularly for commuting trips, given congestion's adverse effects on

¹⁶ The FHWA–American Transportation Research Institute (ATRI) Freight Performance Measurement (FPM) Initiative, described in Chapter 3, collects data on heavy-truck travel times at key international border crossings and motor vehicle travel speeds on major freight highway corridors.

¹⁷ BTS collects data from 18 major air carriers and one voluntary reporting carrier on on-time and delay data for the Airline Service Quality Program (BTS 2010). The FHWA–ATRI FPM Initiative gathers data on the reliability of a sample of over-the-road trucks on major freight corridors. Amtrak provides information on on-time performance and primary causes of delay (last 12 months) for a selected group of major corridors (see “Historical On-Time Performance” on the Amtrak website).

personal travel time, fuel use, and emissions. And the unreliability of transit is frequently cited as one of many impediments to greater transit use (Krizek and El-Geneidy 2006).¹⁸

- *Travel behavior*—Considerable amounts of data are collected on travel movements, mode of transport, and even trip purpose. However, far less attention has been given to understanding what motivates travel for both individuals and firms. This understanding is important not only for designing and evaluating policies that involve changing travel behavior (e.g., travel demand management measures), but also for more basic purposes, such as designing travel surveys and other data collection activities. For example, one of the difficulties of using the establishment-based CFS to obtain freight travel data is a change in the underlying logistics patterns and supply chain orientation that has rendered shipper-based surveys on freight movements increasingly less reliable. On both the passenger and freight sides, a better grasp of trip chaining or tours¹⁹ that included all modes would improve understanding of total trips and potential impediments to efforts to change travel behavior.

- *Impacts of travel*—Increasingly, transportation and travel are coming under scrutiny for their wide-ranging impacts on economic productivity; economic opportunity; the environment; and equity in the allocation of resources, services, and costs. Box 1-2 in Chapter 1 provides examples of many of the gaps in understanding the impacts of travel.

- *Linkages to contextual data*—The context for travel—nearby land use, activity densities, and availability of facilities that support nonmotorized travel—is an important influence on many key travel choices, such as the decision to make a trip, the selection of mode, and the choice of route. Travel data, however, are poorly linked to contextual data. For example, travel data on transit use, bicycling, and walking are collected, but data on access to work or other destinations using any of these modes (e.g., destinations reachable by walking, distance to the closest rail or bus stop) are not gathered for any large-scale surveys. Similarly, data on land use patterns, particularly higher-density development, mixing of land uses, and high-quality transit service—characteristics that are thought to encourage reductions in automobile use and more livable communities—are seldom linked to data on personal travel to provide the information needed to probe these relationships.²⁰

- *Geographic specificity*—Geocoding of travel data is important for linking separate data sets to understand the relationships between travel and contextual factors and to construct models for policy evaluation.²¹ Geocoding also supports map-based analysis and display of data, an important way to visualize and understand travel patterns. At the national level, the Freight Analysis Framework (FAF) has been instrumental in visualizing freight flows and identifying major interstate freight corridors as a first step in examining capacity issues. At the local level, more MPOs are geocoding the data collected in local travel surveys to better understand trip generators (e.g., shopping malls, office parks) and travel patterns. Geographic information

¹⁸ Availability, frequency, and travel times are other impediments to greater transit use.

¹⁹ These terms refer to trips with multiple stops, such as stopping at the grocery store and the cleaners on the way from work to home, or truck stops at multiple store locations to complete food or other deliveries.

²⁰ Some limited linked data are available at the national level. FHWA purchased data on neighborhood and workplace location characteristics from Claritus, a private company, for use with the NHTS. The Claritus data were tagged to individual addresses of the NHTS respondents, so that at a national level, questions such as whether higher-density locations result in shorter home or work trips could be explored (H. Contrino, FHWA, personal communication, May 24, 2010).

²¹ Geocoding refers to the process of identifying associated geographic coordinates from other geographic data, such as street addresses or zip codes. With such coordinates, the data can be mapped and entered into geographic information systems.

systems have been available for decades, enabling data to be linked with geographic locations, but their application, particularly at the state and local levels, is uneven.

- *Timeliness*—The relative infrequency of data collection—at least 5 years between the flagship passenger and freight travel surveys—and the length of time required to process and release survey results (up to 2 years for the CFS) make it difficult to track trends and may result in an unrepresentative picture of travel patterns. For example, the NHTS was conducted during 2008 and 2009 when the nation was in a deep recession and travel was depressed, and the next survey will not be conducted before 2014, if then. Personal travel patterns are likely to remain relatively stable from year to year; with the exception of recessionary periods, however, such infrequent cross-sectional “snapshots” provide an inadequate picture of travel trends. The lag in reporting of results from the CFS and its relative infrequency are more problematic still for users because of more rapid changes in freight patterns. For both surveys, analysis of travel and trip-making trends over time, including the stability of travel patterns, could help determine how often these data should be collected.

FINDINGS

This chapter and the related Appendix E examine current major travel data programs—who administers them; what data are collected and at what level of geographic specificity; how frequently key surveys or other data collection activities are conducted; and, for many data sources, at what cost and with what level of staff support. They also provide an assessment of shortfalls in travel data, identifying gaps in data content. The picture of travel data programs that emerges can best be described as uneven, incomplete, and poorly integrated.

In particular, individual programs suffer from a lack of integrated, strategic management. The federal government, through U.S. DOT and the Census Bureau, plays a key role in the conduct of important travel surveys and other data collection activities for both passenger and freight travel. But no one office—presumably at U.S. DOT—has assumed the necessary leadership to integrate these surveys into a coherent national data program to support policy analysis and decision making. Moreover, travel data programs often are funded modestly and inconsistently. The lack of sustained funding for core programs affects the frequency, sample sizes, level of geographic detail, and scale of data collection, as well as the extent of data analysis and dissemination to users and research on new data collection methods. In the next chapter, opportunities for new approaches to collecting travel data to alleviate some of these problems are explored.

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Abbreviations

BTS	Bureau of Transportation Statistics
FHWA	Federal Highway Administration
RITA	Research and Innovative Technology Administration
TRB	Transportation Research Board

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New Approaches for Meeting Travel Data Needs

This chapter explores new approaches for meeting travel data needs. It begins with a summary of key barriers to survey data collection. Then, opportunities for addressing these challenges are discussed. These opportunities range from greater use of technology for more accurate and timely data capture, to alternative methods of data collection that have the potential to yield improved understanding of travel behavior and more stable cost and staffing requirements than are obtained through traditional large-scale periodic surveys. The discussion includes the pros and cons of these approaches, drawing on examples of their use. The chapter ends with a series of findings regarding implications for travel data programs.

BARRIERS TO SURVEY DATA COLLECTION

Travel data are collected using a wide range of means, from surveys, to administrative records (e.g., the rail Carload Waybill Sample), to automated data collection (e.g., use of Global Positioning System [GPS] tracking). This section focuses on survey data because the flagship passenger and freight travel surveys—the National Household Transportation Survey (NHTS) and Commodity Flow Survey (CFS), respectively—are the primary sources of multimodal travel data. In examining barriers to the collection of travel data with surveys, it is important to distinguish between the different types of respondents. Households and individuals are the units surveyed to obtain data on personal travel, whereas businesses (e.g., establishments, shippers, carriers) are surveyed to obtain data on freight movement. Each target group poses different challenges.

Personal Travel Data

The last several decades have seen a general decline in the willingness of the public to respond to surveys; at best, response rates have remained constant (Zmud 2010a). In the telephone survey area, particularly relevant to the NHTS, response rates have fallen steadily over time to very low levels (see Curtin et al. 2005). Response rates for other survey modes have also either declined or remained relatively constant, but at much greater cost. A recent and visible example of steady response rates at greatly increased cost is the 2010 U.S. census. The mail portion of the census achieved a 74 percent response rate, matching the response rate of the 2000 census. Both the 2000 and 2010 censuses had substantially higher response rates for the mail portion than the 1990 low of 65 percent (Billitteri 2010; Zmud 2010a). However, achieving this response rate came at a significant cost. Overall, the mail and subsequent face-to-face follow-up cost was \$13 billion, representing the most expensive census ever conducted (GAO 2010).¹ A large share of this cost was allocated to efforts to boost response rates, including an extensive media

¹ The cost was twice the \$6.5 billion cost of the 2000 census, or 1.57 times the 2000 cost in inflation-adjusted dollars (GAO 2001; GAO 2010).

campaign emphasizing the importance of the census to local communities, use of the Internet to publicize the importance of the census for the entire country, and a significant simplification of the census instrument itself to a brief 10-question form to reduce respondent burden (Billitteri 2010).²

Travel surveys have much less visibility and far fewer resources than the census. The typical cost of a local travel survey for a large metropolitan area, for example, is about \$2–4 million, or about \$150 per surveyed household, and typical response rates are generally in the range of 30–40 percent (Zmud 2010a).³ The response to the initial recruitment for the 2009 NHTS was only 23 percent, nearly 60 percent less than the 56 percent response rate for the 2001 survey.^{4,5} Of those households that did agree to participate, however, 80 percent completed the survey, some 10 percentage points higher than the 70 percent completion rate for the 2001 survey, reflecting in part the increased training and effort involved in ensuring that initial recruits would actually complete the survey.⁶

What accounts for the decline in willingness to participate in surveys? The decline has been attributed to a wide range of societal factors and technological changes. Less discretionary time has reduced the motivation of respondents to cooperate and limited opportunities for contact, particularly at home (Lepkowski 2010a; Zmud 2010a). Norms of civic duty and cooperation for the common good are less powerful motivators than in the past, affecting participation in publicly sponsored surveys in particular. Declining participation has also been the overall result of declining levels of trust in government (Pew Research Center 2010), greater concerns about privacy, the rise of telemarketing and the corresponding introduction of no-call registers, and the ability to screen out calls (Stopher 2009). A random telephone survey of U.S. residents, for example, conducted since 1982 by the Council for Marketing and Opinion Research, a nonprofit organization working on behalf of the survey research industry to improve respondent cooperation, found that the percentage of those who had “refused to participate in a survey in the past year” had risen from 15 percent in 1982, to 31 percent in 1992, to 45 percent in 2001 (Zmud 2010a). Finally, the population’s increased mobility and location in large metropolitan areas has made it more difficult both to find and to contact respondents. The most difficult populations to reach are males; young people; the less well educated; nonwhites; and the nonemployed, including students (Princeton Survey Research Associates 2008). Technological changes have played a role as well, particularly the use of cellular phones and the Internet, which have increased the difficulty of reaching younger, minority, and lower-income groups through traditional survey methods. A growing number of households, for example, no longer use landline telephones, still the primary method for conducting the NHTS household interviews.

² The simplification was possible because the “long form” Census questionnaire, administered to approximately one of every six households in the previous censuses, was replaced with a separate continuous survey—the American Community Survey (ACS).

³ The total cost figures were reported by Ronald Kirby, Transportation Director of the Washington Area Council of Governments, in a briefing to the committee at its second meeting (February 18, 2010) for recent household travel surveys conducted for the Washington and Baltimore metropolitan areas. The estimated cost of the 2010 Travel Behavior Inventory, a local travel survey conducted by the Minneapolis-St. Paul metropolitan area every 10 years in conjunction with the decennial census, is \$4 million (information provided by committee member Timothy Henkel, Aug. 2010).

⁴ This is the response rate reported to the Office of Management and Budget.

⁵ T. Tang, Federal Highway Administration (FHWA), personal communication, June 11, 2010.

⁶ T. Tang, FHWA, personal communication, June 11, 2010.

Freight Travel Data

Collecting freight travel data typically involves the private sector and a different set of challenges for data collection managers. It is difficult to generalize about response rates because some surveys, such as the CFS, are mandatory.⁷ The collection and reporting of other administrative data, such as data on rail carload waybills and on waterborne commerce, are required by federal regulation or statute for railroads and domestic vessel operators, respectively. Nevertheless, as shown by the experience with the most recent 2007 CFS—with a response rate of 83.1 percent⁸—nonresponse can be an issue. Respondent burden in filling out the traditional mail-out, mail-back survey is part of the explanation. The accuracy of survey responses is also a problem; for example, only 58.7 percent of the total number of establishments sampled in the 2007 CFS provided complete and usable responses.⁹

More generally, data providers in the private sector are most concerned about protection of proprietary data.¹⁰ In the context of growing interest in detailed travel data by transportation planners and modelers, companies are worried about the risk of revealing such data to competitors. Many businesses also are skeptical of data collection by the federal government, particularly for open-ended purposes. The fear is that the data will be used to regulate the industry or in legal action against it. This is a key concern, for example, with the use of electronic data recorders, which many trucking companies have adopted to track the locations of drivers and shipments (Murray 2010). In the event of a crash, the recorder data could be subpoenaed to determine culpability. Many companies also are in the business of selling data, not giving them away for free. Thus, they are looking for some exchange of value or incentive to share data with the public sector, with the exception, of course, of data that must be provided by law or regulation. Some federal agencies are already purchasing private data (e.g., the U.S. Army Corps of Engineers purchases data on foreign waterborne commerce from the Port Import Export Reporting Service [PIERS]), and, as discussed subsequently, new data ownership and licensing arrangements are emerging. Finally, the burden of lengthy surveys or those conducted over an extended period is an issue for busy company staff and may encourage ignoring the request or handing the survey off to less knowledgeable staff unless it is perceived to be of value to the company.

Implications of These Barriers

The increasing difficulty of collecting travel data, particularly through surveys, has important implications for data providers and users. First, the cost of data collection is increasing, often just to keep response rates constant. Second, declining response rates may introduce bias, calling into question the representativeness of survey results.¹¹ For household surveys, the difficult-to-reach nonrespondents are a key problem. A pilot test of a sample of cellular telephone-only users conducted for the 2009 NHTS, for example, found different travel patterns for this group

⁷ However, enforcement measures, such as civil penalties, to coerce firms to participate have not been used.

⁸ This is the official rate reported to the Office of Management and Budget.

⁹ R. Duych, BTS, personal communication, April 14, 2010.

¹⁰ This discussion draws heavily on briefings to the committee by committee members Joseph Bryan and Daniel Murray at the committee's third meeting (May 6, 2010) and Thom Pronk, CR England, who participated in a roundtable at the committee's second meeting (February 18, 2010).

¹¹ The issue here is nonresponse bias that is introduced when some members of the population are more likely to be included than others, and their responses differ from those of nonrespondents.

(Contrino 2010). To what extent do other nonrespondent groups have different travel patterns? The link between response rates and bias is not well understood, and existing research on the topic may offer guidance to the transportation community.

For freight surveys, particularly the mandated CFS, the issue is less nonresponse to the survey than the completeness and accuracy of the data. Third-party logistics companies, for example, which handle shipments for many large firms and carriers, are not surveyed in the CFS. As a result, those who do fill out the establishment-based survey may not have the detailed knowledge about freight shipments that they once did when transport and logistics typically were handled in house. Another explanation may lie in the fact that respondents do not see the value of the data or understand the purpose for which they will be used.¹² Both factors underscore the importance of establishing close ties with data providers and users, involving them in helping to structure data collection instruments.

OVERCOMING THE BARRIERS

Strategies for overcoming the barriers discussed above fall into two broad categories: capitalizing on technology and other techniques to improve data collection, and employing alternative methods of data collection for surveys.

Capitalizing on Technology and Other Techniques to Improve Data Collection

A range of techniques are being used to help overcome many of the barriers described in the previous section, especially to improve survey response rates. In particular, greater use of technology has the potential to improve the timeliness, efficiency, and accuracy of current travel data collection efforts by substituting automated methods for manual processes. New data collection methods reduce some barriers but do not solve all problems. On the contrary, new issues arise, such as extensive post-processing of data, technical difficulties resulting in missing information, and difficulties collecting socio-demographic information about mode of transport, trip-purpose, and vehicle occupancy (Stopher et al. 2010). Moreover, none of these techniques is likely to reduce the cost of data collection in the short term.

Improving Response Rates of Existing Travel Surveys

For household surveys, data collectors are using a variety of approaches to improve response rates, ranging from media campaigns to use of incentives (e.g., compensating survey respondents) (see [Box 3-1](#)). The use of incentives has become a routine part of many survey research efforts, and survey researchers are generally convinced that incentives should be used to obtain respondent cooperation and ensure proper sample representation (Berry et al. 2008). Nevertheless, their use raises many complex issues. Incentives improve cooperation but do they reduce bias in the estimates produced? Is the use of incentives a reflection of changes in societal norms away from a more altruistic view of survey participation and towards an economic information exchange model? While the use of differential incentives to different groups may prove cost effective, is the practice “fair”? These questions are beyond the scope of this study,

¹² This discussion draws heavily on briefings to the committee by committee members Joseph Bryan and Daniel Murray at the committee’s third meeting (May 6, 2010).

Box 3-1

Approaches to Overcoming Barriers to the Collection of Passenger Travel Data

Most approaches to overcoming barriers to the collection of passenger travel data are focused on boosting response rates to household travel surveys. These approaches include:

- Media campaigns,
- “Rest and recycle” (staged telephone callbacks) for telephone interviews,
- Data gathering at a convenient time for the respondent and not necessarily by telephone (e.g., scheduled personal interview),
- Special targeting of difficult-to-access socioeconomic groups, and
- Use of incentives.

and they represent important questions to be addressed within the recommended travel data program going forward.

Many advances in household travel surveys, including greater use of technology, especially GPS tracking has become commonplace within the United States over the past decade (Zmud 2010b). Until 2006, vehicle-based studies were dominant due to technology limitations of wearable GPS devices. With the relatively recent 'explosion' of small, battery-powered, commercially-available GPS data loggers, these GPS augments have switched almost entirely to a person-based approach, given the desire to capture detailed data on all modes of travel. A split technology design (in-vehicle / wearable) allows for the collection of many days of highly accurate vehicle-based GPS data with minimal respondent burden. Passive data collection of travel with GPS equipment has many proven benefits, including trip making rate correction due to under-reporting, improved accuracy of travel times and trip destinations, and detailed travel paths. In addition, multi-day data collection enables the evaluation of day-to-day variability of travel along with weekend travel patterns, which can be useful in designing policies to affect choice of time or route of travel (Wolf 2009).

A concern for the environment (specifically air quality and emissions regulations), coupled with the modeling community's desire for more robust data, has led to an increase in the use of on-board diagnostic (OBD) sensors in air quality studies. These sensors monitor vehicle engine performance and store engine operating parameters useful for evaluating the environmental impacts of personal travel and activity patterns. By coupling GPS-based location details with OBD-provided vehicle operations data, engine and vehicle activity can be mapped to the transportation network. In the California Statewide Travel Survey, the California Energy Commission and the California Air Resources Board are planning to fund an additional in-vehicle GPS/OBD sample focused on alternative fuel, flex fuel, and hybrid vehicle owners.¹³

With the rapid introduction and use of smart phones, their use to track travel is the next horizon beyond GPS (Schuman 2010). For example, mobile text surveys, completed in real-time on hand-held devices, are being increasingly used to collect travel data and beam

¹³ Personal communication with J. Wolf, GeoStats, Feb. 11, 2011.

location/GPS information. Data can be collected on origin–destination flows, travel times, and speeds (*The Economist* 2007). This technology application may be a mechanism for reducing nonresponse, particularly among hard-to-survey population groups, such as young adults. This is a relatively new use for the transportation field, however, and there has not been a great deal of study on how taking surveys on a mobile device may change the survey process or results. A number of problems must be addressed. For example, the signals are recorded in the cellular phone network, and thus the data belong to the service provider and require provider cooperation for release. Moreover, subscriber cooperation and identification are needed so that the traveler can be contacted and the reasons for the travel added to the flow data—all of which are currently major limitations to gathering survey data with smart phones. And the distribution of smart phones is not universal. Economic disparities related to smart phone penetration may lead to biased estimation when persons with lower socio-economic status are under covered. Nevertheless, California is exploring the use of smart phones for data collection for a portion of its next statewide household travel survey, a \$12 million project (Zmud 2010b).

Greater use of the Internet to gather survey data has the potential to increase the efficiency and timeliness of data collection and may also reduce respondent burden. Travel surveys using paper travel diaries can take a long time to complete and process.¹⁴ Web-based diaries not only can “remember” and automatically populate repetitive information, but also are typically linked to interactive maps (such as Google maps) that allow easy identification of exact locations. Automatic error checking can be built into these web-based diaries as well, making the information provided by respondents more accurate than that recorded in paper diaries.

Electronic processing and cleaning of the travel diary data is also more efficient and less prone to errors. At present, however, travel diary surveys generally are not being conducted online. Rather, the Internet is being used to advertise the survey, recruit respondents, and display survey results (Zmud 2010b). Greater use of the Internet is limited by household access to high-speed connections, although such access has been growing.¹⁵ Another difficulty is obtaining a representative sample; no list of households with Internet access and e-mail addresses currently exists from which a sample can be drawn. Opt-in respondents are the hallmark of many web surveys, but are not a suitable sample for travel surveys because of self-selection bias, among other issues.

To date, use of technologies that are becoming state-of-the-practice for data collection in local travel surveys is limited for the flagship NHTS. FHWA has recognized the problem and is undertaking a \$1.6 million project to explore a wide range of methods (e.g., different sampling frames, different response options) for conducting the next NHTS to boost response rates.^{16,17}

A broader-based research initiative is needed, however, focused on the CFS as well. Some technology innovations were introduced for the most recent CFS, but did not directly

¹⁴ The diaries capture information on the total number of trips as well as their characteristics, including purpose, time of travel, transportation mode, and location (i.e., origins and destinations), among other information.

¹⁵ In the 2007 Internet and Computer Use Supplement to the Current Population Survey, the Census Bureau found that 62 percent of households reported having Internet access in the home in 2007, an increase from 18 percent in 1997, the first year the Bureau collected such data (U.S. Census Bureau 2009).

¹⁶ T. Tang, FHWA, personal communication, June 11, 2010.

¹⁷ The project is funded by FHWA (\$1 million) and the Office of the Secretary (\$600,000). To date, no funds have been provided by the Research and Innovative Technology Administration, but its Bureau of Transportation Statistics is part of the study team.

affect how the survey was conducted.¹⁸ Staff acknowledged the need to do much more electronically to move away from the traditional mail-out, mail-back survey approach and help reduce respondent burden (Fowler, 2009). More generally, numerous approaches for overcoming barriers to the collection of freight travel data are being explored and implemented (see Box 3-2). Most apply to data collected from the private sector that are not required by statute or regulation. The focus is less on technology than on arrangements for data sharing and protection of proprietary data. Nevertheless, technology is playing a role. As more source documents become electronic (e.g., rail carload waybills, automated customs data on imports and exports used by PIERS), respondent burden is reduced or eliminated entirely, the speed of data collection is enhanced, and the cost may be reduced. As the PIERS example discussed in Appendix E illustrates, however, considerable funds still must be spent on data quality control.

In summary, a wide range of methods are being explored, including greater use of technology, to reduce respondent burden and improve survey response rates and increase the accuracy and efficiency of both passenger and freight travel data collection. However, use of these methods, particularly technology, requires the resolution of numerous issues, which often involves further research and testing before the effectiveness of the methods can be confirmed and they can be widely adopted. Nor will their use necessarily reduce the cost of travel data collection.

Box 3-2

Approaches for Overcoming Barriers to the Collection of Freight Travel Data

A broad range of approaches, focused mainly on arrangements for data sharing with the private sector and protection of proprietary data, are being considered and implemented to overcome barriers to the collection of freight travel data. These approaches include:

- New data ownership arrangements, with the data being purchased or leased from the private sector for public use;
- More cooperative public–private arrangements and data sharing to increase value to private data providers;
- Greater clarity about the use of the data, increasingly specified in licensing agreements;
- Sanitizing of the data to substantially alleviate disclosure concerns, either by the Census Bureau (for the CFS) or through cooperative agreements with third-party providers;
- Fusion of disparate data sources for the purpose of obscuring competitive information;
- Greater use of modeling in cases where the data are particularly sensitive; and
- Use of incentives.

¹⁸ For example, a geographic information system (GIS) postprocessing routing tool was developed to compute mileage for origin–destination data reported on freight shipments to improve accuracy (Duych 2009).

Gathering New Kinds of Travel Data

Some of the most innovative uses of technology for gathering travel data are occurring in the private sector, where the focus has been less on conducting surveys than on capturing raw data, often in real time, an approach made possible only recently with the widespread introduction and adoption of new smart technologies and applications. To date, the usefulness of both passenger and freight travel data has been hampered by the lack of timeliness and inadequate detail of the data, particularly for metropolitan and smaller geographic areas.

Using technology, the private sector is offering solutions to both of these problems. Two examples are provided here to illustrate the type of automated travel data being collected by the private sector, its public applications, and the implications for data ownership and use. To date, the major focus has been on new ways of tracking vehicle movements.

INRIX, a leading provider of traffic and navigation services in North America, aggregates traffic data from more than 2 million GPS-enabled vehicles and cellular probes in its Smart Driver Network, along with other traffic-related data sources, to provide real-time traffic information to both private- and public-sector clients (INRIX 2010a) (see [Box 3-3](#)).¹⁹ Coverage includes about 100,000 miles of arterials, city streets, and secondary roads, as well as nearly all limited-access highways in the United States (INRIX 2010b).

INRIX provides its data to the public sector through licensing agreements with public agencies.²⁰ The data can be used at various levels of aggregation and road coverage for operational purposes, such as dynamic message signs, weather safety alerts, and statewide 511 services (INRIX 2008).²¹ The data can also be used for congestion analysis on major corridors in metropolitan areas, as well as for traffic management on multistate corridors (e.g., the I-95 corridor on the East Coast). INRIX provides a free annual National Traffic Scorecard, which reports on nationwide congestion trends over time, identifies and ranks the worst traffic bottlenecks, and provides regional traffic comparisons on the nation's major highways (INRIX 2010c).²² Currently, INRIX travel data are limited to vehicle speeds. The main issue for transportation planners and modelers is the lack of information on trip origins and destinations, who is traveling (e.g., socioeconomic characteristics), and the purpose of their travel—behavioral data that are essential to building policy-sensitive predictive models.

¹⁹ The 2 million drivers of the vehicles currently in the INRIX Smart Driver Network report their location, heading, and speed from vehicles with embedded GPS systems, portable navigation devices, and smartphones. The data are combined with traditional road sensor information, and real-time and predictive traffic speeds are sent to INRIX commercial customers and drivers in the INRIX Smart Driver Network (Schuman 2010). INRIX pays some drivers to provide the needed data where the location information is critical to support its traffic data services. For others, INRIX provides the data free or at a reduced price in exchange for drivers passively reporting their location and speed (personal communication with R. Schuman, INRIX, June 10, 2010).

²⁰ INRIX provides clients with ready access to data through a simple application programming interface, a web-based monitoring site, and traffic tile map overlays (INRIX 2008).

²¹ The telephone number 511 is designated by the Federal Trade Commission for traveler information. Established in 1999, 511 information services vary widely both by provider (ranging from state departments of transportation [DOTs] to local transportation and transit agencies) and by information provided (from traffic delays and weather, to transit and tourism information) (description provided by the 511 Deployment Coalition at <http://www.deploy511.org/whatis511.html>).

²² Most recently, the company launched INRIXTraffic.us—a free web service providing state, regional, and municipal transportation agencies with information on real-time traffic flows on all major highways, Interstates, arterials, and secondary roads in major cities and rural areas and across state lines (INRIX 2010a).

Box 3-3

INRIX and Private-Sector Travel Data Collection

INRIX, a privately held corporation founded by former Microsoft executives in 2004, aggregates and enhances traffic-related data from its own unique and growing Smart Driver Network, along with data obtained from traditional sources such as road sensors. The result is a critical mass of real-time data on vehicle speeds on a broad road network.

Once received, the traffic data are fused and processed, using advanced algorithms, to produce information for both individual private-sector clients (INRIX was chosen to be Ford Motor Company's in-vehicle traffic advisory service, for example) and public-sector clients ranging from individual state departments of transportation to the multistate I-95 Corridor Coalition. Applications of the data range from real-time, in-vehicle traffic information and advisories for drivers, to more aggregated data on traffic flows combined with information on incidents and weather alerts, used by transportation agencies for daily operational purposes. Data are also archived for future retrieval, for example, by public agencies wishing to measure traffic flows and bottlenecks for safety and emergency planning and evacuation purposes and for investment analyses for new capacity.

The data are limited to traffic movements and speed, but INRIX announced early in 2010 that it was partnering with the Texas Transportation Institute (TTI), which has data on traffic volumes from the Highway Performance Management System (see the description in Appendix E). For TTI, the partnership will provide a timelier, more accurate, and more complete picture of traffic volumes and congestion in 100 cities, covering virtually every major U.S. metropolitan area. For INRIX, the partnership will increase its visibility as an important contributor to TTI's highly publicized annual Urban Mobility Reports.

In theory, INRIX could also provide origin–destination data (Schuman 2010). Since every vehicle INRIX tracks has an identification number, the company could create an application that would capture vehicle trip traces on the network. At present, however, these data are rapidly discarded for confidentiality reasons. INRIX would have to obtain authorization to keep the vehicle identification data for the purpose of creating origin–destination data.

A partnership between FHWA and the American Transportation Research Institute (ATRI), the independent research arm of the American Trucking Associations,²³ offers another model for providing current data on traffic movements (see [Box 3-4](#)). In 2002, FHWA launched the Freight Performance Measurement (FPM) initiative to fill a gap in information on how congestion and delay affect goods movement by trucking companies (Mallet et al. 2006). Because data on freight movements generally reside in the private sector, FHWA partnered with ATRI to collect intercity travel data from motor carriers on significant freight corridors and international land-border crossings.

²³ Legally, ATRI is a 501(c)3 not-for-profit organization.

Box 3-4

Federal Highway Administration–American Transportation Research Institute Partnership to Collect Truck Travel Data for Freight Performance Management

The collaboration between the Federal Highway Administration (FHWA) and the American Transportation Research Institute (ATRI) represents a new public–private approach to travel data collection. With its close association to the trucking industry, ATRI has assumed primary responsibility for recruiting a nationwide volunteer sample of heavy-duty, over-the-road, GPS-instrumented trucks to provide the data. FHWA set general guidelines for the intended uses of the data (Jones and Murray 2010).

The data are collected from participating vehicles using anonymous, randomly generated identification numbers to maintain the confidentiality of the truckers and trucking companies (Mallet et al. 2006). Data on the position of the truck (latitude and longitude), spot speeds, and time and date are received at predetermined intervals. The data are then matched to latitude and longitude coordinates of the Interstate corridors of interest. The processed data can be incorporated into data models, dashboards, or visualization software. Beyond spot-speed data, the recording of location and time along a route enables the calculation of average “processed” speed for each truck on a specific road segment; speeds of multiple trucks are then aggregated to determine average speed on a road segment or network (Mallet et al. 2006). Finally, average truck speeds in miles per hour are calculated for the entire length of a corridor. Either spot-speed or processed speed data can be used to calculate travel time reliability measures such as buffer time indices, variability measures, and simple standard deviations from mean speeds.

Since the Freight Performance Measurement (FPM) initiative began, FHWA has continually revised the program by increasing the sample size, the geographic coverage, and the representativeness of the truck fleets. The expansion of the number of trucking firms and trucks involved in the project reflects in part the negotiated disclosure agreements with multiple data sources; these agreements create binding stipulations on the purpose of the data collection and what data can be collected, provisions to ensure anonymity (including legal and financial consequences for violations), and sunset provisions (Jones and Murray 2010). Private parties receive some remuneration for the provision of the data. To ensure that the core mission of the program is not endangered by inappropriate uses, both FHWA and ATRI monitor requests for data and determine cooperatively who should have access and at what level of aggregation.

Currently, public distribution of the travel data is limited to travel speed and reliability. Data on average speed can also potentially be coupled with ideal speed (posted speed limits), as well as with data on truck volumes and percentage of truck traffic from FHWA’s Highway Performance Management System, to derive measures of delay. Other potential measures for future use include expansion of border crossing monitoring, truck parking applications, and weather and work zone impact analyses (Mallet et al. 2006).

Working with trucking companies and third-party vendors protected by contractual arrangements and nondisclosure agreements that maintain the confidentiality of the data, ATRI currently collects data from approximately 600,000 GPS-instrumented trucks throughout North America (Jones and Murray 2010).²⁴ The core FPM initiative centers on data on travel speeds and reliability for some 25 significant Interstate freight corridors, border crossing times and reliability for 15 major U.S. international land-border crossings, truck origins–destinations, and truck parking activities.²⁵ In both 2008 and 2009, FHWA and ATRI released an annual report on the top freight-critical nodes and bottlenecks in the United States (see Short et al. 2009 for the most recent report).^{26,27}

The main incentive for ATRI and the trucking industry to participate in the FPM initiative is to educate U.S. DOT leadership about the critical effect of congestion on trucking operations and the economic costs and productivity losses that accrue from those delays. By specifically identifying the worst bottlenecks on roadways and at border crossings, the trucking industry hopes to garner support for greater investment in transportation infrastructure projects. The main limitations of the publicly available data are twofold: *a*) like the INRIX data, the ATRI data are restricted to travel speeds, and *b*) the coverage properties of the data are unknown (i.e., what kinds of trucks are not covered and the extent to which uncovered trips differ from those covered).

INRIX and the FHWA–ATRI partnership are only two examples from a growing field of private-sector providers of travel data, whose data collection approaches range from Bluetooth-enhanced traffic surveillance equipment to airborne traffic data collection.²⁸

Implications and Assessment

INRIX and ATRI provide good examples of new ways of thinking about data collection, ownership, and access in a postregulatory environment. The data are not collected through a traditional sample survey approach but through automatic collection of millions of bits of raw data, which are then fused with other data, aggregated, and archived for different applications. In this context, no one entity owns all the data; a common arrangement, if the public sector is

²⁴ INRIX also collects data on commercial vehicle movements as a subsample of its network data, but its sample does not include as large a number of heavy-duty, over-the-road trucks as ATRI's (Schuman 2010).

²⁵ The data on Interstate corridors are supplemented with average annual daily traffic data from FHWA's Highway Performance Measurement System, described in Appendix E (Mallet et al. 2006). Much of the data on travel time and delay at U.S.–Mexico border crossings is provided by vehicle-mounted radio frequency identification tags (Jones 2010).

²⁶ Using truck position and speed data, ATRI identified and analyzed the bottlenecks. They were ranked on the basis of severity through an analysis of speed data for 24 1-hour time blocks, which involved comparing actual speeds with a free-flow criterion—55 mph—and computing the miles per hour below free-flow on an hour-by-hour basis for the 24-hour period (Short et al. 2009).

²⁷ Most recently, FHWA, in partnership with ATRI, launched a free web tool—FPMWeb—that enables state and local transportation agencies, as well as businesses and freight companies, to access data on where and when trucks are moving at slower than free-flow speeds, to visualize the results in a web-based GIS environment, and to probe the data more deeply through a customized query option (FPMweb undated; *AASHTO Journal* 2010).

²⁸ Traffax Inc., for example, uses its proprietary Blufax traffic surveillance units, together with in-vehicle Bluetooth technology, to provide state and local governments with continuous real-time measurement of travel times (between data collection stations) for vehicle and pedestrian applications on freeways, arterials, and pedestrian environments. Skycomp contracts with transportation agencies and engineering firms to collect traffic data using time-lapse aerial photography across large regions and built-up urban areas and at small sites with complex vehicle movements.

interested in accessing the data, is to lease them from private data aggregators. With this arrangement, the government can use the data for well-defined purposes, but the private sector is protected from Freedom of Information Act disclosure.

The benefits to the public sector are that the data are timely, detailed, and scaleable. The main drawbacks are the lack of control over the data, the lack of transparency with respect to their collection and quality (such as coverage), and the need in most cases to purchase the data from the private sector. Finally, much of the data is focused on vehicle movements and speeds but not connected to information on traffic volumes, trips, people, or vehicle characteristics; travel behaviors; or the condition of the infrastructure on which the travel occurs.²⁹

Employing Alternative Methods of Data Collection for Surveys

The flagship federal travel surveys, which are key elements of current travel data programs, are conducted as periodic cross-sectional surveys. They are expensive to conduct, their results are dated by the time the data are released, and the data provide an incomplete picture of travel patterns and issues. Alternative data collection methods for surveys hold potential for providing data that are less expensive to obtain, more timely, and more appropriate for answering today's transportation questions. These alternative methods include *a*) continuous surveys with responsive design, *b*) panel surveys, and *c*) hybrid approaches.

Both continuous and panel surveys collect data over long time periods. Continuous surveys provide repeated cross-sectional “snapshots” of a population using a new sample of the population each time. These surveys are constantly sampling and including new groups, enabling direct measurement of changes in the overall population. Panel surveys, on the other hand, track the behavior of a fixed sample of subjects over relatively long time periods (i.e., years). It may be necessary to replenish panel samples because of attrition and the introduction of new groups into the population. Both types of surveys can provide data on a more timely basis since the data collected can be processed and released even as data collection continues for new cross-section samples in a continuous survey or reinterviews with panel members.

Continuous Surveys

Continuous surveys may require smaller staff than periodic cross-sectional surveys and thus may cost less per unit of data collected. This benefit is realized through more efficient utilization of management and supervision in data collection operations and less need for staff specialization, as staff perform multiple duties throughout the data collection. Periodic cross-sectional surveys, in comparison, require the development of a large staff dedicated to one operation in a limited time period, a relatively expensive way to collect data.

Continuous surveys enable planners and decision makers to monitor travel behavior over time so as to understand changes at different stages in an economic cycle or during periods of high or low fuel prices (Raimond 2009). Periodic surveys, such as the NHTS, on the other hand, may be conducted during atypical travel periods and are less well configured to measure change except by comparison with previous periodic surveys. For example, the 2001 NHTS was conducted at the time of the terrorist attacks of September 11, which sharply depressed travel,

²⁹ Wrap-up commentary by committee member Lance Grenzeback at Session 2, on *Capitalizing on New Technologies* to the Committee on Strategies for Improved Passenger and Freight Travel Data, May 6, 2010.

and the 2009 NHTS was conducted during a deep recession, which also depressed travel.³⁰ The absence of intermediate measurements leaves the transportation community without adequate data with which to assess the severity of the travel reduction during these periods. Continuous surveys also reduce the pig-in-a-python effect of funding for large periodic surveys by spreading out the costs more evenly over several years and can offer greater flexibility (e.g., new topics and questions can be added without having to wait until the next survey) (Raimond 2009; Stopher 2009; Zumkeller and Ottmann 2009).

Continuous surveys also offer the opportunity to monitor the performance of the data collection system more carefully, identify and measure indicators of data quality, and intervene to improve data quality as the survey is conducted. These monitoring and intervention methods are referred to as responsive or adaptive design, and they offer the potential for continuing improvement in some properties of quality (Groves and Heeringa 2006). Examples are beginning to appear in the survey literature (see, for example, Lepkowski et al. 2010), indicating how responsive designs can be implemented in continuous surveys and what impact responsive design techniques can have on cost and data quality. Significant savings have been demonstrated, for example, by moving from periodic cross-section surveys to continuous data collection. But the gains are not guaranteed, and must be coupled with recent advances in responsive survey designs. These emerging techniques deserve the careful attention of the transportation survey community.

Continuous surveys require a different way of analyzing and interpreting the data. Since the data are collected continuously, they are received in smaller increments over extended periods of time compared with those collected by periodic one-time efforts. Any one year of data in a continuous survey would have larger sampling variances than a single cross-sectional survey for the same year. Continuous data must often be aggregated over time to obtain the same sample sizes for small groups that would be obtained from periodic surveys conducted at one point in time. Continuous surveys thus require pooling data over several years to increase confidence in the estimates derived from the data (Raimond 2009).³¹ This is major issue for small-area data, an issue discussed below with respect to the Journey to Work data in the ACS. The aggregation forces analysts to use such techniques as moving averages over time rather than single-point-in-time estimates generated from periodic surveys (Lepkowski, 2010b). Analysts also face challenges in interpreting trend data from continuous surveys. For example, if multiple years are to be compared, care must be taken to avoid overlap in years across aggregated data time periods (Plewes 2010).

Other data quality concerns arise with continuous surveys. Some suggest that team fatigue and waning motivation with continuous surveying lead to declining response rates, while limited evidence suggests that response rates that have been declining could actually be stabilized by more consistent staffing and methods (Lepkowski et al. 2010).

Finally, continuous surveys even out funding requirements, a particularly valuable feature in stable funding environments. If budgets remain flat over time while per unit costs increase, however, sample sizes must be reduced, and overall confidence in the estimates diminishes

³⁰ NHTS program managers note, however, that the travel effects were somewhat mitigated since data collection took place over the period of a year.

³¹ Of course, smaller annual sample sizes can also be viewed as a benefit from the perspective of cost and burden for staff and respondents.

(Lepkowski 2010a). The ACS is already an example of how flat budgets over extended time periods reduce sample size as a survey progresses.³²

To date, the transportation community's experience with the ACS has not been entirely satisfactory, particularly with respect to small-area data (Christopher 2009; Murakami 2009). Part of the problem is transitional. It has taken 5 years after the start of the ACS to pool sufficient data for small-area analysis; each year after that, new data based on a moving 5-year average will be made available. But even with such accumulations, the variability of the data and disclosure issues for small areas are likely to remain (Plewes 2010). Although small-area estimates derived from the long form of the census were less variable, however, they were also less timely, the data being collected only once every 10 years. A project now under way (NCHRP forthcoming) is exploring possible solutions, ranging from combining small geographic units (e.g., traffic analysis zones) to using synthetic data and modeling.³³ Data managers viewing the ACS experience are concerned that a shift to continuous survey data collection for the NHTS will pose similar challenges and trade-offs with respect to small-area estimates.

Continuous surveys have long been successful in other fields, such as health, where they have generally proved less expensive than periodic surveys and provided better value, largely through smaller, better-trained, and more experienced staff (Lepkowski 2010a). Continuous surveys also are used in other countries.³⁴ For example, Great Britain has successfully used continuous surveying since 1988 for its National Travel Survey (see [Box 3-5](#)). That survey provides regular, up-to-date data on personal travel, including long-distance travel (i.e., greater than 50 miles) within Great Britain, which enables monitoring of changes in travel behavior and helps inform the development of policy (Anderson et al. 2009). The smallest geographic units for which the data are generally published are the nine Government Office Regions.³⁵

Panel Surveys

Panel surveys are another way of collecting data that can be particularly useful in understanding the dynamics of travel behavior, although experience with these surveys in transportation research, particularly in the United States, is limited. In comparison with periodic and continuous surveys, which rely on cross-sectional designs, longitudinal panels enable analysts

³² The sample size of the ACS is about 3 million households per year, but respondents number fewer than 2 million annually, and the 5-year cumulated sample is less than the 2000 long-form sample (Plewes 2010). The Census Bureau's fiscal year 2011 budget includes funding to boost the annual ACS household sample size by 500,000 to achieve original precision and sample-size goals and preserve the reliability of small-area estimates (Plewes 2010).

³³ Synthetic data replace underlying microdata with values derived from a model-dependent imputation approach (e.g., using regression models), data swapping, or an additive noise technique. A random component is used in the generation of synthetic data, and thus "noise" is added to the data as a means of disclosure control. For example, in a particular locality where revealing household identity could be an issue, the characteristics of one household could be swapped with those of another to protect the identity of persons in the households. The goal of the approach is to retain household characteristics and travel patterns at an aggregate level, capture the error component due to the masking procedure, and retain multivariate associations between household characteristics (T. Krenzke, Westat, personal communication, Aug. 17, 2010).

³⁴ Committee member Johanna Zmud briefed the committee on international practices, particularly the use of panel surveys, at the third committee meeting in Session 3: Alternative Data Collection Methods to Support Future Data Programs. She also directed the committee to a book, summarizing the results of the 8th International Conference on Survey Methods in Transport at Annecy, France, in 2008 (Bonnell et al. 2009a), which provided many examples of international practice.

³⁵ Analyses at finer geographic levels (e.g., urban, rural) are possible if sample sizes are large enough.

Box 3-5

The National Travel Survey of Great Britain
An Example of a Continuous Survey

The National Travel Survey (NTS) of Great Britain, sponsored by the Department for Transport (DfT), provides continuous data on personal travel within Great Britain. The sample frame is postal addresses in Great Britain, and data are collected continuously during every month of the year on the basis of a stratified sample of 40 regions (relating roughly to counties or groups of counties in England and groups of unitary authorities or council areas in Scotland and Wales), with oversampling in London. The results are weighted to help reduce the effect of nonresponse bias.

The process of recruiting and interviewing households includes an advance recruitment letter, followed by a face-to-face interview with all household members (or proxies). During the interview, point data on household characteristics and vehicle ownership are collected, and a £5 gift voucher is offered if all household members complete every section of the survey. Households are informed of their travel week and left with a 7-day travel diary in which they record each trip, including origin–destination details, purpose, mode used, distance traveled, trip time, and number traveling. Within 6 days of the end of the travel week, a pick-up interview is conducted, and the travel diaries are collected. The data are coded and entered into a data system, and quality checks are performed. Response rates are high—around 60 percent overall, but lower in inner and outer London (46 percent and 49 percent, respectively, in 2008) (Anderson et al. 2009).

The data are analyzed at various levels (e.g., by household, individual, vehicle, day, trip), but the smallest geographic unit typically published is at the Government Office Region level; nine such regions exist in Great Britain. Long-distance trips (more than 50 miles) within Great Britain are also recorded, with respondents being asked to note any such journeys during their travel week and during an additional week. Finally, questions may be added periodically to gather information on a particular policy or question. Key results are published annually in a statistical bulletin available on the DfT website. Technical reports and additional analyses, including a set of factsheets, are also available on the web. Finally a nondisclosure version of the NTS data set is deposited at the UK Data Archive at the University of Essex.

DfT funds the NTS, which is currently carried out under contract by the National Centre for Social Research, an independent social research institute. The contractor is responsible for questionnaire development, sample selection, data collection and editing, and data file production (Anderson et al. 2009). DfT, supported by a staff of 5 full-time equivalents (FTEs), is responsible for the building of the database, data analysis, publication, archiving, and research on future survey methods. The total cost of the survey (contractor and DfT staff costs) is currently about £2.8 million (about \$4.18 million) annually, about two-thirds of which is for basic fieldwork and incentives (L. Avery, Department for Transport, UK, personal communication, June 24, 2010).

not only to study changes in travel behavior over time, but also to understand the reasons for shifts in behavior or attitudes because the same group (panel) of respondents is queried in each survey wave (Zmud 2009).³⁶ Thus, panel surveys provide a more sophisticated understanding of travel behavior than can be derived from cross-sectional analyses, and the data can be used in travel demand models to better predict travel behavior (Zmud 2009). Questions can readily be added to the survey to explore traveler responses to a particular policy or transportation investment (e.g., expanded transit services). Panel surveys also provide timely information and require smaller sample sizes than periodic or continuous surveys and thus have lower recruitment and staff costs, at least in the early years of a panel (Zmud 2009).

Panel surveys pose challenges, not the least of which are initial recruitment in the face of the continuing nature of the survey, imposing a heavier respondent burden; natural attrition of the panel and declining response rates over time; and panel fatigue and poorer quality of responses in later survey waves (Zmud 2009).³⁷ These problems can be addressed through such measures as refreshing the panel by replacing members who have left and providing incentives to panel members, but these measures complicate longitudinal analyses. Finally, taking advantage of the data provided by panel surveys requires knowledgeable staff and sophisticated models. In fact, one of the reasons given for the lack of more panel surveys in the United States is the absence of dynamic models, such as activity-based models, which can make use of the results (Stopher 2009).³⁸

The primary example of a panel survey in the United States is the Puget Sound Transportation Panel, which ran nearly annually from 1989 to 2002. Data on one day of travel activity were collected from about 1,700 respondents in 10 annual survey waves (Zmud 2009). In 2002, the panel was discontinued and replaced with a typical cross-sectional local travel survey. The main reasons for its termination were the time-consuming nature of maintaining the panel, the resulting cost, and the lack of sophisticated dynamic models for using the data captured from the panel.³⁹ The cost, for example, increased by more than 2.5 times, from \$75,000 in 1989 to \$200,000 in 2002, or about 1.8 times in inflation-adjusted dollars (Howard, 2010). The cost of the cross-sectional household travel survey, which was conducted in 2006 and replaced the panel, was \$1 million; it is planned to be repeated no later than 2015.⁴⁰

One way to reduce the initial costs of establishing a panel and anticipate the challenges of response bias, panel maintenance, and panel attrition is to use an existing panel source. There are private firms that specialize in running or establishing customized longitudinal panels for

³⁶ In a panel survey, a wave is the interviewing period during which the entire panel is surveyed and asked the same questions. A panel survey consists of multiple waves.

³⁷ Panel attrition is not a trivial problem. The Puget Sound Transportation Panel experienced about a 20 percent attrition rate between the first two survey waves, the German Mobility Panel a 43 percent attrition rate, and the Dutch National Mobility Panel a 44 percent attrition rate (Zmud 2009, 3).

³⁸ Activity-based models capture the dynamic interaction between the activities of households and individuals and their travel decisions. They are based on a more comprehensive understanding of the trade-offs that affect decisions about whether to make a trip, what time to make it, what destination to visit, what mode to use, and what path to take (TRB 2007).

³⁹ At the committee's third meeting, on May 6, 2010, Elaine Murakami (FHWA) noted that one of the reasons for the decision not to continue the Puget Sound Transportation Panel was the lack of modeling capacity to take advantage of the survey-generated data.

⁴⁰ N. Kilgren, Puget Sound Regional Council, personal communication, July 1 and July 6, 2010.

both public and private clients.⁴¹ Special care must be taken to ensure that the selected panel meets rigorous standards of accuracy and reliability through probability-based, statistically valid (not opt-in) sampling, and that panel recruits have similar access to technology (e.g., a computer and free Internet service), particularly when online participation is desired.

The German Mobility Panels are an example of long-standing use of panel surveys in transportation research. This panel has been conducted nationally each year since 1994, with a sample of about 1,000 households reporting on travel activity in a 7-day diary (Zmud 2009).⁴² A rotating panel approach is used, whereby respondents participate for three consecutive years, replaced by new panel respondents, so as to ensure reliable and motivated participants (Zumkeller et al. 2008).⁴³ Provision is also made for stratified recruitment of new cohorts to balance any dropout bias (Zumkeller 2007). The national panel survey is complemented by several similarly designed regional panels to obtain more detailed data on travel in major regions of the country and to increase the opportunities for pooling data (Zumkeller et al. 2008).^{44,45} The panel surveys are part of a family of personal travel surveys, described in the following subsection.

A Hybrid Approach

In view of the pros and cons of the different survey methods, the most efficacious strategy may be to combine several different types of surveys to meet a range of needs that motivate the surveys (Bonnell et al. 2009b). Germany provides an excellent example of this approach for household surveys. It conducts periodic national cross-sectional surveys with large samples every 5 to 10 years. These surveys are supplemented by two longitudinal panel surveys at the national level—the annual German Mobility Panel focused on everyday travel (previously discussed) and the INVERMO panel survey of long-distance travel (i.e., distances greater than 100 kilometers)—as well as selected regional panel surveys (also previously discussed) (Zumkeller 2007).⁴⁶

The primary sponsor of the German Mobility Panel is the German Ministry of Transport.⁴⁷ The cross-sectional surveys are cosponsored by regional and state authorities, whose funding enlarges sample sizes for their geographic areas. The INVERMO panel is funded by the German Federal Ministry for Education and Research and includes several private

⁴¹ For example, D.K. Shifflet & Associates, which collects tourism-oriented travel data (described in Appendix E), uses a panel company to recruit nationally representative panels of households, which have agreed in advance to participate in periodic surveys.

⁴² The diary survey of travel activity is conducted during September through November of each year. A 3-month odometer survey with a focus on fuel consumption is administered during April through June (Zumkeller 2007).

⁴³ Response rates are relatively low—about 20 percent of the original sample recruited by telephone.

⁴⁴ Panel participants at the national level are not required to geocode their trips, easing respondent burden. However, these data are collected in the regional panels because they are needed for planning and modeling purposes (Zumkeller et al. 2008).

⁴⁵ In the early years of a regional panel, household data from the national survey for a specific region are pooled with the regional data, so that the regional authorities have immediate results. Over time, the national sample data are phased out.

⁴⁶ The INVERMO survey was last conducted between 1999 and 2002. Using a combination of a screening telephone interview and a postal survey, panel members reported their long-distance travel for a 2-month period over four reporting time frames (Zumkeller 2007).

⁴⁷ Technical support is provided by the University of Karlsruhe, and the fieldwork is conducted by several market research companies.

partners.⁴⁸ Together these surveys provide a broad picture of personal travel behavior in Germany and have enabled in-depth analyses of such topics as the stability and variability of weekly travel behavior, fuel price elasticities, coordination of travel among different household members, and car dependency and multimodal travel behavior (Zumkeller 2007). As discussed in the following subsection, a similar approach could be adopted in the United States.

Implications and Assessment

The different approaches to data collection just reviewed suggest that there is no one best method. Each approach has its pros and cons, and each serves a particular purpose. The United States should consider adopting an approach similar to the German model—using a portfolio of surveys at the core of comprehensive data programs to meet future travel data needs, both passenger and freight. This approach should include:

- Consideration of continuous surveys to replace or supplement the federal flagship surveys to provide more timely travel data or, at a minimum, a regular cycle of periodic surveys with updates in interim years using a smaller sample;
- Establishment of a national panel survey to improve understanding of the dynamics of household travel behavior and to track national travel trends over time, which could be supplemented by periodic surveys targeting traveler response to particular policies and investments;
- Partnerships with state and local governments to expand national surveys to collect more state- and regional-level data and to work toward more common formats for state and local travel surveys so as to encourage pooling of data, or substitution of modeled data, particularly for use across small metropolitan areas with common characteristics; and
- Partnerships with the private sector to acquire more fine-grained data on the travel patterns of individuals and private firms, using digital methods of data capture and methods to protect sensitive competitive data, and integrating and aggregating the automated data for analysis and decision making.

Unlike the German top-down model, however, the portfolio approach envisioned for the United States would be a more decentralized data collection system. It would be built on a strong, federally supported core of surveys and data collection activities to enable the gathering and dissemination of essential travel data, but well integrated with travel data collected by the states, MPOs, transit agencies and other local authorities, as well as the private sector. This concept is described in greater detail in the next chapter.

FINDINGS

The transportation community needs to change the way it collects travel data to address many significant barriers to data collection. Traditional methods of collecting essential national travel data through large-scale, periodic surveys should be adapted to address issues of public willingness to provide data and should take advantage of evolving technologies and data

⁴⁸ Among these are the private German Rail system (Deutsche Bahn AG), Lufthansa German Airlines, and the German arm of the global market research company TNS Infratest (Zumkeller 2007).

collection approaches. Fortunately, alternative methods of data collection are available, but each involves trade-offs compared with large-scale, periodic surveys. Use of continuous cross-sectional surveys and panel surveys can help spread out the costs of data collection, maintain a well-trained core staff, and provide more timely results. Experience with such approaches is limited in the transportation sector, however, and the learning curve for properly collecting, analyzing, and using the data is likely to be steep. In addition, more evidence is needed on whether these methods will improve or stabilize response rates compared with periodic surveys.

Greater use of automated data sources (e.g., passive probes) and technology (e.g., web surveys, GPS) may reduce respondent burden and improve response accuracy, but most of these methods are unlikely to reduce the costs of data collection. Furthermore, much of the data collected with these methods is focused on vehicle movements and speeds and trip origins and destinations, without being linked to information about who is traveling and for what purpose—behavioral information critical for modeling and analysis to support policy making.

A program of methods research is needed to examine a wide range of approaches to data collection. Such research would help determine the optimal frequency for surveys and updates, involve pilot testing of new techniques before they are adopted more widely, and identify opportunities for purchasing commercial data or contracting with private vendors for data collection.

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Abbreviations

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GAO	U.S. Government Accountability Office
NCHRP	National Cooperative Highway Research Program
TRB	Transportation Research Board

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Designing a National Travel Data Program

This chapter begins with a description of the committee’s proposal for a National Travel Data Program that would better meet the current and emerging travel data needs of transportation policy and decision makers. Program costs are summarized, followed by a discussion of who should manage the program, at what funding level, and with what funding sources. A final section considers ways to build constituency support and help ensure program implementation and accountability. The chapter ends with a brief set of findings.

CONCEPT AND CONTENT OF A NATIONAL TRAVEL DATA PROGRAM

The committee recommends a broad and sustained National Travel Data Program, built on the collection of a core of essential nationwide passenger and freight travel data sponsored at the federal level and well integrated with travel data collected by the states, metropolitan planning organizations (MPOs), and other local agencies (e.g., transit), and the private sector. [Figure 4-1](#) provides a schematic of the program, including the proposed management structure, which is discussed later in the chapter.

Program Content

The proposed National Travel Data Program builds on many existing travel data collection activities and adds new initiatives to fill data gaps, with the goal of organizing and maintaining a more comprehensive and better integrated travel data program to support policy and decision making. The committee envisions a program in which data are captured from many data providers at all governmental levels and in the private sector. At the core, federally sponsored data collection activities include a national passenger travel data component, a national freight travel data component, and data collection activities that include both passenger and freight travel data.¹ [Box 4-1](#) provides a brief description of each of these program components and its purpose, as well as other key program elements. The latter include partnerships with state departments of transportation (DOTs) and MPOs and other local agencies to amplify the National Travel Data Program through both add-ons to federally sponsored surveys and greater pooling of data collected at the state and regional levels. Partnerships with the private sector should lead to mutually beneficial arrangements for the collection and sharing of travel data or for the outright purchase of private data where their sources have clear cost, quality, or coverage advantages.

¹ The assumption is that these core data programs would be sustained over time to ensure continuity for trends analysis. Although use of new methods and technologies for collecting data should be considered and encouraged, they should be introduced in a way that maximizes backward compatibility so that comparisons with earlier data sets can be maintained.

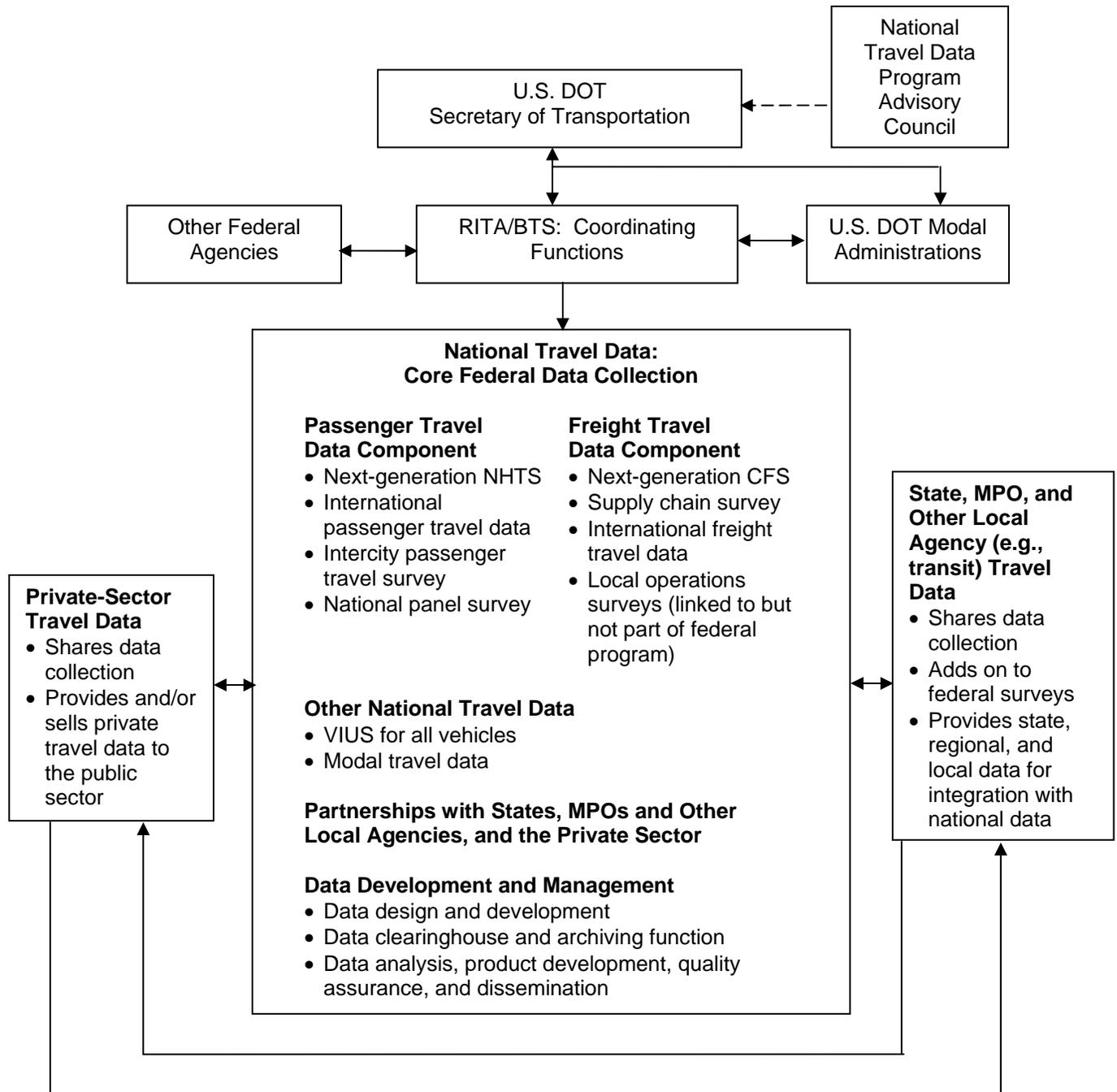


FIGURE 4-1 Schematic of a national travel data program.

(NOTE: BTS = Bureau of Transportation Statistics; CFS = Commodity Flow Survey; MPO = metropolitan planning organization; NHTS = National Household Travel Survey; RITA = Research and Innovative Technology Administration; U.S. DOT = U.S. Department of Transportation; VIUS = Vehicle Inventory and Use Survey.)

Box 4-1

Key Elements of a National Travel Data Program

A National Travel Data Program for the collection of essential national passenger and freight travel data should include the following elements.

National Passenger Travel Data Component

- A next-generation *National Household Travel Survey* (NHTS), focused on household travel and conducted every 5 years or possibly as a continuous survey. The national sample, ensuring reliable state-level reporting, would include a core of travel behavior questions and a rotating set of policy questions. Add-ons would be invited, and subsamples could be used to experiment with new data collection techniques. The NHTS should move toward new technologies for data collection and communication with respondents. The data collected should include or be integrated with data on transportation service quality and area characteristics (i.e., supply-side data).

Purpose: Track trends in household passenger travel at a national scale—including mobility across socioeconomic groups and locations and effects of changing demographics, resource prices, and policies—to measure performance; detect problems; design, evaluate, and select policies; and direct the allocation of resources.

- A periodic (e.g., every 10 years) *National Intercity Passenger Travel Survey* and *update* (e.g., every 5 years), with a sufficiently large sample to capture city-to-city flows by mode.

Purpose: Track trends in intercity passenger travel and, in conjunction with existing data on domestic air travel, provide a basis for planning, evaluating, and supporting decisions about planning, regulating, and investing in existing and new intercity passenger services, including high-speed rail, rail, air, and highway transportation.

- A *National Panel Survey* conducted annually to track travel and location dynamics so as to measure traveler responses to changing conditions and policies, as well as attitudes and preferences. Use of the Internet for this survey should be considered, although the sample could be drawn from a non-Internet frame and initially contacted by another mode.

Purpose: Provide an understanding of passenger travel dynamics by tracking a representative set of households over time to measure responses to changing external conditions, prices, technologies, services, and policies at the national level; providing insights into travel and location dynamics; and measuring attitudes and preferences with respect to emerging issues and policies.

(continued)

Box 4-1 (*continued*)**National Freight Travel Data Component**

- The *Commodity Flow Survey* (CFS), either at the current 5-year interval as long as it remains part of the economic survey of the Census Bureau or as a continuous survey. Sample sizes should be large enough to capture subregion-to-subregion flows, and electronic methods of data collection should be used whenever possible. Low-cost improvements in survey coverage should be considered, and the private sector should be involved in any survey design changes. Opportunities for sharing or purchasing private data should be considered as well.

Purpose: Track national trends in freight flows by commodity, mode, and geography to measure performance; detect problems; and provide a basis for predicting the effects of freight programs, policies, and regulations on the movement of freight and the impacts on the economy.

- A new industry-based *Supply Chain Survey* to capture intercity data on freight shipments from origin, to intermediate handling and warehousing locations, to final destination, which are not captured in the CFS. Supply chain organizations and other private-sector experts should be consulted about the survey design and the most accurate and easiest ways of sampling shipment data. Two surveys per decade are envisioned, but survey design and testing will be needed before such details can be determined.

Purpose: Understand what businesses ship, how, why, and where in order to analyze the state and local economic impacts of freight logistics choices and plan supporting public infrastructure investments.

- *Survey data on international freight flows*, particularly inland movements of freight and destinations within the United States. A properly designed Supply Chain Survey should collect the necessary data, so a separate survey should not be necessary.

Purpose: Understand the domestic flows of international freight by mode and U.S. destinations to monitor impacts on the economy and plan for transportation infrastructure improvements.

- *Local operations surveys* of intraregional freight movements to gather data from motor carriers and short-line railroads on domestic freight origins and destinations. The Supply Chain Survey should provide the framework for these surveys, which should be designed to be compatible with the CFS and the Vehicle Inventory and Use Survey (VIUS). Implementation would be primarily the responsibility of states and metropolitan planning organizations (MPOs), although some federal funding could be provided to encourage their follow-through.

Purpose: Fill a major gap in freight data, particularly in the area of urban goods movement. These data are needed to understand freight flows within metropolitan areas so that supporting infrastructure investments to mitigate congestion and encourage economic activity can be identified.

(*continued*)

Box 4-1 (*continued*)**Data Collection Activities Including Both Passenger and Freight Travel Data**

- A restarted *VIUS*, expanded to cover automobiles and buses as well as commercial vehicles and conducted every 5 years, probably in conjunction with the economic census.

Purpose: Provide national and state-level estimates of the total number of motor vehicles and their physical and operational characteristics; track and forecast trends in fleet mix, safety risks, fuel efficiency, and environmental impacts (e.g., greenhouse gas emissions); and determine cost allocations and user fees. The new *VIUS* would be the only source for monitoring data on heavy-duty trucks, which will soon have new fuel-economy standards, and for differentiating commercial from personal use of light-duty trucks. It would also be a source of data on difficult-to-locate operators of vehicle fleets (e.g., intercity buses).

- *Modal travel data* (e.g., the Federal Transit Administration's National Transit Database, BTS's Air Carrier Traffic Statistics, the Surface Transportation Board's/Federal Railroad Association's rail Carload Waybill Sample, the U.S. Army Corps of Engineers' Waterborne Commerce Statistics) integrated into the core National Travel Data Program. Administratively, these programs should remain with the U.S. DOT operating administrations and other relevant federal agencies.

Purpose: Provide detailed data on the operation and performance of specific modes needed to assess performance; identify problems and needs; and guide decisions about investments, regulations, and other policies in support of national economic and social interests.

Partnerships with States, MPOs and Other Local Agencies, and the Private Sector

- *Federal partnerships with state departments of transportations (DOTs), MPOs, and other local transportation agencies (e.g., transit agencies)* to enrich, supplement, and validate national data (through add-ons to national surveys) and supplement and validate data collected by other jurisdictions (providing benchmarks); *federally supported data architecture, common definitions, and general specifications for data collection* to encourage greater harmonization of state, MPO, and other locally collected travel data across jurisdictions and facilitate integration into the National Travel Data Program; and *methods for substituting modeled data* for use across metropolitan areas, particularly small geographic areas, with common characteristics.

Purpose: For U.S. DOT, extend national surveys to support more detailed results at finer-grained geographic levels and greater consistency in data collected across states and regions, enabling more data fusion and providing better comparative data. For state and local partners, provide benchmarks for state- and locally collected travel data; interim estimates between infrequent state and local travel survey updates; and for smaller metropolitan areas, a substitute for locally collected data.

(*continued*)

Box 4-1 (*continued*)

- *Federal partnerships with industry* for data sharing or purchase of private-sector data when the data are needed, appropriate, of suitable quality, and cost-effective.

Purpose: For U.S. DOT, secure and disseminate essential data not otherwise available from public sources or collected more efficiently by private transportation firms and data vendors. For private-sector data providers, bring attention to transportation problems that adversely affect productivity and operations (e.g., congestion and major transportation bottlenecks for freight carriers) in ways that safeguard proprietary data and provide new public-sector markets for data.

Data Development and Management

- *Methods research and pilot testing of new data collection methods* that are most appropriate for transportation. Designing and testing new freight travel data surveys (e.g., Supply Chain Survey, local operations surveys) to fill critical data gaps should be a major emphasis.

Purpose: Conduct the design and testing necessary to develop the next generation of passenger and freight travel surveys and data collection activities and to incorporate more innovative data collection methods.

- *A national travel data clearinghouse* to lead the effort to consolidate, scrub, and organize the travel data collected by many partners to form a coherent picture of national travel activity. This clearinghouse would be a source of survey designs, experience with new data collection methods, lessons learned in implementation, and models and documentation for all data partners and provide an archiving function to maintain critical data sets over time. It would also provide a mechanism for receiving and summarizing feedback from data providers and users.

Purpose: Achieve data integration and maintain key databases.

- Working with data users and providers, the development of *new methods of data analysis, distribution, and dissemination* that enhance the capability, accuracy, speed, and convenience of communicating the knowledge obtained from the data collected.

Purpose: Provide more user-oriented data products.

In addition to the data collection components, the core program includes a data development and management component composed of three elements: (a) a data design and development element to provide the research and testing necessary to design and develop the next generation of passenger and freight travel surveys and incorporate innovative methods of data collection; (b) a data clearinghouse and archiving function to achieve better data integration and maintain key databases; and (c) a data analysis, product development, quality assurance, and dissemination element to provide more user-oriented data products.

National Passenger Travel Data Component

Developing the next generation of passenger travel data will require a more robust National Household Travel Survey (NHTS), supported by a data design and development effort to address the problem of declining response rates and the introduction of more innovative techniques for data collection. In addition, two new surveys are proposed to fill data gaps: a National Intercity Passenger Travel Survey and a National Panel Survey. Each of these program elements is described below, including a rough cost estimate where possible. The costs in both this and the following subsections reflect actual estimates when available or the committee's best judgment. Greater precision will require a more detailed planning effort, beyond the scope of this committee's charge. Despite all the uncertainties, however, the committee recognized the importance of providing a sense of the scale of the proposed National Travel Data Program as a necessary prerequisite for the program's funding request.

- *National Household Travel Survey*—The next-generation NHTS must focus on today's travel issues, which require more geographically and modally detailed data than have been collected in the past, and it must support state-level reporting; all of these capabilities demand a larger national sample than has been collected in prior surveys.² The recent practice of supplementing the national survey through the purchase of add-ons by states and MPOs should be continued because it supports more detailed state and regional analyses where needed. This practice would be even more effective if a reliable national survey sample framework were clearly defined early in the process, providing a structure for comparability among state and MPO surveys that would aid analysis at all geographic levels. Conducting an expanded national survey every 5 years using traditional survey methods would cost about \$20 million per decade (Table 4-1).³ The committee urges that other options for conducting the survey be explored, including continuous surveying and new sampling frames and methods, if coverage or quality can be improved and/or cost savings realized.

- *National Intercity Passenger Travel Survey*—A National Intercity Passenger Travel Survey should be instituted to cover long-distance passenger trips that are not included in the NHTS. In the last 30 years only two intercity passenger travel surveys have been conducted by the U.S. government, the most recent of these in 1995 (see Appendix E). The importance of such a survey has grown substantially because of the recent interest in intercity passenger rail. These data are also critical for ensuring that the transportation system remains adequate and competitive for domestic and international business travel and tourism. Because intercity travel

² In the committee's judgment, on the order of 35,000 to 40,000 observations are needed. The 2001 and 2009 NHTSs had national sample sizes of approximately 25,000 households.

³ This cost estimate is based on a cost of \$250 per completed survey, a generous increment over the 2009 NHTS cost of \$185 per completed survey.

TABLE 4-1 Gross Estimate of the Costs of the Federal Core of the Proposed National Travel Data Program

Program Component	Frequency of Data Collection per Decade	Proposed Sample Size	Estimated Unit Cost (per completed survey)	Total Cost per Decade (\$ in millions)	Annualized Cost (\$ in millions)
National Passenger Data Component					
• Next-Generation National Household Travel Survey (national sample only)	2	40,000	\$250	\$20.0	\$2.0
• National Intercity Passenger Travel Survey ^a	1	75,000	\$400	30.0	3.0
• National Intercity Passenger Travel Survey Update	1	5,000	\$400	2.0	0.2
• National Panel Survey	10	5,000	\$ 60	<u>3.0</u>	<u>0.3</u>
Subtotal				\$55.0	\$5.5
National Freight Travel Data Component					
• Commodity Flow Survey	2	100,000	\$250	\$50.0	\$5.0
• New surveys to fill data gaps					
– Supply Chain Survey ^b	2	N.A.	N.A.	30.0	3.0
– Local operations surveys				<u>0.0</u> ^c	<u>0.0</u> ^c
Subtotal				\$80.0	\$8.0
Data Collection Including Both Passenger and Freight Data					
• Vehicle Inventory and Use Survey	2	140,000	\$100	<u>\$28.0</u>	<u>\$2.8</u>
Subtotal				\$28.0	\$2.8
Data Design and Development					
• Freight travel data	N.A.	N.A.	N.A.	\$ 8.0	\$0.8
• Passenger travel data	N.A.	N.A.	N.A.	2.5	0.25
• Ongoing program	N.A.	N.A.	N.A.	<u>2.5</u>	<u>0.25</u>
Subtotal				\$13.0	\$1.3

Program Component	Frequency of Data Collection per Decade	Proposed Sample Size	Estimated Unit Cost (per completed survey)	Total Cost per Decade (\$ in millions)	Annualized Cost (\$ in millions)
Total Proposed Cost				\$176.0	\$17.6
Total Proposed Cost Range				\$150.0–200.0	\$15.0–20.0

^a Includes better data on international passenger travel.

^b Includes data on inland portions of international freight movements.

^c Assumes that states and metropolitan planning organizations will assume the cost of data collection for these surveys. The federal contribution is in the design and development of the survey instrument and appropriate data collection methods, an allowance for which is provided under “Data Design and Development” (freight travel data).

NOTE: See text for discussion of assumptions. N.A. = not applicable.

is a relatively rare event in most U.S. households, however, such surveys are difficult and expensive to conduct. To be useful for policy analysis, the survey must provide valid data on origin-to-destination passenger flows by mode for major national travel corridors. Instead of conducting such a survey every 5 years as is the case with the NHTS, it may prove more effective to aim for such a detailed capability every 10 years, with a smaller update survey in the interim 5-year periods to obtain current travel and traveler characteristics, such as trip lengths, frequencies, and mode choice patterns. In the committee’s judgment, such a national effort would cost on the order of \$30 million per decade for the detailed survey and \$2 million for the interim update (Table 4-1).⁴ Opportunities for cooperative programs with the private sector should be actively sought to reduce costs and enhance the utility of the data.

- *International passenger travel data*—Data are currently collected on international travel to the United States, but they provide little or no detail on foreign visitors’ inland destinations and use of transportation facilities. Nearly 60 million foreign visitors come to the United States each year (ITA 2008) and use U.S. transportation facilities—airports, highways, tour buses, car rentals, and transit and rail systems. The Department of Commerce’s (DOC) annual survey of international air travelers, described in Appendix E, is incomplete in its coverage. Not all air carriers, airports, and inland destinations are included, and, most important for transportation, little information is provided on in-country travel and transportation use.⁵ The Bureau of Transportation Statistics (BTS) also collects data on incoming vehicles, passengers, and pedestrians for land ports on the U.S. borders with Canada and Mexico, but the data do not capture inland travelers’ destinations, transportation use, or daily recurring automobile travel around U.S. borders.⁶ The U.S. Department of Transportation (U.S. DOT) should examine these

⁴ The cost estimate for the detailed survey assumes 75,000 observations at a cost of \$400 per completed survey, reflecting the greater complexity of obtaining reliable long-distance travel data. The interim update would be limited to 5,000 observations and assumes the same unit cost.

⁵ The primary focus of the survey, which is conducted by the Office of Travel and Tourism Industries (OTTI), is on estimating expenditures of travelers both in the United States and abroad and obtaining information on foreign visitors to assist marketing efforts by the U.S. government, the tourism industry, and related private firms to attract more foreign travelers.

⁶ The data are part of the North American Transborder Freight Database, developed in response to the signing of the North American Free Trade Agreement by the United States, Canada, and Mexico in 1992 (see Appendix E).

data sources from the perspective of strengthening the collection of transportation-related data. For example, it would be useful to examine ways to supplement the DOC survey to improve coverage and data quality. Continued cooperation with Canadian and Mexican statistical authorities is essential for enhancing land-border crossing data, particularly for capturing automobile travel around U.S. borders. The previously described National Intercity Passenger Travel Survey should be designed to ensure greater compatibility with both of these data sources; data improvement and compatibility should be accommodated within the funding level proposed for the National Intercity Passenger Travel Survey and its updates.

- *National Panel Survey*—U.S. DOT should initiate a longitudinal National Panel Survey, implemented annually, to measure traveler responses to changing socioeconomic conditions, prices, technologies, services, and policies; to provide insights into travel and location patterns; and to gauge attitudes and preferences with respect to emerging issues and policies. The NHTS uses field procedures, instruments, and sample designs that are generally comparable from survey to survey, and thus it is possible to measure variations in travel behavior over time. However, because of its repeated cross-sectional design, drawing on fresh household samples for each survey, the NHTS does not provide clear information on why changes in travel behavior occur. A national longitudinal panel survey could track the reasons for change and provide more timely trend information than can be obtained with a periodic survey. Once in place, a panel could serve as an ongoing source of up-to-date information on attitudes, public preferences, and travel choices.⁷ An online panel, which would reduce respondent burden, would offer the additional benefits of even greater cost-efficiency and more rapid response.

Annual surveying of a national transportation panel should produce national-level estimates sufficient for analytical purposes.⁸ U.S. DOT should consider using an existing panel source maintained by an outside contractor to help reduce the costs and burden of establishing and maintaining a new panel.⁹ With this approach, the cost per survey wave is estimated at approximately \$300,000 annually or \$3 million over a decade-long period (Table 4-1).¹⁰

National Freight Travel Data Component

In the immediate future, the Commodity Flow Survey (CFS) should be continued with a sample size adequate to provide reliable subregion-to-subregion freight flow estimates. In the long run, new surveys may make some current data collection activities redundant, but for the foreseeable future, both current and new surveys should be conducted at some level in tandem to ensure continuity for trend analysis. More detail on next-generation freight travel data collection activities is provided below, but precise specifications and costs must await the results of the proposed design and development effort. Developing the next generation of freight travel data surveys will require a major reorientation in approach and a substantial design and development

⁷ New data could be examined as they became available, and questions could be added to the survey instrument as needed to address current concerns and policy issues. Adding supplemental questions to an existing panel is far easier and faster than mounting a new survey to acquire the same information.

⁸ A sample size of at least 5,000 individuals is required, and to minimize panel attrition, the survey should be kept short (not to exceed 15 to 20 minutes in length).

⁹ As noted in Chapter 3, special care should be taken in selecting the existing panel source to ensure that it meets rigorous standards of accuracy and reliability through probability-based, statistically valid (non-opt-in) sampling. Such panels exist, and the most rigorous rely on an address-based sample frame to ensure coverage of cellular telephone-only households.

¹⁰ This estimate was provided by a panel survey company at the request of a committee member.

effort, which must begin soon, to fill three critical gaps in current freight travel data. First, the CFS currently does not provide freight flow data organized on an industry basis and focused on supply chain linkages; these data are needed to determine the economic impacts of freight flows by industry and location and related needs for public infrastructure investment. Second, given the importance of foreign trade and globalization of the economy, better data are needed on the domestic portion of international freight shipments, including commodities shipped, transport mode, and inland destinations. Finally, data on local freight operations at the intraregional level, particularly in metropolitan areas—a long-standing gap in freight data—should be gathered, but the federal role here should be limited to the collaborative design and development of an appropriate survey instrument; the data should be collected by local agencies to meet their planning needs. The national freight travel data component of the proposed National Travel Data Program fills these gaps through the following elements:

- *Commodity Flow Survey*—The CFS provides critical information on commodity movements and thus, as suggested above, should be continued with a sample size sufficient to yield reliable data on subregion-to-subregion flows. Given the burden on business respondents, use of the Internet for survey response and other approaches, such as greater use of administrative data and continuous surveying, should be considered for future surveys. Improvements in coverage that can be made without a major new investment should be undertaken as well. The CFS, however, uses the master establishment list of the Census Bureau and thus is limited in the sample design variations that are possible. The private sector should be involved in any effort to improve the overall survey program design, and opportunities to share or purchase privately collected data on goods movement at substate levels should be considered. The current cost of the CFS is on the order of \$50 million per decade for the conduct of two surveys in years ending in 2 and 7 (Table 4-1). This level of funding should be sufficient going forward, particularly if new freight data collection activities are undertaken.

- *Supply Chain Survey*—A new industry-based, logistics-oriented intercity survey is needed to capture data on freight shipments from origin, to intermediate handling and warehousing locations, to final destination. These data are necessary so planners and decision makers can understand what businesses ship, how, why, and where and analyze the economic impacts of freight logistics choices and plan supporting infrastructure investments. Organized by industry type, probably on the basis of the North American Industry Classification System,¹¹ the proposed Supply Chain Survey would cover both domestic shipments and the U.S. portions of international shipments, connecting their travel paths. The new survey would require a design and testing phase,¹² which would be informed by existing studies of supply chain structure¹³; supply chain organizations, among other private-sector experts, should be involved in the survey design to help determine accurate and easy ways to sample shipment data. The committee

¹¹ This system is the standard used by federal statistical agencies in classifying business establishments for purposes of collecting, analyzing, and publishing statistical data related to the U.S. business economy. It replaced the old Standard Industrial Classification System in 1997.

¹² The design phase should include determining the range of industries to be included, which influences cost, and methods for managing their intersections. The survey itself would require data collection through logistics managers in either establishments or third-party providers.

¹³ The American Association of State Transportation and Highway Officials' (AASHTO) *Freight Transportation Bottom Line Report* (Grenzeback forthcoming) and the forthcoming report from the National Cooperative Highway Research Program (NCHRP) 15A (Wilbur Smith Associates forthcoming) contain depictions of a variety of supply chains. Further examples can be found in MPO and state DOT freight studies and in private sources.

envisions two surveys per decade, which in its judgment would together cost on the order of \$20–30 million (Table 4-1); more precise cost estimates would depend on the results of the survey design and development phase.

- *International freight travel data surveys*—Data on international freight flows, particularly movements and destinations within the United States, are critical to understanding the transportation implications of foreign trade and its effects on the U.S. economy. The new Supply Chain Survey, if properly designed, would collect the necessary data on the interior movement of international shipments.¹⁴ Existing surveys of cross-border and other international commerce flows should be maintained because they serve trade, security, and facility management purposes. However, their data components should be reviewed to ensure integration with the Supply Chain Survey and local operations surveys (described next) through industrial classification and geographic area definitions and other means.

- *Local operations surveys*—A properly designed Supply Chain Survey could establish a framework for more detailed local operations surveys on intraregional freight movements. Data on urban goods movement, in particular, have long been sought by state and MPO planners to understand freight movements within metropolitan areas in support of public planning and investment. Outside urban areas, such surveys could be useful in collecting data on movements of agricultural goods, now missing entirely from the CFS. Using the framework of the Supply Chain Survey, the data on freight origins and destinations would be gathered from motor carriers and short-line railroads.¹⁵ The design and development of the survey instrument would be part of the National Travel Data Program to ensure consistency with the CFS, the new Supply Chain Survey, and the proposed Vehicle Inventory and Use Survey (VIUS) (see below). However, its implementation would be the responsibility of states and MPOs, although some federal matching funds could be provided to encourage local survey investments.

Data Collection Activities Including Both Passenger and Freight Travel Data

In the proposed National Travel Data Program, the following data collection activities include both passenger and freight travel data:

- *Vehicle Inventory and Use Survey*—The VIUS should be restarted and expanded to include automobiles and buses, given the national interest in the energy efficiency and environmental impacts of both passenger and commercial vehicles. The VIUS, which collected basic descriptors of the vehicle fleet,¹⁶ was the only source of data on the use of heavy-duty trucks and on commercial versus personal uses of light-duty trucks (vans, pickup trucks, and sport utility vehicles). With fuel economy standards being proposed for the first time for heavy-duty trucks and buses, as well as more stringent standards already in effect for light-duty trucks and passenger vehicles, these data are critical for monitoring energy use and related greenhouse gas emissions of the vehicle fleet. The VIUS's immense potential lies in its data source—vehicle

¹⁴ The establishment-based CFS, in comparison, is derived from the shipping documents of American firms. Thus in the present system, no flows from foreign points are traceable before their first point of rest or transshipment within the United States.

¹⁵ The survey would collect data on trip patterns, stops and payloads, trip times and equipment utilization, operating ranges and empty distances, and reliance on and positions of yards and terminals.

¹⁶ The survey provided information on ways in which vehicles are used, their range of use, frequency of travel, and purpose for travel.

registration records—which provides a third perspective, besides households and business establishments, from which to view U.S. travel.¹⁷ The costs of restarting and conducting two surveys with an expanded scope in parallel with the economic census in years ending in 2 and 7 are estimated at \$28 million per decade (Table 4-1).¹⁸ In the future, if the proposed local operations surveys are widely conducted, they could overlap to some extent with the heavy-truck data collected by the VIUS, which might then be reduced in scope.

- *Modal data*—Modal travel data should continue to be collected by the operating administrations of U.S. DOT and other federal agencies (e.g., the U.S. Army Corps of Engineers) for their own purposes, but should also be integrated into the core National Travel Data Program. This integration would require adapting data architectures to ensure compatibility and support data fusion, as well as making data available through a common portal and in common formats. Additional, one-time funding would likely be required for this purpose.

Partnerships with State and Local Governments

U.S. DOT should engage in partnerships with states, MPOs, and other local agencies, such as transit agencies, to amplify and extend national travel data, provide benchmarks for more detailed local surveys and forecasting models, and define the architecture and offer incentives for pooling and integration of travel data across states and regions. Partnerships could take the form of add-ons to national surveys, such as the current practice of state and MPO add-ons to the NHTS, which are requested and paid for by these jurisdictions. The benefits for U.S. DOT would be a richer national survey, the opportunity to provide more detailed results at finer-grained geographic levels, and the development of modeled estimates to substitute for travel data in small geographic areas with common characteristics. The benefits for state and local partners would be benchmark data for state and local travel surveys and travel forecasting models; interim estimates between infrequent state and local travel survey updates; and for small metropolitan areas, a substitute for locally collected data. U.S. DOT should also encourage more pooling and integration of travel data across jurisdictions, as proposed above for local operations surveys in the freight area, by providing the data architecture, common definitions, and general specifications for local data collection. To encourage local efforts, particularly in the freight area, where local experience is limited, U.S. DOT should consider providing some federal funding to encourage local survey and data collection designs that are compatible with the national freight travel data component. The committee did not attempt to specify the cost of such activities. Other state and local travel data collection activities—state-collected traffic data for the Federal Highway Administration’s (FHWA) Highway Performance Monitoring System (HPMS) (see Appendix E) and state and local travel surveys to support travel demand models—should be continued, but data collected strictly for state and local purposes would not be part of the national program.

¹⁷ Through this data source, the survey was able to identify operators of vehicles, such as public vehicles, who are normally difficult to contact and interview.

¹⁸ If the survey were restricted to light- and heavy-duty trucks, as it was previously, the cost would be \$18.6 million per decade. The source of the cost estimate for the VIUS is a forthcoming report from Oak Ridge National Laboratory, a summary of which can be found in a PowerPoint presentation to the BTS Advisory Committee on Transportation Statistics (BTS 2010a).

Partnerships with the Private Sector

U.S. DOT should take the lead in encouraging partnerships with industry for data sharing arrangements or outright purchase of private data when the data are needed, appropriate, of suitable quality, and cost-effective. Chapter 3 (Box 3-4) provides one illustration of how U.S. DOT and the private sector have worked for their mutual benefit to improve the collection of travel data—the partnership between FHWA and the American Transportation Research Institute in the Freight Performance Measurement initiative. This partnership enables FHWA to gain access to private-sector data on freight movements on major corridors through an arrangement that safeguards proprietary data, and potentially benefits the private sector by bringing attention to highway congestion and major bottlenecks that adversely affect freight operations and productivity so as to prompt public investment. Opportunities for data sharing in other areas (e.g., intercity passenger travel and tourism) and/or the purchase of private data should be explored and federal funding made available to help support promising data sharing or data purchase arrangements. State and local governments could also engage in such data sharing arrangements with the private sector to obtain more geographically detailed passenger and freight travel data. U.S. DOT should encourage these efforts, provide guidance on methods for safeguarding proprietary and potentially sensitive private data while obtaining adequate data for public decision making, and help ensure that the results can be integrated into the National Travel Data Program. The committee did not attempt to specify the cost of such activities.

Data Development and Management

Realizing a successful National Travel Data Program will require a strong data development and management component to help ensure the collection of appropriate data and their integration into useful decision-support products. Three additional elements beyond the collection of appropriate travel data are involved:

- *Data design and development*—Developing the next generation of passenger and freight travel data surveys will require a major design and development effort to build new survey designs and test new methods, including greater use of technology for data collection. For the freight travel data component, design and development are needed to create and test the surveys that will fill the gaps in these data. A major undertaking will be required to design and test a core freight flow survey that can better describe freight movements from the supply chain perspective and provide data at the levels of geographic specificity needed for transportation infrastructure planning and development. Moreover, this next-generation freight travel survey must be compatible with data on the domestic movement of international freight and local goods movement, two major gaps in current understanding of freight movements. The committee estimates that this activity, which should involve the private sector in the design phase, could cost as much as \$8 million over the course of the next several years (Table 4-1).

For the passenger travel data component, FHWA, with the assistance of the Office of the Secretary, has already funded a \$1.6 million effort to help redesign the NHTS. This initiative should be expanded to include the design of the proposed National Intercity Passenger Travel and National Panel Surveys at an additional estimated cost, in the committee's judgment, of about \$2.5 million. Finally, an ongoing design and development effort—costing about \$0.25 million annually—will be needed to keep current with changing technologies and new methods

of data collection. In total, these activities would cost approximately \$13 million over the next decade (Table 4-1).

- *Data clearinghouse and archiving function*—A data clearinghouse should be a principal element of the core National Travel Data Program. As envisioned by the committee, that program depends on the data collection activities of many partners, and a major role of the clearinghouse would be to consolidate, scrub, and organize the data to provide a coherent picture of national travel activity. In addition, the clearinghouse should be a repository of survey designs and experience with new data collection methods, lessons learned in implementation, and models and documentation for use by all data partners. The clearinghouse should also provide a mechanism for user feedback, organizing and summarizing that feedback for program managers and the new National Travel Data Program Advisory Council (discussed in a subsequent section).

Finally, an archiving function will be needed to ensure that critical data sets are maintained over time. Currently, for example, much of the data for the flagship national travel surveys is managed, archived, and made available through individual agency programs or contracts with third parties. Creating a one-stop clearinghouse and archiving function would make national travel data more easily accessible to users, with common user interface and data formats, and would ensure the data's continued availability. In the committee's judgment, the clearinghouse and archiving functions would require significant resources. However, the committee cannot specify the costs at this point; they would need to be developed as part of a more detailed program planning effort.

- *Data analysis, product development, quality assurance, and dissemination*—These are core activities of a National Travel Data Program, essential to ensure that the data collected in the proposed surveys and other data collection activities are analyzed, checked for quality assurance, and presented in ways that are relevant for policy analysis and decision support.¹⁹ Data users (and providers) should be closely involved in these activities, and the user feedback received through the proposed clearinghouse should help shape data products and dissemination channels. The committee believes these activities could entail significant costs that should be specified in a detailed program planning effort.

COST OF THE PROGRAM

Table 4-1 provides an order-of-magnitude estimate of the total cost of the proposed federal core of the National Travel Data Program. For each core element, the table shows the frequency of data collection per decade, proposed sample size, estimated cost per completed survey, decadal cost, and cost on an annual basis. The total program cost is shown as a range—from \$150–200 million over a decade, or \$15–20 million annually—to reflect the high degree of uncertainty of the estimate.

The sources of this uncertainty are many. For surveys, some of the more critical factors include sample size, sampling approach, data collection mode, and duration and productivity of fieldwork, and response rates. Each of these factors in turn will be affected by more detailed assessments of data needs; required geographic resolution; and effects of new methods and

¹⁹ Data mining could identify and extract relevant patterns in the data for decision makers, and disseminating and marketing the data through a wide range of channels (e.g., websites, newsletters, blogs) could potentially expand the audiences for the data and broaden support for their collection.

technologies on data collection, analysis, and dissemination costs. The committee prepared its estimate with the understanding that some of these critical factors will change in the years ahead. Nevertheless, it recognized the need for a rough estimate to provide Congress and U.S. DOT with a sense of scale of the proposed program and required additional funding.

The committee's estimate also is notable for the costs that are not included. For example, working toward greater integration and pooling of state and metropolitan-area data will involve significant costs, but the committee had no basis for their estimation. Moreover, better integration of modal data into the National Travel Data Program, increased data sharing with or data purchase from the private sector, a clearinghouse and archiving function, and more data analysis and the development and dissemination of user-oriented products are all likely to add significant costs that cannot be estimated precisely at this point. Also of importance, the committee made no provision for inflation in its decadal cost estimate. An annual escalation factor should be built into the cost estimates for data collection to avoid cutbacks in sample size and other adjustments to meet flat-lined budgets.

PROGRAM MANAGEMENT

Management of the proposed National Travel Data Program should entail strong organization and leadership, partnerships, and a strong federal role.

Strong Organization and Leadership

Leadership and good management are critical to the success of the proposed National Travel Data Program. Strong management is crucial in developing and setting the mission, facilitating staff growth, and ensuring customer-oriented product development and dissemination. U.S. DOT is the most logical and appropriate agency to spearhead the program because of the central relationship of good national travel data to its mission. To date, however, the department has failed to exercise the leadership and provide the sustained support necessary to develop a robust travel data program that meets the needs of transportation policy and decision makers. Despite four previous National Research Council reports urging such action,²⁰ responsibility for federally sponsored travel data programs, as noted in Chapter 2, remains dispersed among several units at U.S. DOT and other federal agencies, such as the Census Bureau. U.S. DOT needs to ensure that these data are coordinated and integrated into a more coherent picture of how the nation's transportation system functions. As the system faces mounting competitive, economic, demographic, environmental, and energy challenges and embarks on new capital investment programs, it will be important for the Secretary of Transportation to exercise the leadership and provide the necessary direction to ensure the success of the proposed National Travel Data Program so that the travel data needs of the department and the nation will be met.

The Research and Innovative Technology Administration (RITA) and BTS have the appropriate mission and mandate to carry out the design and management of the proposed program. RITA was created in a departmental reorganization in 2004 to coordinate research-driven innovative technology and transportation statistics, and BTS was assigned to RITA by

²⁰ See NRC 1997, TRB 1992, 2003a,b.

statute.²¹ BTS was created in 1991 as the federal statistical agency for transportation, although as discussed in Chapter 2, it has not had the sustained leadership, resources, and staffing necessary to carry out its mission. Nevertheless, with their focus across all modes and coordinating statistical role, RITA and BTS, respectively, have the capability, given sustained funding and appropriate staffing, to develop the next generation of national passenger and freight travel surveys and data collection activities. Moreover, the National Transportation Library (NTL), which is administered by BTS, could undertake the proposed clearinghouse and archiving function.²² The committee does not intend for RITA or BTS to supplant the unique, mode-specific data programs of the modal administrations; rather the two agencies should work closely with the modal administrations to integrate their data into the national program to support better multimodal policy making and modal comparisons.²³

U.S. DOT clearly has the mandate and the mission to lead the development and management of a national travel data program. Because transportation services are so tightly entwined in the economy, society, and security, many other federal agencies require—and in some cases contribute to—transportation data for program and policy design and assessment. It will be important for U.S. DOT, through RITA and BTS, to work closely with sister federal agencies that collect or use travel data (e.g., the Census Bureau, the Bureau of Labor Statistics, the Environmental Protection Agency, the U.S. Department of Housing and Urban Development, the U.S. Department of Agriculture) to ensure that the National Travel Data Program meets their mutual needs. U.S. DOT should look for opportunities to insert important transportation-related questions in the data programs of these other agencies and to integrate the travel data that they do collect into the National Travel Data Program.²⁴

Ultimately, the Secretary of Transportation is responsible for moving the department toward more performance-based—hence data-driven—policies and programs. Congress also has a role to play. To support its interest in performance-based management, Congress should provide the necessary funding and hold U.S. DOT accountable for making progress on developing the National Travel Data Program, topics that are covered in the final two sections of this chapter.

Partnerships and the Federal Role

The success of the National Travel Data Program will require the active participation and sustained support of many partners. A strong federal role is essential to bring these partners together. U.S. DOT's responsibilities include the following functions, which are summarized in [Box 4-2](#):

²¹ The Norman Y. Mineta Research and Special Programs Improvement Act, House Report 563, 108th Congress, 2nd Session, Oct. 7, 2004.

²² The mission of NTL is to maintain and facilitate access to statistical and other information needed for transportation decision making at the federal, state, and local levels, and to coordinate with public and private transportation libraries and information providers to improve information sharing among the transportation community. NTL was established in 1998 by the Transportation Equity Act for the 21st Century.

²³ The legislation creating BTS (see Appendix D) envisioned that it would work with the operating administrations of U.S. DOT to establish and implement BTS's data programs and improve the coordination of data collection efforts with other federal agencies.

²⁴ These data programs could include the Consumer Expenditure Survey, the Economic Census, the Agricultural Census, the American Time Use Survey, and the American Housing Survey, among others.

Box 4-2

U.S. DOT Role in a National Travel Data Program

A strong federal role is critical to the success of the proposed National Travel Data Program. U.S. DOT's responsibilities should include the following:

- Provide strong leadership, advocacy, and coordination across transportation modes and governmental agencies at all levels and with industry.
 - Manage the collection of essential travel data, working to fill key data gaps in collaboration with other data providers and users.
 - Set minimum standards and checks for data quality.
 - Identify appropriate objectives, roles, and responsibilities for data collection at different governmental levels and within the private sector, and encourage more collaboration and partnerships in data collection, particularly with the private sector.
 - Undertake research on and pilot testing of new data collection methods that are most appropriate for transportation data.
 - Provide leadership for continuing improvements in geospatial mapping and analysis.
 - Build and retain professional data staff capabilities and expertise.
 - Establish a data clearinghouse to lead the data integration effort and an archiving function that are comprehensive, convenient, timely, and user-friendly in their implementation.
 - Develop new methods of data analysis, distribution, and dissemination that enhance the capability, accuracy, speed, and convenience of communicating the knowledge gained from the data.
 - Establish effective mechanisms for gathering systematic feedback from data providers and users and a process for collaboratively identifying future data needs.

- *Provide strong leadership, advocacy, and coordination*—Encourage integration of travel data across the modes; incorporate travel data from other federal agencies, states, MPOs, and local governments (e.g., transit agencies); work with industry; and advocate for the importance and funding of travel data with other federal statistical agencies, data providers and users, Congress, and the general public.

- *Manage the collection of essential travel data*—Working collaboratively with other data providers and users, define what data are essential and for what purposes, seek ways to use existing data more productively, and fill critical data gaps through new data sources or expansion of current data collection activities.

- *Set minimum standards and checks for data quality*—For public data collection, provide greater consistency and enable greater data sharing across geographic and governmental units, and help ensure the accuracy of the data.

- *Identify appropriate objectives, roles, and responsibilities for data collection*—Develop and expand more explicit collaborative roles for data partners, such as states, MPOs and

other local agencies (e.g., transit agencies), and the private sector, by involving data providers and users in planning ways to meet future travel data needs.

- *Undertake research on and pilot testing of new data collection methods*—Design and test new survey instruments and data collection methods that are most appropriate for transportation data. Explore and adopt techniques to improve survey response rates and accuracy, new technologies for data capture, and use of simulation and other modeling approaches to improve the coverage of data for decision making.
- *Provide leadership for continuing improvements in geospatial mapping and analysis*—Consider the adoption of new technologies and tools, as well as improvements to existing tools, such as geographic information systems (GIS), for improved spatial and network analysis and data display.²⁵
- *Build and retain professional data staff capabilities and expertise*—A strong professional staff will be essential for developing and maintaining the National Travel Data Program. Critical areas of expertise for staffing and development include transportation policy, statistics, survey research, data collection methods, industry knowledge, data analysis and dissemination techniques, and marketing.
- *Establish a data clearinghouse and archiving function*—The clearinghouse should be the primary location of the critical data integration function, providing the data architecture and common data definitions necessary to enable greater pooling and aggregation of data to meet user needs. The clearinghouse should also disseminate good practices, survey designs, models, and documentation. The archiving function should include a repository for key data sets. A one-stop clearinghouse and archiving function should be developed that is comprehensive, convenient, timely, and user-friendly.
- *Develop new methods of data analysis, distribution, and dissemination*—Such methods should enhance the capability, accuracy, speed, and convenience of communicating the knowledge contained in the data. Translating data into information that is useful for decision making requires distilling the data into decision-support products readily accessible to policy makers, enhancing the visibility and value of the data to these users, and providing the metadata (e.g., standard errors) needed by modelers and researchers.
- *Establish effective mechanisms for gathering systematic feedback from data providers and users*—Greater involvement of data providers and users in improving existing travel data collection activities and identifying emerging data needs should help build stronger constituency support for a National Travel Data Program. The clearinghouse should serve as an important link to transportation users for articulating their data needs. The proposed National Travel Data Program Advisory Council (discussed below) would reflect users' views to U.S. DOT leadership.

There is a clear and developing role for the private sector in travel data collection. The private sector can gain access to data that are often protected from government, and it can frequently undertake such activities as data fusion, creative product design, and dissemination more effectively and efficiently than government. Thus, the private sector should play an important role in the development of a National Travel Data Program. This involvement can be accomplished in a variety of ways, from more collaboration with the public sector in data

²⁵ BTS is U.S. DOT's lead agency for coordinating GIS activities within the department and participating in the Steering Committee of the Federal Geographic Data Committee, which coordinates all geospatial activities between, among, and within federal agencies (BTS 2010b).

collection to the purchase of private data. Partnering with the private sector in a postregulatory environment, where the collection and provision of data are frequently voluntary rather than mandatory, requires different working relationships. The private sector must have an incentive to share data, including remuneration and/or the exchange of data that are of value to private providers. Different ownership and collaborative arrangements, including licensing private data and working through trusted third parties to protect sensitive competitive information, are feasible and likely to be necessary. In turn, these collaborations will require more sophisticated licensing agreements and contractual arrangements to ensure that the public sector has access to the data or to a public-use version of the data that it needs while proprietary interests are protected.

Another option, particularly in cases in which the private sector has a well-developed database, is for the public sector to purchase the data outright. As discussed in Appendix E, the U.S. Army Corps of Engineers has purchased the PIERS database since 2000 to obtain the data it needs on foreign waterborne commerce. Similarly, the TRANSEARCH[®] database is widely used by the public as well as the private sector for freight forecasting and planning. Because of the proprietary nature of data collected by the private sector, however, mutually agreed-upon purchasing arrangements would have to be worked out to ensure that the data are of the requisite quality for the proposed public use.

PROGRAM FUNDING

U.S. DOT needs to move from a strategy of conducting individual surveys to one of funding a cohesive National Travel Data Program whose objectives are to provide decision support and an enhanced customer orientation. As a package, a comprehensive and well-integrated travel data program should offer greater combined benefits to users and spread costs out more evenly.

Funding the proposed National Travel Data Program will require action on several fronts. Ensuring a strong core of federally sponsored national travel data collection activities will require sustained funding on the order of \$150–200 million over the next decade (see [Table 4-2](#)). Expressed as an annual average, the \$15–20 million range represents an annual spending increase of about \$9–14 million over current federal spending of about \$6 million on core travel data collection activities.²⁶ Funding a strong federal core of national travel data collection activities will require both strategically redeploying existing funds (e.g., moving to continuous surveys to help smooth out funding and staffing requirements over the budget cycle) and seeking new funding to fill critical data gaps and improve the integration of disparate data sets.

The next reauthorization of surface transportation legislation provides an opportunity to secure dedicated and continuing funding for core federally sponsored travel data, linked to the need for essential data to support performance-based decision making and performance monitoring and reporting for passenger and freight travel. For example, the legislation could include a new data sub-title—Sub-Title A, Data and Information—under the research title (Title V). In addition, BTS will need funding so it can carry out its mission of coordinating travel data

²⁶ This estimate does not include annual spending on modal travel data, the Census Transportation Planning Products, or state and MPO add-ons to the NHTS, which total about \$24 million. Together, the \$6 million core national-level data programs and the additional \$24 million just described total \$30 million, the annual spending estimate on current travel data programs provided in Chapter 2.

TABLE 4-2 Cost of Proposed Core Federal Travel Data Program Compared with Current Spending

Program Component	Current Spending (\$ millions)		Incremental Investment (\$ millions)		Proposed Spending (\$ millions)	
	Per Decade	Per Annum	Per Decade	Per Annum	Per Decade	Per Annum
National Passenger Data Component						
• Next-Generation National Household Travel Survey (national sample only)	\$6	\$0.6	\$14	\$1.4	\$20	\$2
• National Intercity Passenger Travel Survey and Update	—	—	\$32	\$3.2	\$32	\$3.2
• National Panel Survey	—	—	\$3	\$0.3	\$3	\$0.3
Subtotal	\$6	\$0.6	\$49	\$4.9	\$55	\$5.5
National Freight Travel Data Component						
• Commodity Flow Survey	\$50	\$5	—	—	\$50	\$5
• Supply Chain Survey	—	—	\$30	\$3	30	3
• Local operations surveys*	—	—	—	—	—	—
Subtotal	\$50	\$5	\$30	\$3	\$80	\$8
Data Collection Including Both Passenger and Freight Data						
• Vehicle Inventory and Use Survey	—	—	\$28	\$2.8	\$28	\$2.8
Subtotal			\$28	\$2.8	\$28	\$2.8
Data Design and Development	—	—	\$13	\$1.3	\$13	\$1.3
Total Spending	\$56	\$5.6	\$120	\$12.0	\$176	\$17.6
Proposed Spending Range	\$56	\$5.6	\$94–144	\$9.4–14.4	\$150–200	\$15–20

* Design only; costs are included under “Data Design and Development.”

collection activities across U.S. DOT and with other relevant federal agencies. Additional funding will also be needed to support the proposed clearinghouse and archiving function.

Ensuring adequate funding for state DOT and MPO travel data collection activities will require multiple funding sources. As a general principle, opportunities for collaboration should be sought to share responsibilities and costs. At the state level, the majority of travel data are collected through collaboration with U.S. DOT—through the use of State Planning and Research (SP&R) funds to support annual reporting efforts such as the HPMS and through periodic additions to the NHTS. States could seek an increase in SP&R funds in the next reauthorization of surface transportation legislation and use their own funds to ensure more consistent support for travel data.²⁷ Once a more regular cycle of national travel data collection has been established,

²⁷ The current set-aside is 2 percent of the funds apportioned to the states under the Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) (see §505).

states should be better able to plan and budget for these expenditures. States could also look to professional organizations such as the American Association of State Highway and Transportation Officials (AASHTO) and the American Public Transit Association to assist with collaborative purchases of data for state-level decision making; the Census Transportation Planning Products program organized by AASHTO (described in Appendix E) is a good model.

MPOs, which are facing new responsibilities for monitoring travel and greenhouse gas emissions, among other requirements, could seek additional federal planning funds in the next reauthorization of surface transportation legislation²⁸ and expanded eligibility for data collection activities. In the short run, additional funding would provide support for more MPO add-ons to the next-generation NHTS; in the long run, it would encourage greater standardization of local travel surveys, enabling more pooling of survey results across metropolitan areas and integration of these data into the National Travel Data Program.

Finally, increased partnerships with the private sector hold significant promise for providing timely and useful data on travel movements and more efficient collection of these data. Offering incentives for private partners to participate can be as important as funding. One way to move forward is to engage in pilot projects to define the circumstances under which the data gathering objectives are feasible and worthwhile to both public and private partners. RITA and BTS could be funded to provide direction and support for greater federal, state, and MPO access to private data.

CONSTITUENT SUPPORT AND ACCOUNTABILITY

Two additional items are critical to the success of the proposed National Travel Data Program: (a) a greater role for users in shaping the program and (b) accountability to assure funders and data partners that progress is being made. The point has already been made that current federal travel data programs do not fully meet the needs of their customers, and that data users themselves are widely dispersed and have no systematic mechanism for voicing their needs. Establishing a National Travel Data Program Advisory Council representing major travel data constituencies could provide such a mechanism for channeling the input of data providers and users. In contrast to the existing Advisory Council on Transportation Statistics of BTS, which advises BTS on statistical matters, the proposed National Travel Data Program Advisory Council would provide strategic advice to the Secretary of Transportation on the design and conduct of the National Travel Data Program (see Figure 4-1).²⁹ More generally, it would provide feedback on data issues as they arise, help identify emerging transportation issues and related data needs, and assist in the challenging task of communicating the value of good data. The National Travel Data Program Advisory Council would also serve as the primary conduit for the transportation user community to employ in making its needs known to U.S. DOT leadership, the user feedback

²⁸ SAFETEA-LU currently sets aside 1.25 percent of state apportionments for the Interstate Maintenance, National Highway System, Surface Transportation, Congestion Mitigation and Air Quality Improvement, and Highway Bridge Replacement and Rehabilitation Programs to be made available to MPOs for metropolitan planning activities (see §104).

²⁹ The Advisory Council on Transportation Statistics advises the Director of BTS on the quality, reliability, consistency, objectivity, and relevance of transportation statistics and analyses collected, supported, or disseminated by BTS and U.S. DOT. The Council also advises the Director on methods for encouraging cooperation and the interoperability of transportation data collected by BTS, the operating administrations of U.S. DOT, state and local governments, MPOs, and private-sector entities.

from the clearinghouse providing an additional source. The National Travel Data Program Advisory Council membership should be broad, representing governments at all levels, the private sector, universities, and professional associations and advocacy groups. With such a mechanism in place, data products are more likely to meet user needs, and data users, in turn, are more likely to become strong supporters of sustained data programs.

U.S. DOT needs to move quickly in collaboration with its data partners to implement the proposed National Travel Data Program by developing a multiyear implementation plan; laying out action steps, roles and responsibilities, and milestones; and seeking the necessary funding in the next reauthorization of surface transportation legislation. In the spirit of the current emphasis on performance management and accountability, U.S. DOT should report biennially to Congress, its data partners, and customers on the progress of the program.

FINDINGS

This chapter has described in some detail the committee's vision of a National Travel Data Program that would better meet the needs of transportation decision makers than the current fragmented system. Achieving that vision will require the alignment of leadership, appropriate and forward-looking data collection methods, funding, and understanding of market requirements.

The leadership and overall direction of the Secretary of Transportation will be important to ensure the success of the program. RITA and BTS have the appropriate mission and mandate, if provided sustained funding and appropriate staffing, to design and carry out the program in collaboration with partners at all governmental levels and in the private sector. It is important that the proposed program receive the necessary funding, which the committee estimates at \$15–20 million annually on average, or sustained funding of \$150–200 million over the next decade. This level of funding represents an additional \$9–14 million annually above current federal spending of about \$6 million annually on core travel data collection activities. The next reauthorization of surface transportation legislation provides the opportunity to secure this modest funding increment to help make better decisions with billions of dollars at stake. Finally, developing a program that incorporates enhanced customer orientation and accountability measures should help build constituency support and ensure that progress is being made.

The next and final chapter provides the committee's key findings and recommendations for a strategy for improved travel data.

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Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
BTS	Bureau of Transportation Statistics
ITA	International Trade Administration
NRC	National Research Council
TRB	Transportation Research Board

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A Strategy for Improved Travel Data

To meet the needs for public and private transportation policy analysis and decision making, the committee recommends the organization of a National Travel Data Program, built on a core of essential travel data sponsored at the federal level and well integrated with travel data collected by states, metropolitan planning organizations (MPOs), transit and other local agencies, and the private sector. To ensure the success of the program, it is important that the Secretary of Transportation provide the necessary leadership and overall guidance because these data are central to the mission of the U.S. Department of Transportation (U.S. DOT). To support this data program, sustained funding on the order of \$150–200 million is needed over the next decade—an annual average of \$15–20 million. This proposed funding level represents an annual increase of about \$9–14 million over current federal spending of about \$6 million on core travel data collection activities. The next reauthorization of surface transportation legislation provides an opportunity to secure the necessary funding. The committee’s consensus findings and recommendations are elaborated below.

A NATIONAL TRAVEL DATA PROGRAM: THE CONCEPT

***Finding 1:** Transportation decision makers face a complex, changing, and uncertain environment, yet the data essential for supporting transportation operations, policy, and investment decisions at all governmental levels and in the private sector are fragmented and incomplete in coverage and detail, lack timeliness, and are poorly integrated for analysis of current and emerging issues.*

The issues facing transportation decision makers today range from system performance; to safety; to energy use and environmental impacts; to economic impacts and international competitiveness; to changing demographics; to equity in the allocation of resources, services, and costs. The primary data used to support decision making on these issues are provided in periodic large-scale federal surveys of passenger and freight movement. The sample sizes in these surveys are often insufficient to support analyses at the levels of geographic detail and for the market segments needed by data users. Nor are results always timely, leaving decision makers with no choice but to make decisions with inadequate and outdated data support.

Recommendation 1: A National Travel Data Program should be organized and sustained, built on a core of essential national passenger and freight travel data sponsored at the federal level and well integrated with travel data collected by the states, MPOs, transit and other local agencies, and the private sector.

Addressing critical issues, particularly in today’s highly constrained funding environment, requires a strategic, interlinked system of passenger and freight travel data. A strong federal role

is foundational to enable the combination of travel data from numerous sources to be organized into a coherent national program, well integrated in terms of data architecture (i.e., the framework and relational structure), timing, and methods of data collection and sharing.

COLLABORATIONS AND PARTNERSHIPS

***Finding 2:** Developing the next generation of passenger and freight travel data surveys and data collection activities will require the active participation and sustained support of many data partners.*

***Finding 3:** Private sector data providers are necessarily key partners because they generate, aggregate, and disseminate data essential to transportation decisions. Thus they can and must play an important role in the development of a National Travel Data Program.*

In view of the wide range of data needs and the diversity of users, organizing a National Travel Data Program cannot be just a federal responsibility but must involve the active collaboration of all data partners, with well-defined roles and responsibilities.

Recommendation 2: U.S. DOT should work cooperatively with public agencies at all governmental levels, private sector data providers, and professional and nonprofit associations to organize and implement a National Travel Data Program.

The proposed program would advance the current travel data collection system by employing more consistent data definitions, stronger quality controls, better integration of data sets, and more strategic use of privately collected data. States and MPOs, for example, collect a considerable amount of travel data, often for their own planning and management purposes, which cannot currently be aggregated for national use because of different data definitions, collection methods, and formats. A process for working collaboratively and on a continuing basis with states and MPOs is needed to develop more common formats so that state and regional travel data can be better integrated and aggregated across jurisdictions for analysis and decision making. Opportunities for partnering with the private sector to derive mutual benefits should be pursued so that private-sector data can be accessed and used while proprietary interests are protected and private-sector expertise in such areas as data collection, aggregation, display, and dissemination is leveraged. More generally, collaboration among data providers, both public and private, can help meet user needs for more detailed data and customized applications for specific sectors, geographic areas (e.g., local bicycle and pedestrian data), and markets that cannot readily be provided by a single data source.

ORGANIZATION AND LEADERSHIP

***Finding 4:** A successful National Travel Data Program that serves policy makers and planners will require the alignment of leadership, methods, funding, and understanding of market requirements.*

***Finding 5:** U.S. DOT remains the logical and most appropriate agency to spearhead such a program because of the central relationship of good national travel data to its mission, even though it has failed in the past to exercise the essential leadership and provide the sustained support necessary to ensure that the data required to meet the needs of policy and decision making are available.*

U.S. DOT's lack of a sustained commitment to meeting travel data needs despite numerous prior assessments of its data programs by National Research Council (NRC) committees and others has resulted in an erosion of travel data quality, coverage, and completeness, leaving significant gaps between the needs of decision makers and the data available to support them. In addition, U.S. DOT lacks the requisite breadth and depth of personnel and skills to support data collection activities. As the nation's transportation system faces mounting competitive, economic, demographic, environmental, and energy challenges and embarks on new capital investment programs, U.S. DOT should assume a strong leadership role to meet these challenges and ensure that the needed data are coordinated and integrated into a more coherent picture of how the nation's transportation system functions. The department needs to move from a mentality of conducting individual surveys to developing a well integrated National Travel Data Program that provides decision support and is customer oriented.

Recommendation 3: The leadership role necessary to the success of the proposed National Travel Data Program at the federal level should be assigned to the Secretary of Transportation to ensure that the data needs of U.S. DOT and the nation are met.

The Research and Innovative Technology Administration (RITA) and the Bureau of Transportation Statistics (BTS) have the appropriate mission and mandate to carry out the design and management of the proposed program. RITA was created in a departmental reorganization in 2004 to coordinate research-driven innovative technology and transportation statistics, and BTS was assigned by statute to RITA. BTS was created in 1991 as the federal statistical agency for transportation, although it has not had the sustained leadership, resources, and staffing necessary to carry out its mission. Nevertheless, with their focus across all modes and their coordinating statistical role, RITA and BTS, respectively, have the capability, with sustained funding and appropriate staffing, to develop the next generation of passenger and freight travel surveys and data collection activities. The committee does not intend for these activities to supplant the unique, mode-specific data programs of the modal administrations; rather, RITA and BTS should work closely with these administrations to integrate their data into the National Travel Data Program to enable better multimodal policy making and modal comparisons.

The Secretary of Transportation is ultimately responsible for moving U.S. DOT toward more performance-based—hence data-driven—policies and programs. Congress, with its own

interest in performance-based management, should provide the necessary funding and hold the department accountable for making progress toward developing the needed data.

NEW DATA COLLECTION, INTEGRATION, AND ANALYSIS APPROACHES

***Finding 6:** Realizing the vision of a well-integrated, coordinated National Travel Data Program will require addressing many significant barriers to data collection, integration, and sharing. Traditional methods of collecting data through large-scale, periodic surveys need to be adapted to address issues of public acceptance and take advantage of evolving technologies and data collection approaches.*

Some of the key barriers to data collection include declining response rates on surveys, privacy and disclosure issues that make it difficult to collect travel data at the level of detail required by some users, the proprietary nature of data collected by the private sector, the challenge of capturing the complexity of travel behavior itself, and the lack of standardization that hampers greater pooling of data from multiple sources. New approaches for overcoming these barriers include media campaigns and incentives to improve survey response rates, as well as greater use of technology to reduce respondent burden (e.g., online surveys and electronic reporting); improve reporting accuracy (e.g., use of Global Positioning System [GPS] technology along with household travel diaries); and provide timelier travel data, sometimes in real time (e.g., use of passive cellular telephone probes to capture travel speeds). None of these measures is a panacea. They also may increase the costs of data collection, but they can also provide data that are more accurate, relevant, and timely.

U.S. DOT's flagship multimodal surveys have not kept pace with innovations in data collection. For example, the Commodity Flow Survey (CFS) still relies on mail out–mail back surveys, and the National Household Travel Survey (NHTS) still uses households with landline telephones as its sampling frame despite the growth in cellular- and Internet-only households. Relying solely on traditional survey methods thus threatens the validity and relevance of the data products.

Recommendation 4: RITA, through BTS and in collaboration with its data partners, should aggressively invest in the design and testing of alternative methods for data collection, integration, management, and dissemination.

A major redesign effort will be required if a new supply chain–focused freight survey is to be mounted and other key gaps in freight travel data filled. The Federal Highway Administration (FHWA) is already conducting research on new sampling strategies for the next NHTS. BTS should build and expand on that effort to conduct research on alternative data collection methods more generally (e.g., continuous surveys, longitudinal panel surveys); greater use of technology (e.g., GPS, web-based surveys, passive cellular and smart phone probes to collect travel data in real time, data mining); and federal acquisition, integration, and modification of commercial data that could be useful but are not designed for policy analysis and decision making (e.g., real-time data on vehicle speeds). This research should also include determining the optimal frequency of surveys and updates, pilot testing new techniques, determining the requirements for a national

data architecture and clearinghouse function to facilitate the integration of data sets, examining prospects for contracting with private vendors for data collection, and uncovering opportunities for gathering travel data from other federal data collection programs and the private sector. BTS and staff of other data programs across U.S. DOT should also take an active role in the existing interagency Federal Committee on Statistical Methodology under the Office of Management and Budget. This committee is dedicated to improving the quality of statistics among federal statistical agencies and providing a mechanism for statisticians in different federal agencies to meet and exchange ideas. It provides another mechanism for improving the coordination of data collection activities and sharing research on methodological problems related to the collection of travel data.

SUFFICIENT AND SUSTAINED FUNDING

***Finding 7:** Funding for federal travel data programs has been both limited, given the need for data, and inconsistent, threatening the existence of some key program components and causing the elimination of others.*

Over time, the funding situation has resulted in the erosion of travel data coverage, quality, sample sizes, and staff resources and development, and left decision makers with a limited capacity to address emerging challenges and opportunities in data collection and analysis.

Recommendation 5: The proposed National Travel Data Program should receive sustained funding for its core activities, estimated by the committee to be on the order of \$150–200 million over the next decade—an annual average of \$15–20 million.

Ensuring a strong federal core of national travel data will require both a strategic redeployment of existing funding (e.g., moving to continuous surveys to help smooth out funding and staffing requirements) and new funding to fill critical data gaps and improve the integration of disparate data sets.

***Finding 8:** The next reauthorization of surface transportation legislation offers the opportunity to secure the new funding, building on the need for better data to support performance-based decision making.*

The proposed funding represents an increase of about \$9–14 million over current annual federal spending of about \$6 million on core travel data collection activities. Securing this funding would provide support for the core national passenger and freight travel data surveys and the recommended design and development effort. In addition, BTS will need funding to fulfill its data coordinating role and to establish the national clearinghouse and data archiving function to facilitate data integration efforts. Increases in State Planning and Research funds and MPO planning funds are also essential so that state and local data partners can provide more consistent support for national travel data surveys and further efforts to pool and integrate data at all governmental levels. Data sharing arrangements with the private sector could provide an opportunity for cost sharing with industry partners. The total necessary funding noted above—

on the order of \$15–20 million annually—is modest relative to the size of transportation investments and the substantial risks of making uninformed choices.

CONSTITUENT SUPPORT

***Finding 9:** Current federal travel data programs fail to fully meet the needs of their customers, and data users are widely dispersed and have no systematic mechanism for voicing their needs.*

Without more systematic user feedback and market-sensitive programs, building constituent support for data collection is difficult, and data providers risk designing and delivering data products that fail to meet user needs.

Recommendation 6: A National Travel Data Advisory Council representing the major travel data constituencies should be formed to provide strategic advice to the Secretary of Transportation on the design and conduct of the National Travel Data Program and on emerging data needs.

This Advisory Council would be distinct from the Advisory Council on Transportation Statistics of BTS, which provides technical advice to the Director of BTS, largely on statistical issues. The new Advisory Council would report directly to the Secretary of Transportation, and its primary mission would be to provide guidance to the Secretary on the conduct of the National Travel Data Program. The Advisory Council should have a broad membership, including representatives of all governmental levels, the private sector, universities, and professional associations and advocacy groups. In addition to its advisory role, it should provide feedback on data issues as they arise, assist in identifying emerging transportation problems and opportunities and related data needs, and help communicate the value of good data.

MANAGEMENT AND ACCOUNTABILITY

***Finding 10:** An implementation plan, establishing action steps, roles and responsibilities, and milestones, is needed to ensure accountability to those who fund, develop, and use the National Travel Data Program.*

A plan with actionable steps and accountability is critical so that U.S. DOT can assure Congress, its data partners, and its constituents that progress is being made.

Recommendation 7: U.S. DOT should develop a multiyear plan for implementing the National Travel Data Program in collaboration with its data partners; move rapidly to take the necessary first steps to put the plan into operation; and report biennially to Congress, its data partners, and its constituents on progress made.

Now is an opportune time to move forward with the National Travel Data Program proposed in this report. With leadership commitment at the Secretarial level, a new Advisory Council, and a legislative mandate already in place, U.S. DOT should be poised to take on the responsibilities identified herein. Pending reauthorization legislation, with its likely emphasis on performance management and accountability, provides an opportunity to secure the necessary funding.

Appendix A

Study on Strategies for Improved Passenger and Freight Travel Data

Statement of Task

This study will assess the state of passenger and freight travel data at the federal, state, and local levels and make recommendations for an affordable and sustainable system for estimating personal and freight travel to support public and private transportation planning and decision making. Most travel data at the federal, state, or local levels are collected in one-off surveys or programs that are highly contingent upon shifting political and funding priorities and not infrequently in danger of cancellation. The primary emphasis of this project will be on understanding user needs for travel data and developing a practical, achievable, and affordable strategy for collection of, and funding for, essential travel data programs.

To create responsive, cost-effective and sustainable data programs for personal and freight travel data, user needs should be understood, current and emerging barriers to such data programs identified, new approaches for collecting data assessed, costs evaluated, and benefits documented. With these goals in mind, the committee will qualitatively examine the effectiveness and feasibility of promising innovations in data collection, such as continuous longitudinal surveys, web surveys, and methods to capture data from automated sources (e.g., probe vehicles, cell phone probes, radio frequency identification tags), and recommend strategies for ensuring the timely availability and quality of essential travel data at acceptable costs.

List of Briefings at Committee Meetings

FIRST COMMITTEE MEETING DECEMBER 10–11, 2009, WASHINGTON, D.C.

Sponsor Perspectives on Study Objectives and Overview of Travel Data Programs

Gregory Nadeau, Deputy Administrator, Federal Highway Administration (FHWA)

Peter Appel, Administrator, Research and Innovative Technology Administration

Michelle Maggiore, American Association of State Highway and Transportation Officials

Freight Travel Data Programs

Commodity Flow Survey

Ronald Duych, Bureau of Transportation Statistics

John Fowler, U.S. Bureau of the Census

Vehicle Inventory and Use Survey

Rolf Schmitt, FHWA (Office of Freight Management)

Passenger Travel Data Programs

National Household Travel Survey

Heather Contrino, FHWA (Office of Highway Policy Information)

Journey to Work/American Community Survey

Alan Pisarski, committee member

Robert Kominski, U.S. Bureau of the Census

Census Transportation Planning Products

Elaine Murakami, FHWA (Office of Planning)

Ed Christopher, FHWA Resource Center

State Travel Data Programs

Highway Performance Monitoring System

Ralph Gillmann, FHWA (Office of Highway Policy Information)

Timothy Lomax, Texas Transportation Institute

Transit Travel Data Programs

National Transit Database

John Giorgis, Federal Transit Administration

Steven Polzin, committee member

Metropolitan Planning Organization Travel Data Programs

Local Travel Surveys

Johanna Zmud, committee member

**SECOND COMMITTEE MEETING
FEBRUARY 18–19, 2010, WASHINGTON, D.C.**

Roundtable 1: Federal Travel Data Users

Nikki Clowers, U.S. Government Accountability Office
Jack Wells, U.S. Department of Transportation (U.S. DOT)
Brodi Fontenot, U.S. DOT
John Thomas, U.S. Environmental Protection Agency

Roundtable 2: State and Metropolitan Planning Organization (MPO) Travel Data Users

David Ekern, Virginia DOT (retired)
Ronald Kirby, Metropolitan Washington Council of Governments
Thomas Kane, Des Moines Area MPO
Mary Lynn Tischer, FHWA, (formerly Virginia DOT)

Luncheon Speaker

Jonette Kreideweis, Minnesota DOT

Roundtable 3: Private-Sector Travel Data Users

Ava (Kitty) Vollbrecht, Norfolk Southern Corp.
Stéphane Gros, HDR Decision Economics
Paul Ciannavei, IHS Global Insight, Inc.
Thom Pronk, CR England

Roundtable 4: Public Interest Group Travel Data Users

Charles Kooshian, Center for Clean Air Policy
Robert Puentes, The Brookings Institution
Scott Bernstein, Center for Neighborhood Technology
Jana Lynott, The American Association of Retired Persons

Boarder Crossing Travel Data

Thomas Plewes, Committee on National Statistics
Crystal Jones, FHWA

American Transportation Research Institute—FHWA Freight Data Project

Dan Murray, committee member
Crystal Jones, FHWA

**THIRD COMMITTEE MEETING
MAY 6–7, 2010, WASHINGTON, D.C.**

Capitalizing on New Technologies

Rick Schuman, INRIX

Luncheon Speaker

Gordon Baldwin, Statistics Canada

Appendix C

Bibliography of Selected Studies on Passenger and Freight Travel Data and Related Topics

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Legislation Establishing the Bureau of Transportation Statistics

TITLE 49 > SUBTITLE I > CHAPTER 1 > § 111

§ 111. Bureau of Transportation Statistics

(a) Establishment.— There is established in the Research and Innovative Technology Administration a Bureau of Transportation Statistics.

(b) Director.—

(1) Appointment.— The Bureau shall be headed by a Director who shall be appointed in the competitive service by the Secretary of Transportation.

(2) Qualifications.— The Director shall be appointed from among individuals who are qualified to serve as the Director by virtue of their training and experience in the collection, analysis, and use of transportation statistics.

(c) Responsibilities.— The Director of the Bureau shall serve as the Secretary's senior advisor on data and statistics and shall be responsible for carrying out the following duties:

(1) Providing data, statistics, and analysis to transportation decision makers.— Ensuring that the statistics compiled under paragraph (5) are designed to support transportation decision making by the Federal Government, State and local governments, metropolitan planning organizations, transportation-related associations, the private sector (including the freight community), and the public.

(2) Coordinating collection of information.— Working with the operating administrations of the Department to establish and implement the Bureau's data programs and to improve the coordination of information collection efforts with other Federal agencies.

(3) Data modernization.— Continually improving surveys and data collection methods to improve the accuracy and utility of transportation statistics.

(4) Encouraging data standardization.— Encouraging the standardization of data, data collection methods, and data management and storage technologies for data collected by the Bureau, the operating administrations of the Department of Transportation, States, local governments, metropolitan planning organizations, and private sector entities.

(5) Transportation statistics.— Collecting, compiling, analyzing, and publishing a comprehensive set of transportation statistics on the performance and impacts of the national transportation system, including statistics on—

(A) productivity in various parts of the transportation sector;

(B) traffic flows for all modes of transportation;

(C) other elements of the intermodal transportation database established under subsection (e);

(D) travel times and measures of congestion;

(E) vehicle weights and other vehicle characteristics;

(F) demographic, economic, and other variables influencing traveling behavior, including choice of transportation mode and goods movement;

(G) transportation costs for passenger travel and goods movement;

(H) availability and use of mass transit (including the number of passengers served by each mass transit authority) and other forms of for-hire passenger travel;

(I) frequency of vehicle and transportation facility repairs and other interruptions of transportation service;

(J) safety and security for travelers, vehicles, and transportation systems;

(K) consequences of transportation for the human and natural environment;

(L) the extent, connectivity, and condition of the transportation system, building on the national transportation atlas database developed under subsection (g); and

(M) transportation-related variables that influence the domestic economy and global competitiveness.

(6) National spatial data infrastructure.— Building and disseminating the transportation layer of the National Spatial Data Infrastructure developed under Executive Order No. 12906, including coordinating the development of transportation geospatial data standards, compiling intermodal geospatial data, and collecting geospatial data that is not being collected by others.

(7) Issuing guidelines.— Issuing guidelines for the collection of information by the Department required for statistics to be compiled under paragraph (5) in order to ensure that such information is accurate, reliable, relevant, and in a form that permits systematic analysis.

(8) Review sources and reliability of statistics.— Reviewing and reporting to the Secretary on the sources and reliability of the statistics proposed by the heads of the operating administrations of the Department to measure outputs and outcomes as required by the Government Performance and Results Act of 1993 (Public Law 103–62; 107 Stat. 285), and the amendments made by such Act, and carrying out such other reviews of the sources and reliability of other data collected or statistical information published by the heads of the operating administrations of the Department as shall be requested by the Secretary.

(9) Making statistics accessible.— Making the statistics published under this subsection readily accessible to the public.

(d) Information Needs Assessment.—

(1) In general.— Not later than 60 days after the date of enactment of the SAFETEA–LU, the Secretary shall enter into an agreement with the National Research Council to develop and publish a National ^[1] transportation information needs assessment (referred to in this subsection as the “assessment”). The assessment shall be submitted to the Secretary and the appropriate committees of Congress not later than 24 months after such agreement is entered into.

(2) Content.— The assessment shall—

(A) identify, in order of priority, the transportation data that is not being collected by the Bureau, operating administrations of the Department, or other Federal, State, or local entities, but is needed to improve transportation decisionmaking at the Federal, State, and local levels and to fulfill the requirements of subsection (c)(5);

(B) recommend whether the data identified in subparagraph (A) should be collected by the Bureau, other parts of the Department, or by other Federal, State, or local entities, and whether any data is of a higher priority than data currently being collected;

(C) identify any data the Bureau or other Federal, State, or local entity is collecting that is not needed;

(D) describe new data collection methods (including changes in surveys) and other changes the Bureau or other Federal, State, or local entity should implement to improve the standardization, accuracy, and utility of transportation data and statistics; and

(E) estimate the cost of implementing any recommendations.

(3) Consultation.— In developing the assessment, the National Research Council shall consult with the Department’s Advisory Council on Transportation Statistics and a representative cross-section of transportation community stakeholders as well as other Federal agencies, including the Environmental Protection Agency, the Department of Energy, and the Department of Housing and Urban Development.

(4) Report to congress.— Not later than 180 days after the date on which the National Research Council submits the assessment under paragraph (1), the Secretary shall submit a report to Congress that describes—

(A) how the Department plans to fill the data gaps identified under paragraph (2)(A);

(B) how the Department plans to stop collecting data identified under paragraph (2)(C);

(C) how the Department plans to implement improved data collection methods and other changes identified under paragraph (2)(D);

(D) the expected costs of implementing subparagraphs (A), (B), and (C) of this paragraph;

(E) any findings of the assessment under paragraph (1) with which the Secretary disagrees, and why; and

(F) any proposed statutory changes needed to implement the findings of the assessment under paragraph (1).

(e) Intermodal Transportation Database.—

(1) In general.— In consultation with the Under Secretary for Policy, the Assistant Secretaries, and the heads of the operating administrations of the Department, the Director shall establish and maintain a transportation database for all modes of transportation.

(2) Use.— The database shall be suitable for analyses carried out by the Federal Government, the States, and metropolitan planning organizations.

(3) Contents.— The database shall include—

(A) information on the volumes and patterns of movement of goods, including local, interregional, and international movement, by all modes of transportation and intermodal combinations and by relevant classification;

(B) information on the volumes and patterns of movement of people, including local, interregional, and international movements, by all modes of transportation (including bicycle and pedestrian modes) and intermodal combinations and by relevant classification;

(C) information on the location and connectivity of transportation facilities and services; and

(D) a national accounting of expenditures and capital stocks on each mode of transportation and intermodal combination.

(f) National Transportation Library.—

(1) In general.— The Director shall 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.

(2) Access.— The Director shall facilitate and promote access to the Library, with the goal of improving the ability of the transportation community to share information and the ability of the Director to make statistics readily accessible under subsection (c)(9).

(3) Coordination.— The Director shall work with other transportation libraries and transportation information providers, both public and private, to achieve the goal specified in paragraph (2).

(g) National Transportation Atlas Database.—

(1) In general.— The Director shall develop and maintain a national transportation atlas database that is comprised of geospatial databases that depict—

- (A) transportation networks;
- (B) flows of people, goods, vehicles, and craft over the networks; and
- (C) social, economic, and environmental conditions that affect or are affected by the networks.

(2) Intermodal network analysis.— The databases shall be able to support intermodal network analysis.

(h) Mandatory Response Authority for Freight Data Collection.— Whoever, being the owner, official, agent, person in charge, or assistant to the person in charge of any freight corporation, company, business, institution, establishment, or organization of any nature whatsoever, neglects or refuses, when requested by the Director or other authorized officer, employee, or contractor of the Bureau, to answer completely and correctly to the best of the individual's knowledge all questions relating to the corporation, company, business, institution, establishment, or other organization, or to make available records or statistics in the individual's official custody, contained in a data collection request prepared and submitted under the authority of subsection (c)(1), shall be fined not more than \$500; but if the individual willfully gives a false answer to such a question, the individual shall be fined not more than \$10,000.

(i) Research and Development Grants.— The Secretary may make grants to, or enter into cooperative agreements or contracts with, public and nonprofit private entities (including State transportation departments, metropolitan planning organizations, and institutions of higher education) for—

(1) investigation of the subjects specified in subsection (c)(5) and research and development of new methods of data collection, standardization, management, integration, dissemination, interpretation, and analysis;

(2) demonstration programs by States, local governments, and metropolitan planning organizations to coordinate data collection, reporting, management, storage, and archiving to simplify data comparisons across jurisdictions;

(3) development of electronic clearinghouses of transportation data and related information, as part of the National Transportation Library under subsection (f); and

(4) development and improvement of methods for sharing geographic data, in support of the database under subsection (g) and the National Spatial Data Infrastructure.

(j) Limitations on Statutory Construction.— Nothing in this section shall be construed—

(1) to authorize the Bureau to require any other department or agency to collect data; or

(2) to reduce the authority of any other officer of the Department to collect and disseminate data independently.

(k) Prohibition on Certain Disclosures.—

(1) In general.— An officer, employee, or contractor of the Bureau may not—

(A) make any disclosure in which the data provided by an individual or organization under subsection (c) can be identified;

(B) use the information provided under subsection (c) for a nonstatistical purpose; or

(C) permit anyone other than an individual authorized by the Director to examine any individual report provided under subsection (c).

(2) Copies of reports.—

(A) In general.— No department, bureau, agency, officer, or employee of the United States (except the Director in carrying out this section) may require, for any reason, a copy of any report that has been filed under subsection (c) with the Bureau or retained by an individual respondent.

(B) Limitation on judicial proceedings.— A copy of a report described in subparagraph (A) that has been retained by an individual respondent or filed with the Bureau or any of its employees, contractors, or agents—

(i) shall be immune from legal process; and

(ii) shall not, without the consent of the individual concerned, be admitted as evidence or used for any purpose in any action, suit, or other judicial or administrative proceedings.

(C) Applicability.— This paragraph shall apply only to reports that permit information concerning an individual or organization to be reasonably determined by direct or indirect means.

(3) Informing respondent of use of data.— In a case in which the Bureau is authorized by statute to collect data or information for a nonstatistical purpose, the Director shall clearly distinguish the collection of the data or information, by rule and on the collection instrument, so as to inform a respondent who is requested or required to supply the data or information of the nonstatistical purpose.

(l) Transportation Statistics Annual Report.— The Director shall submit to the President and Congress a transportation statistics annual report which shall include information on items referred to in subsection (c)(5), documentation of methods used to obtain and ensure the quality of the statistics presented in the report, and recommendations for improving transportation statistical information.

(m) Data Access.— The Director shall have access to transportation and transportation-related information in the possession of any Federal agency, except information—

(1) the disclosure of which to another Federal agency is expressly prohibited by law; or

(2) the disclosure of which the agency possessing the information determines would significantly impair the discharge of authorities and responsibilities which have been delegated to, or vested by law, in such agency.

(n) Proceeds of Data Product Sales.— Notwithstanding section 3302 of title 31, funds received by the Bureau from the sale of data products, for necessary expenses incurred, may be credited to the Highway Trust Fund (other than the Mass Transit Account) for the purpose of reimbursing the Bureau for the expenses.

(o) Advisory Council on Transportation Statistics.—

(1) Establishment.— The Director shall establish an advisory council on transportation statistics.

(2) Function.— The function of the advisory council established under this subsection is to—

(A) advise the Director on the quality, reliability, consistency, objectivity, and relevance of transportation statistics and analyses collected, supported, or disseminated by the Bureau and the Department;

(B) provide input to and review the report to Congress under subsection (d)(4); and

(C) advise the Director on methods to encourage cooperation and interoperability of transportation data collected by the Bureau, the operating administrations of the Department, States, local governments, metropolitan planning organizations, and private sector entities.

(3) Membership.— The advisory council established under this subsection shall be composed of not fewer than 9 and not more than 11 members appointed by the Director, who are not officers or employees of the United States. Each member shall have expertise in transportation data collection or analysis or application; except that 1 member shall have expertise in economics, 1 member shall have expertise in statistics, and 1 member shall have experience in transportation safety. At least 1 member shall be a senior official of a State department of transportation.

Members shall include representation of a cross-section of transportation community stakeholders.

(4) Terms of appointment.—

(A) In general.— Except as provided in subparagraph (B), members of the advisory council shall be appointed to staggered terms not to exceed 3 years. A member may be renominated for 1 additional 3-year term.

(B) Current members.— Members serving on the Advisory Council on Transportation Statistics as of the date of enactment of the SAFETEA–LU shall serve until the end of their appointed terms.

(5) Applicability of federal advisory committee act.— The Federal Advisory Committee Act shall apply to the advisory council established under this subsection, except that section 14 of such Act shall not apply.

Current Data Programs for Monitoring Passenger Travel and Freight Movement

This appendix describes the major sources of travel data in the United States today. It covers programs addressing passenger travel, those addressing freight movement, and those addressing both. Issues and gaps associated with each program are highlighted.

DATA PROGRAMS FOR MONITORING PASSENGER TRAVEL

A comprehensive picture of passenger travel requires measurements of both local and long-distance travel. Local travel is frequent and often repetitive, dominated by journeys to work, shopping, schools, and services. For most people, long-distance travel is less frequent, is dominated by tourism and business trips, and involves a different set of mode choices than local travel. A comprehensive picture of local and long-distance travel across all modes at the national scale has yet to be developed, though some initial work to this end is under way at the Federal Highway Administration (FHWA). Building blocks for a national picture of local travel include the National Household Travel Survey, the Census Transportation Planning Package, and the National Transit Database, supplemented by a half-century of surveys by local agencies and metropolitan planning organizations (MPOs). Building blocks for national measures of long-distance travel include the American Travel Survey (ATS), the survey of international air travelers conducted by the Department of Commerce's Office of Travel and Tourism Industries (OTTI), tourism surveys conducted by the private sector, and air carrier traffic statistics (discussed in the section on data programs for monitoring both passenger travel and freight movement).

National Household Travel Survey

The NHTS is the only source of national data on personal travel by all modes in the United States. Data on travel characteristics—trip frequency, length, and time; travel mode (including nonmotorized modes); and purpose—are linked with household and personal data (e.g., household composition, income, age, work characteristics, general location type) and vehicle ownership and use data to provide a snapshot of personal travel (Contrino 2009). Limited data are available for states and some large metropolitan areas, but not below this geographic level. The 2009 NHTS focused on short trips (within 50 miles). Although respondents recorded their trips of all distances for one day, long-distance trips were so infrequent that these data could not be used for any substantive analysis.

The NHTS started in 1969 as the Nationwide Personal Transportation Survey (NPTS), a home-interview survey conducted in roughly 5-year cycles. The NPTS was merged with the ATS (described below) and renamed the NHTS in 2001 to capture both local and long-distance travel in one survey. The long-distance portion of the NHTS was not successful and has since been dropped.

Historically, the NHTS has been funded primarily by FHWA, with modest contributions by other administrations at the U.S. Department of Transportation (U.S. DOT). States and MPOs can purchase larger local samples through add-ons to the national sample. With the creation of the Bureau of Transportation Statistics (BTS) in 1991, that agency became a cosponsor of the 1995 survey; the cost was split equally in 2001 in the effort to replace the ATS for measuring long-distance travel. The most recent survey (2009) was delayed when BTS announced it could no longer support the effort. FHWA reassumed full responsibility for its funding and administration and, largely with the support of the departments of transportation (DOTs) of 14 states and six MPOs that provided the bulk of the funding—\$21 million of the \$24 million cost—the survey moved forward.¹ Currently the program is staffed with only 1 full-time equivalent (FTE) from FHWA and 2.5 FTE on-site contractors.

In addition to issues of funding stability, the NHTS faces the increasing challenge of low response rates. Data collection conducted primarily through landline telephone surveys yielded only a 23 percent response rate to the initial recruitment for the 2009 survey, a sharp decline from the 56 percent response rate for the 2001 NHTS.^{2,3} U.S. DOT staff acknowledge that the growing share of cellular telephone-only households will require abandoning complete reliance on landline telephone communication in future surveys. In addition, greater use of web surveys, Global Positioning System (GPS) data recorders, and other approaches may be needed. In fact, a small pilot test of surveying cellular telephone users was conducted as part of the 2009 survey (Contrino 2010). Subsequent analysis showed that cellular telephone-only respondents have different travel patterns from those of other respondents, an issue that must be revisited as the next survey plan is developed. As a step in this direction, FHWA, together with the Office of the Secretary of Transportation, is funding a \$1.6 million study to explore a wide range of methods for conducting the next NHTS. BTS is part of the study team but has not contributed funding.⁴ Response rate issues are not limited to the NHTS and are not new, having been identified in a letter report from the Transportation Research Board (TRB) to BTS in 2002 and in a TRB Special Report the following year (TRB 2003).⁵

Another critical issue is the timeliness of the data. Although many data products are provided within 6 months to 1 year after survey completion, the length of time between surveys and the one-snapshot, cross-sectional approach are problematic. When the 2009 survey was conducted, for example, the nation was in a deep recession, so that travel, particularly discretionary travel, was suppressed.

¹ The 14 states were California, Florida, Georgia, Indiana, Iowa, New York, North Carolina, South Carolina, South Dakota, Tennessee, Texas, Vermont, Virginia, and Wisconsin. The six MPOs were Chittenden County MPO (Vermont), Linn County Regional Planning Commission (Cedar-Rapids (Iowa), Maricopa Association of Governments and Pima Association of Governments (Arizona), Piedmont Regional Transportation (North Carolina), and Omaha-Council Bluffs Metro Area Planning Agency (Nebraska) (Contrino 2010). The state and MPO contributions were handled as a pooled-fund project of FHWA, an arrangement that enables agencies to pool resources for a common purpose. In the case of the NHTS, the matching fund requirement was waived (Contrino 2009).

² These are the response rates submitted to the Office of Management and Budget (OMB). The retention rate for those initially recruited was much higher—80 percent—even higher than the 2001 rate of 70 percent, reflecting a greater effort to obtain responses and the use of incentives.

³ T. Tang, FHWA, personal communication, June 11, 2010.

⁴ T. Tang, FHWA, personal communication, June 11, 2010.

⁵ The letter report appears in Special Report 277 as Appendix A.

Census Transportation Planning Products

The CTPP provides nationwide passenger work trip data, anchored on home and work locations. Through 2000, these data were drawn from the long form of the decennial census of population and housing; more recently, they have been drawn from the continuous American Community Survey. Initially collected in the 1960 census to support the definition of metropolitan areas by the Office of Management and Budget, Journey to Work data provided through the CTPP support regional and local transportation planning with geographically detailed information on where people live and work, how they get to work, and when they depart for work (Pisarski 2006). These data are available at a fine-grained geographic level—typically by traffic analysis zones used by planning agencies or census block groups—to provide inputs for regional travel demand models for larger MPOs and to serve as primary source data for smaller agencies with limited modeling capabilities (Pisarski 2006). Although work trips now account for only slightly more than 20 percent of all household vehicle trips (Hu and Reuscher 2004, 16) and just 15 percent of all person trips (Pisarski 2006, 3), these data are vital for understanding peak demand loads on the transportation system and overall levels of and options for addressing congestion.

The Census Bureau collects Journey to Work data through its regular programs, and the transportation community funds the special tabulations to support transportation planning through the CTPP (Pisarski 2006; Christopher 2009). FHWA supported initial development of the CTPP, and worked with the American Association of State Highway and Transportation Officials (AASHTO) and the National Association of Regional Councils to encourage states to use their federal State Planning and Research (SP&R) funds and MPOs to use their federal planning funds through a pooled-fund project to support the CTPP.⁶ In 2000, a budget of \$3 million supported dedicated staff within AASHTO for continued development and deployment of the CTPP. The budget has grown to \$5.9 million for 2007 through 2011.

The effectiveness of the CTPP is now dependent on the American Community Survey.⁷ That survey ensures much more timely data relative to the decennial census and smoothes out data collection costs over time, but continuous data collection has its own problems. Not the least of these are smaller (timely) sample sizes, which have not only increased the variability of the data but also entailed disclosure restrictions, particularly for the modal and small-area data routinely used by transportation modelers. Establishing methods for properly interpreting continuously collected data for trend analysis and accumulating sufficient data for reliable small-area analyses are works in progress. Resolution of these issues will have important implications for other surveys, such as the NHTS, for which moving to a continuous data collection approach is an option.

National Transit Database

Starting in 1978, Congress required all recipients of federal urbanized area formula grants for transit to participate in a uniform reporting system, then known as Section 15 for the section of the legislation establishing the requirement. Today, the NTD, for which the Federal Transit Administration (FTA) is responsible, is the primary national database of statistics on the

⁶ SP&R funds and planning funds are authorized from the Highway Trust Fund for specific purposes enumerated in Sections 104(f), 134, 135, and 505 of Title 23 and Sections 5303, 5304, and 5305 of Title 49, U.S. Code.

⁷ The decennial census and the American Community Survey were performed in parallel in 2000 to test comparability and ensure continuity. However, the long form was dropped in the 2010 census.

finances, operations, and service characteristics of more than 700 transit providers in urbanized areas across the United States and more than 1,300 transit providers in nonurbanized areas (FTA 2009). The NTD is funded by an annual \$3.5 million designation from FTA's grant programs, and all grantees from the Urbanized Area Formula Program (Section 5307) and Other-Than-Urbanized Area Formula Program (Section 5311) are required to report (Giorgis 2009).⁸ Not surprisingly, compliance is high, particularly for urban transit systems, because the data are used, among other purposes, for grant apportionments for transit properties located in urbanized areas. The data are also used to support the transit section of the biennial *Condition and Performance Report* required by Congress and to measure transit agency performance and serve other benchmarking purposes.

The data on passenger travel by transit are limited. Passenger trips, or boardings, are unlinked trips aggregated for each urban and rural transit property. If, for example, a passenger travels by rail and then transfers to a bus, each boarding is counted as a separate unlinked trip.⁹ Providers in urbanized areas also report passenger-miles, derived mainly by sampling, with larger systems sampling annually and smaller systems every 3 years (Giorgis 2009). Transit properties in urban areas report passenger data by mode (e.g., heavy, light, and commuter rail; buses of various types) and by type of service (direct and contracted out) annually and monthly for unlinked passenger trips only. (The American Public Transportation Association [APTA] also gathers monthly data on unlinked passenger trips from its membership.)¹⁰ States report annually on behalf of all rural transit properties by mode only (Giorgis 2009). The NTD has no data on the characteristics of transit riders or the purpose or time of their trips. It is necessary to rely on the NHTS for some of these data, but the two data sets are not linked or linkable. The NTD has no data on passenger trip costs, travel times, crowding, or service levels and schedule adherence.

Local Travel Surveys

Since the metropolitan transportation studies of the 1950s and 1960s, regional and local agencies have conducted surveys of local travel to support transportation planning. Originally funded by programs of FHWA and Section 701 grants from the Department of Housing and Urban Development (HUD), household travel surveys and other data collection activities of MPOs are eligible for funding from both federal highway and federal transit programs. Surveys are conducted to support travel demand models used for regional transportation plans, corridor studies, and the development of major projects. While these surveys provide a wealth of local information, the lack of standardized methods and data definitions inhibits comparisons among

⁸ The burden on local transit properties reported to OMB some 3 years ago was 229,634 hours at an estimated cost of about \$3.4 million.

⁹ According to BTS, which uses monthly unlinked passenger trip data gathered by the American Public Transportation Association (APTA) as source data for the Transportation Services Index (described in Chapter 1), all ridership data reported relate to trips, not to people. The use of passes, transfers, joint tickets, and cash by people transferring from one vehicle to another, one transit mode to another, and one public transit agency to another makes it difficult to count people. Boardings (unlinked passenger trips) can be counted more accurately. At the largest public transit agencies, even boardings may be estimated for portions of the ridership.

¹⁰ APTA is a nonprofit association of transit systems and commuter rail operators, transit associations, state DOTs, and other organizations. APTA collects these data on a voluntary basis from its membership, which includes virtually all of the larger and many medium-sized transit properties as well as some small transit properties that are not included in the NTD database.

areas or aggregation into a national picture of local travel. Local travel surveys became less common as costs increased, and MPOs became dependent on the CTPP for small-area data and the NHTS for model calibration factors.

American Travel Survey

The ATS was conducted in 1995 to capture travel by all modes for trips to destinations more distant than 50 miles. Telephone interviews of 67,000 households conducted four times during the year provided data on passenger flows among states and major metropolitan areas. The \$18 million survey was conducted by the Census Bureau and funded entirely by BTS. The ATS was the successor to the smaller National Travel Survey, conducted by the Census Bureau in the 1970s to measure travel among states.

As described earlier, the ATS was combined with the NPTS to create the 2001 NHTS in the hopes of reducing costs and establishing a comprehensive, internally consistent picture of local and long-distance travel. However, the NHTS failed to produce reliable passenger flow data among states and major metropolitan areas. While sample sizes and response rates were higher for the ATS than for the NHTS, the ATS shared many of the same challenges of respondent burden and cost.¹¹

Recent interest in high-speed intercity rail investments underscores the continuing importance of data on intercity passenger flows by origin and destination. The ATS data are more than 15 years old, but are the only national source of publicly available information on passenger travel by surface transportation modes to support analyses of intercity transportation.

Survey of International Air Travelers

OTTI has conducted a survey of international air travelers since the early 1980s. The survey is an important source of data on expenditures of foreign visitors to the United States and corresponding expenditures of U.S. residents while traveling abroad, and has been used as a measure of foreign travel by Americans and domestic travel by foreigners. In the past, these data were a primary input to balance-of-payments information for the U.S. national accounts, but they have largely been supplanted by credit card company data on inbound visitor spending.¹²

Data are obtained from survey instruments administered to outbound travelers either on board flights or in the departure gate area at 30 U.S. gateway airports (24 of which are major international gateways) for a sample of aircraft flying between the United States and foreign destinations.¹³ To adjust for over and under sampling, survey observations are weighted to census data from Immigration and Customs forms that regulate inbound and outbound visitors.¹⁴

¹¹ See, for example, the discussion in TRB *Special Report 277* (TRB 2003).

¹² Credit card companies doing business in the United States are now required by regulation to transmit data quarterly to the Department of Commerce on the expenditures made by foreigners visiting the United States.

¹³ The program targets two separate populations: (a) non-U.S. residents who have traveled to the United States and who are returning home, and (b) U.S. residents departing the United States on the originating leg of their flight. Foreign visitors are being asked to account for their activities and expenditures retrospectively, while U.S. outbound travelers are asked to estimate their activities and expenditures prospectively.

¹⁴ The I-92 form is required of all domestic and foreign air carriers to report total passengers by flight, and the I-94 form is required of foreign visitors to provide information on their prospective visit to the United States.

The surveys seek to obtain representative data on all international air travel.¹⁵ Given the complex combinations of carriers, origin–destination pairs, airports, and flights, however, this coverage is not always feasible; thus, the focus is on the top 20 origin countries.

Survey data on travel within the United States are most important from a transportation perspective. Survey data are collected on travel to states and major U.S. destinations by nationality of visitor, use of transportation facilities, mode of transport within the United States, group size, and length of stay. The 2008 survey cost about \$1.7 million, and the data were released for 20 states and Guam in April 2009.¹⁶ The manual form I-94 for inbound travelers to the United States by sea and air is being phased out for those countries participating in the Visa Waiver Program, which will affect more than two-thirds of overseas travelers (OTTI 2010).¹⁷ The same information will be collected from automated sources related to the passenger’s itinerary, which should improve the accuracy and timeliness of reporting.

Data from the Private Sector: Tourism Surveys

Tourism is a major economic activity for a number of states and large companies. The result has been the development of private sources of data to guide market decisions. Timely data are of the essence for the tourism industry, which is focused on “this season,” while public-sector surveys typically measure long-distance travel activities over a minimum of 1 year, thus lagging behind industry needs. One source of current tourism-oriented travel data is the D.K. Shifflet & Associates (DKSA) Survey System. Founded in 1982, DKSA is a private firm serving an array of clients, typically destination attractions, cities, theme parks, and travel associations, but also public entities, such as state offices of economic development and tourism promotion. DKSA retains data sets dating from 1995, derived from a family of monthly surveys, including mail surveys and Internet-based panel interviews, which yield data on more than 75,000 U.S. resident traveling households and their travel each year, measured over a 3-month recall period.¹⁸ The historical data permit clients to track long-term trends pertaining to their interests. Coupled with modeling capabilities, the company provides estimates of traveler volume by such metrics as trips; number of travelers; length of stay; purpose of stay and travel activities; visitor spending; and other attributes, such as demographic data, that serve the market research and service planning needs of clients.^{19,20} Transportation-related data include mode of transportation, trip destination, and traveler transportation expenditures.

Because of the expense of this ongoing activity, great care is taken to ensure that proprietary information is not divulged by clients or others. Data are typically licensed to clients for use, but DSKA retains ownership. The proprietary nature of the data can be a particular concern with regard to services to public entities, which may have problems with observing market protection agreements because of Freedom of Information Act requests. This is a good

¹⁵ Mexican air travel is included, but through an arrangement with Statistics Canada, that agency provides its survey to the United States, thus avoiding duplication.

¹⁶ Data provided by OTTI staff and reported by D. Frechtling, George Washington University, June 29, 2010.

¹⁷ The manual I-94W form will continue to be required at land borders and for non–Visa Waiver Program countries.

¹⁸ DSKA uses a panel company to recruit nationally representative panels of households that have agreed in advance to participate in periodic surveys. Extensive information about the household is gathered at the time of recruitment, and panel response is typically two to three times higher than that obtained by contacting households randomly.

¹⁹ Using DSKA’s visitor volume and spending database as input, IHS Global Insight is able to generate estimated revenues as well as direct, indirect, and induced spending.

²⁰ J. Caldwell, DSKA, personal communication, June 30, 2010.

example of the need to establish a realistic sense of appropriate and effective boundaries between private data providers and data users at the federal, state, and local levels.

Other National Surveys Containing Personal Travel Data

Several other surveys are conducted in which transportation data are gathered for the purpose of comprehensiveness, not to meet a specific transportation need. Three such surveys are reviewed here: the Consumer Expenditure Survey (CEX) and the American Time Use Survey (ATUS), which measure how people spend their money and their time, respectively, and the American Housing Survey (AHS), which contains questions on work travel and availability of transportation services. The Bureau of Labor Statistics sponsors the annual CEX and ATUS, and HUD sponsors the AHS. The Census Bureau conducts all three. These and other, similar surveys provide opportunities for expanded transportation applications.

Consumer Expenditure Survey

Data for the CEX are collected through a direct interview and a detailed diary kept by selected households to facilitate recall of those expenditures easily overlooked. The number of observations is sufficient for national summaries, but detailed area statistics are available for only 18 metropolitan areas, down from 24 to 28 areas in past years. The surveys include a comprehensive set of descriptive variables, such as persons, workers, and vehicles in the household; type of housing; income and age; and gender and racial characteristics. Expenditures on about 10 transportation items are collected, but more detail is available on a selective basis to researchers where the sample size permits.²¹ The survey does not address individual trips but rather records aggregate expenditures for the reporting period, which are then accumulated to an annual total.²² One of the strengths of the survey is that it differentiates purchases in the home community (restaurant food and transit) from spending away from home or during out-of-town travel. A weakness from a transportation perspective, but not according to the survey's intent, is that the expenditures tallied include only those paid for by the consumer and not those reimbursed by others. This means that business travel, or even event travel for which a school or church reimburses users, is not included. This represents a substantial gap in the understanding of transportation spending.

American Time Use Survey

The first survey of time usage was conducted in 2003 and reported in late 2004. Respondents are selected from among households that have nearly completed their participation in the Current Population Survey. One person in the selected household is interviewed regarding his or her previous day's activities. As in the CEX, a diary is employed to support recall. Seventeen main categories of time use with multiple subelements are reported. The variables that describe the

²¹ For example, the item "public transportation" is reported as a single value in standard reporting, but unlike its use in transportation parlance, this item includes all modes of transportation for which one might purchase a ticket, including airlines, buses, rail lines, cruise lines, taxis, and of course urban mass transportation.

²² It is possible, however, to calculate actual trip costs from the data. Thus, the average expenditure per household may be small (e.g., the average amount spent on cruise trips per year), but when the total number of households making such trips is recorded (e.g., say, 2 percent of all households), the average per trip expenditure can be calculated (e.g., $\$40/.02 = \$2,000$ per cruise).

respondents parallel those of the CEX, so that distinctions made on the basis of age, gender, race, and income are possible. More broadly, the survey parallels the CEX in that the ways people spend time and money can be quite similar, particularly for out-of-home activities. Recognizing this link, the Bureau of Labor Statistics joins the two surveys in its website presentation. The ways in which people spend time are important to transportation analysts and modelers not just because they constitute travel time information such as the time spent in traveling to recreation, but also because transportation modeling is increasingly focused on activity-based models that tie travel to the actual activities in which people engage.²³ The use of this survey is in its infancy, and it could become increasingly significant to transportation analysts.

American Housing Survey

The AHS has been conducted since 1973 (then called the Annual Housing Survey). Its main focus is on the condition and characteristics of the U.S. housing stock, with associated demographic statistics for the related households. The housing unit is the main sampling reference, and the surveyors return to that unit repeatedly, interviewing whoever resides there. New housing units are added to represent new construction. The survey consists of a representative national sample and a series of metropolitan samples that are rotated among more than 40 of the larger metropolitan areas. Both are conducted in every odd-numbered year rather than, as previously, in alternating years. The survey covers a set of work travel questions paralleling those of the ACS, including the number of vehicles owned, mode of travel to work, time of departure, and travel time. In addition, it includes questions on distance to work and time spent working at home. From a metropolitan planning viewpoint, the AHS is probably the only survey that asks questions about the quality of housing and the immediate neighborhood, such as noise, smoke odors, and reasons for moving away from a neighborhood, as well as the availability of nearby services, such as transit and shopping. It is also the sole source of information about the work travel characteristics of those who have recently moved to a new home. The collaboration between U.S. DOT, HUD, and the Environmental Protection Agency on the livability issue, described in Chapter 1, has focused interest on the role of the AHS in providing relevant data.

DATA PROGRAMS FOR MONITORING FREIGHT MOVEMENT

Freight travel data have many critical gaps. In contrast to passenger travel, freight movement is somewhat better understood at the national than at the local level. The Freight Analysis Framework (FAF), described below, provides a national picture of freight movement among states and regions, integrating data from the Commodity Flow Survey (CFS), the Transborder Freight Data Program and foreign trade statistics, the rail Carload Waybill Sample, and Waterborne Commerce Statistics. Data on air freight are captured in the air carrier traffic statistics (discussed in the section on data programs for monitoring both passenger travel and freight movement). Nevertheless, the CFS, the primary source of national data on commodity flow movements, does not capture the supply chain orientation of industry and is limited both in industry and shipper coverage and in geographic detail. Private vendors also collect freight data, filling some gaps in publicly collected data, but comprehensive data on local freight movement

²³ The smallest geographic unit for which the data are available, however, is the states.

and freight trip characteristics, particularly urban goods movement, are rarely collected by either the public or private sector.

Commodity Flow Survey

The CFS was reestablished after a decade's hiatus in 1993 and since 1997 has been conducted at 5-year intervals.²⁴ The survey is a joint venture of BTS and the Census Bureau, with the former providing 80 percent and the latter 20 percent of the total funding, which amounted to about \$24.5 million for the most recent 2007 survey.²⁵

The CFS is the primary source of national and state-level data on domestic freight shipments by U.S. establishments in manufacturing, mining, wholesale trade, selected retail trade industries (mainly electronic shopping and mail-order houses), and warehouses and regional management offices for selected retailers (BTS 2008).²⁶ A shipper-based survey, the CFS provides data on the types, origins and destinations, values, weights, modes of transport, distances shipped, and ton-miles of commodities shipped. The data are used by the public and private sectors for a wide range of purposes, from analysis of trends in goods movement over time; to national, regional, and sectoral economic analyses; to forecasting of demand for goods movement; to establishment of benchmarks for the national accounts; to analysis and mapping of the spatial patterns of commodity and vehicle flows (BTS 2008).

The Census Bureau conducts the CFS as part of the 5-year economic census. The sample is drawn from the Census Bureau's registry of business establishments in the 50 states and the District of Columbia. Establishments report shipment data for a 1-week period in each calendar quarter using a mail-out, mail-back survey. Although responses are mandatory, the response rate was 83.1 percent for the 2007 survey.²⁷ Respondents often complain about the burden of reporting. National data are available 2 years after the survey year.²⁸

The CFS is criticized for its small sample size, which is inadequate to support desired geographic detail; its lack of timeliness; gaps in coverage; and its lack of information on supply chains. Coverage and timeliness are addressed by the FAF, in which FHWA estimates missing components of flows among CFS regions and provides annual provisional updates from a variety of data sources and models (Donnelly 2010). The FAF does not provide as much commodity detail as the CFS but covers the same geographic areas and modes, displaying goods movement over the national highway, railroad, and waterway networks. Geographic detail is limited by sample size and disclosure issues, which are more severe than in passenger surveys given the

²⁴ Commodity surveys were conducted between 1963 and 1983 as part of a census of transportation, but the 1983 data were unpublished, and no data were collected for 1987 (U.S. Census Bureau 2009).

²⁵ Not counted is the \$1.84 million cost of the mileage calculation and associated technical and analytical contractor support, which was paid by BTS. In addition, BTS provided staff support that averaged 3.75 FTEs over the 5-year 2007 CFS project, while the Census Bureau provided about 9–10 FTEs plus 2 programmers and 2 statisticians during the peak data collection period (R. Duych, BTS, personal communication, Apr. 14, 2010).

²⁶ The survey does not include establishments classified as farms, forestry, fisheries, governments, construction, transportation, foreign establishments, or services, or most retail establishments (U.S. Census Bureau 2009).

²⁷ This is the response rate submitted to OMB, whose calculation involved dropping establishments that were deemed out of scope or ineligible and weighting responses by size of establishment (R. Duych, BTS, personal communication, April 14, 2010). The percentage of establishments that provided usable data out of the total number sampled was 58.7 percent.

²⁸ Part of the explanation for the delay stems from the fact that the weighting factors used by the CFS come from the economic census, which is not completed until well after the CFS. The lack of electronic reporting also contributes to the amount of time required to process the CFS results.

heterogeneous and uneven nature of business transactions. The sample size was cut to 50,000 establishments in 2002 but restored to 100,000 in 2007, which allowed better representation of international gateways. CFS and FAF regions are states and selected large metropolitan areas within states.²⁹ County-level detail, requested by many users, cannot be derived without the collection of local data to supplement the CFS and FAF.³⁰

Concern about supply chains is twofold. The CFS and FAF track flows among regions rather than among business establishments and do not capture many of the variables of mode and route choice that can be affected by public policy. The CFS also depends on shippers' knowing where and how shipments were sent, yet many supply chains often involve third-party logistics firms that manage the freight shipments (Schofer 2006; TRB 2003). Thus shippers often do not know by what mode a shipment is made or through what intermediate facility, which results in inaccurate or incomplete responses to the CFS.

Transborder Freight Data Program and Foreign Trade Statistics

The North American Transborder Freight Database was developed in response to the signing of the North American Free Trade Agreement (NAFTA) by the United States, Canada, and Mexico in late 1992 to help monitor trade flows among these countries. BTS contracted with the Census Bureau to provide previously unpublished data from the census foreign trade statistics (BTS undated, a). Data on freight flows are reported by commodity type, mode of transportation (all surface modes, air, and water), and U.S. port of entry or exit for imports from and exports to Canada and Mexico (BTS 2010a).³¹ Commodity detail by port is not available because of disclosure limitations (BTS undated, a). State of origin and state of destination for exports and imports, respectively, are also reported for surface transportation modes, but these data may not reflect the physical point of origin.³² No data are available at the metropolitan-area level.

In addition to monitoring North American trade flows, the North American Transborder Freight Database is used by FHWA, which reimburses BTS for the purchase of the data from the Census Bureau,³³ to implement the Coordinated Border Infrastructure Program and to provide one of the data sources for the FAF.³⁴ Finally, the database is used by states, MPOs and local governments, and the private sector for trade corridor studies, transportation infrastructure

²⁹ Boundaries of metropolitan areas are either Metropolitan Statistical Areas (MSAs) or Consolidated Statistical Areas (CSAs) as defined by OMB. When a CSA or MSA spans a state line and both state portions are large enough to support CFS tabulations, each state portion becomes a separate CFS region. When only one state portion is large enough to support CFS tabulations, only the larger portion becomes a separate CFS region; the smaller portion is included in the state totals. The FAF uses the same geographic boundaries as the CFS.

³⁰ Methods of local freight data collection are being developed through the National Cooperative Freight Research Program.

³¹ BTS also provides incoming border-crossing data for vehicles and passengers, containers, and pedestrians for land ports on the U.S. border with Canada and Mexico (BTS 2010a).

³² In general, import data are more accurate than export data because U.S. Customs uses the former data for enforcement purposes (BTS undated, a). Although the original intent of collecting data on state of origin was to capture the state where the goods were grown, manufactured, or produced, in practice the state of origin may represent the mailing address of the U.S. exporter or an intermediary or (mainly for agricultural and bulk shipments) the consolidation point or port of exit, rather than the physical state of origin.

³³ In 2010, it cost \$52,575 to purchase the transborder freight data from the Census Bureau, which was reimbursed by FHWA. BTS provides programming support consisting of 0.4 BTS staff plus 1 FTE contractor, and the Census Bureau provides support consisting of 0.2 FTE.

³⁴ BTS prepares custom tables of the transborder and border crossing data for FHWA to use in calculating the apportionment of funds to states under the Coordinated Border Infrastructure Program (BTS 2010a).

planning, and marketing and logistics planning (BTS 2010a). Monthly and annual data are available online on the BTS website, where users can access the data through an interactive searchable interface or download the data in raw table formats (BTS undated, a).

The transborder data are part of the larger collection of foreign trade statistics and suffer the same limitations associated with using trade as a surrogate for transportation. Data on inland destinations of imports and origins of exports are frequently inaccurate, data on domestic modes used between international gateways and inland locations are generally lacking, and in-transit flows (moves between foreign countries through the United States) can be identified only by joint efforts of all three NAFTA partners. Some of these limitations were addressed in a survey of domestic transportation of U.S. foreign trade in 1970 and 1975; more recent efforts to deal with these limitations depend heavily on models (CNSTAT 2005). Finally, by definition the data are restricted to North American trade flows.

Rail Carload Waybill Sample

The railroad industry reports data on rail freight shipments to the Surface Transportation Board (STB), which replaced the Interstate Commerce Commission in 1995 (the industry was partially deregulated in 1980). All railroads terminating 4,500 or more revenue carloads per year for 3 years in a row are required to file a stratified sample with the STB, averaging about 3 percent of their waybills. Virtually all of the data are filed electronically. A contractor (RAILINC) collects, compiles, and edits a stratified sample of carload waybills in a confidential version. STB and the Federal Railroad Administration (FRA) share equally the annual cost of collecting and processing the data, which totaled \$322,000 for the 2010 Carload Waybill Sample.³⁵ Access to the data is restricted because the sample contains competitive shipping and pricing information.

The contractor also creates a public-use file—the Public Use Waybill Sample—available for download on the STB website at no cost.³⁶ The data include origin and destination points, types of commodities shipped (aggregated to the five-digit Standard Transportation Commodity Code [STCC] level),³⁷ number of cars, tons, revenue, length of haul, participating railroads, and interchange locations (CTRE undated). Origin and destination points are reported by Economic Areas (as defined by the Bureau of Economic Analysis [BEA]), and junction points are reported by state or province, rather than by freight station or city name, to avoid disclosure of data from individual rail carriers.³⁸ As a result of these restrictions, only about 45 to 50 percent of the total waybill records in the public-use file contain full geographic data (STB undated).

Waterborne Commerce Statistics

The Rivers and Harbors Appropriations Act of 1922 granted the U.S. Army Corps of Engineers (USACE) the legal authority to collect, process, distribute, and archive data on all foreign and domestic waterborne commerce on U.S. waters (BTS 2010a).³⁹ For domestic commerce, all

³⁵ J. Palley, FRA, personal communication, May 27, 2010.

³⁶ P. Aguiar, STB, personal communication, May 28, 2010.

³⁷ An STCC code is a seven-digit numeric code representing 38 commodity groupings, developed on the basis of commodity descriptions used by freight rail and motor carriers.

³⁸ The origin and destination BEA areas for a commodity shipment are included only if there are at least three freight stations and at least two more freight stations than railroads in the BEA.

³⁹ Amended and codified in 33 U.S.C. 555.

vessel operators of record must report to USACE waterborne traffic at the ports and harbors and on the waterways and canals of the United States and its territories (NDC undated). For movements with cargo, the point of loading and unloading of each commodity must be delineated. To protect confidentiality, commodities are grouped into general categories, and if three or more vessel operating companies do not carry a particular commodity from a region of origin to a region of destination, that commodity is reclassified as “unknown and not elsewhere classified.” The Waterborne Commerce Statistics Center of USACE compiles and publishes state-to-state and region-to-region origin–destination movements by tons and commodity by code in a series of annual publications entitled *Waterborne Commerce of the United States*.⁴⁰ The fiscal year (FY) 2010 appropriations for these activities totaled \$4,488,660, and a staff of 28 FTEs supports data collection and processing.^{41,42}

Foreign waterborne commerce includes imports, exports, and in-transit traffic among the United States, Puerto Rico, and the Virgin Islands and any foreign country. Since calendar year 2000, foreign waterborne statistics have been derived primarily from data purchased from the Port Import Export Reporting Service (PIERS). Data from U.S. Customs and the Census Bureau also are used. Prior to 2000, data on foreign waterborne commerce were supplied solely by the Census Bureau.

USACE uses the Waterborne Commerce Statistics to analyze the feasibility of new water transportation projects and activities, to set priorities for new investment and rehabilitation, and to manage the operation and maintenance of existing projects. The data are also used by other federal agencies, for example, as input for the U.S. national accounts and for emergency management and homeland defense. Summary statistics that do not disclose movements of individual companies are released to the public.

Private Sources of Freight Data

Shippers and carriers maintain significant amounts of data on freight movements for their own uses, and sometimes share that data with consultants and trade associations. Two private sources with long histories include TRANSEARCH[®] and PIERS.

TRANSEARCH[®]

This database was initially developed by Reebie Associates to meet freight industry needs for market data, and has since been acquired by IHS Global Insight. After passage of the Intermodal Surface Transportation Efficiency Act of 1991, the product was adapted under a competitively awarded federal contract to develop and then privately maintain annual freight flow data organized by county. To this end, the database uses public, commercial, and proprietary data sources, among them a variety of federal data sources including the CFS and an ongoing, long-term private shipment sample from many of the nation’s largest motor and rail carriers.⁴³ As a

⁴⁰ Parts 1–4 summarize data on the movements of vessels (trips) and commodities (in short tons) at ports and harbors and on waterways and canals in the United States and its territories (NDC undated). Part 5 provides summary national statistics on foreign and domestic waterborne commerce on U.S. and territorial waters by tonnage and ton-miles of commodities (USACE 2009).

⁴¹ Data provided by S. Hassett, USACE, July 20, 2010.

⁴² The staffing numbers do not include the Director, two administrators, and one supervisor.

⁴³ The incentives for carriers to provide the data include assured confidentiality in the treatment of the collected data, free analyzed data in return, and no attempt to collect sensitive data (e.g., pricing) (Ciannavei 2010).

result, TRANSEARCH supplies information on U.S. freight flows by county origin and destination, four-digit commodity, and mode and submode of transportation, and offers such additional geographic units as zip codes, Economic Areas, states, and the nation (IHS Global Insight 2010). The data are based in part on IHS Global Insight's economic data, issued annually for the previous year and can be paired with short- and long-term freight forecasts at consistent levels of data detail. The database is sold to a wide range of customers, including railroads, trucking companies, and port authorities for market and network assessment; states and MPOs for freight planning; and financial groups for public infrastructure investment analyses. One drawback of the database is that its private shipment sample depends on voluntary participation and thus is not a random sample, although the vendor attempts to attract a diversity of carrier types. A second drawback is the proprietary nature of the database, and hence its lack of transparency. Users can obtain a reasonably complete account of the construction of the database, and its elements are subject to a degree of market testing in that industry clients can and do provide feedback to the vendor. Nevertheless, users must accept on faith the validity of the results, particularly at the county level.

Port Import Export Reporting Service

Launched more than 30 years ago by the Journal of Commerce, now a division of UBM Global Trade, PIERS collects data on imports and exports.⁴⁴ Import information is gathered from vessel manifests and from U.S. Customs Automated Manifest Systems data from all U.S. ports. The PIERS quality control staff verifies the data monthly by comparing them against a list of all vessels arriving at U.S. ports, provided by U.S. Customs, to identify any discrepancies (PIERS 2010). Export information is gathered by dedicated PIERS staff from bills of lading at all U.S. ports, again verified by PIERS quality control staff monthly against a list of all vessels exiting U.S. ports supplied by U.S. Customs (PIERS 2010).⁴⁵ UBM Global Trade sells these trade data, enhanced with detail on commodity type and value and available monthly, primarily to private companies (e.g., large container companies) for determining market share and analyzing the competition.

DATA PROGRAMS FOR MONITORING BOTH PASSENGER TRAVEL AND FREIGHT MOVEMENT

Some data programs measure both passenger travel and freight movement, in cases in which people and goods are generally carried in the same conveyances or on common infrastructure. These programs include the air carrier traffic statistics, the Highway Performance Monitoring System (HPMS), and the Vehicle Inventory and Use Survey (VIUS). Such data are also collected by several private sources.

⁴⁴ PIERS is the oldest data set on private waterborne trade data and most established in the U.S. federal government market. Other companies, however, such as Zepol and Datamyne, also sell such data and are competitors to PIERS.

⁴⁵ There are 48 of these ports throughout the United States, including Alaska, Hawaii, and Puerto Rico.

Air Carrier Traffic Statistics

Data on air passenger travel are some of the best in the transportation industry. The data are both detailed and timely (released monthly). The Office of Airline Information in BTS makes available a public version of what is known as the Origin & Destination (O&D) Survey—a database of a continuous 10 percent sample of airline tickets sold by certificated air carriers in scheduled domestic passenger service. The data for each passenger include point of origin, destination, airline, class of service, and fare (BTS undated, b). BTS spends \$300,000 annually for data collection by a contractor, which is supported by 0.5 FTE at BTS.⁴⁶

BTS also collects airline traffic data from all U.S. carriers, which include the number of passengers and the weight of cargo (mail and freight) by nonstop flight segment and by market or in-flight segment (BTS 2010a).⁴⁷ Domestic data, that is, for traffic between airports located within the boundaries of the United States and its territories, are unrestricted; international data, that is, between the United States and a foreign point, are restricted for 6 months after the report date (BTS undated). These data as well as other nontravel airline statistics gathered by BTS are widely used by customers within U.S. DOT as well as Congress, the Department of Homeland Security, state and local governments, the air transportation industry, researchers, academia, and the public (BTS 2010a).

Highway Performance Monitoring System

Development of the HPMS was initiated in 1978 to meet congressional requirements to report on the nation's highway needs, among other purposes, and is widely used by FHWA and other federal agencies, states, MPOs, local governments, and other customers. National-level data on highway inventory, condition, performance, and operating characteristics are collected annually for all public roads, with the greatest detail being on major highways.⁴⁸ Data on vehicle-miles traveled (VMT) are based on short-term as well as continuous traffic counters. State DOTs collect and report the data to FHWA in a bottom-up approach. FHWA provides guidelines on data collection in the *HPMS Field Manual* (FHWA 2010) and provides technical support and software to facilitate reporting and assist with data quality checks. Nevertheless, the quality of the data continues to reflect state-to-state variability. SP&R funds are available to fund data collection by the states, which also use their own funds. FHWA provides about \$400,000 annually for system development and support, performed by about 5 FTEs.^{49,50}

FHWA uses HPMS data in its biennial *Condition and Performance Report* to Congress,

⁴⁶ S. Smith, Research and Innovative Technology Administration, personal communication, April 29, 2010.

⁴⁷ The data on air cargo from carriers is limited, partly because of the structure of the air cargo industry where the carriers are often wholesalers not knowing much more than the weight of what they are carrying, at least domestically. As a result, these data are of limited use to analysts and decision makers because they reveal so little of the “what and why” of the use of air cargo and almost nothing about where the air cargo leg fits into the supply chain of the shipment being flown.

⁴⁸ Data are collected on the distribution of travel by six vehicle classes for all public roads except for non-federal-aid local roads and rural minor collectors. Areawide summary information is provided for urbanized, small urban, and rural areas and for air quality nonattainment and maintenance areas (FHWA 2008). Major data items, such as average annual daily traffic, are counted in full, not sampled (R. Gillmann, FHWA, personal communication, April 16, 2010).

⁴⁹ No dollar amount for the cost of state data collection was available. In a burden estimate reported to OMB, however, FHWA estimated that the 52 responses would take approximately 93,600 hours.

⁵⁰ R. Gillmann, FHWA, personal communication, April 16, 2010

in the calculation of apportionment formulas for federal highway funds (a strong incentive for states to provide the data), in support of analytic models,⁵¹ and for other reports such as the annual *Highway Statistics* and the monthly *Traffic Volume Trends* (Gillmann 2009).⁵² The HPMS is also used for safety reporting by National Highway Traffic Safety Administration (NHTSA) staff, who combine their safety databases with HPMS data on VMT to report fatality and injury rates by road class. Finally, states and MPOs use HPMS data to assess highway investment needs and conduct air quality conformity analyses. A recent reassessment of the HPMS (FHWA 2008) resulted in recommendations to, among other things, reduce variability in state-to-state reporting; provide for geographic locating, analysis, comparison, and reporting of data; and expand data collection on VMT to ramps and interchanges. FHWA hopes to have these changes implemented by 2011.

VMT estimation is probably the most common use of HPMS (FHWA 2008). VMT is calculated and used at the national, state, and local levels. One of the original intents of the HPMS was to develop a consistent basis for VMT estimation nationally. Nevertheless, VMT data are supplied by individual states, often using their own data collection procedures.

Vehicle Inventory and Use Survey

The VIUS was launched by the Census Bureau in 1963 as the Truck Inventory and Use Survey and was conducted every 5 years from 1967 through 2002. The 2002 VIUS included typical configurations, weights, fuel usage and economy, miles traveled, economic activity served, commodities carried, and other characteristics for a sample of 130,000 trucks, vans, minivans, and sport utility vehicles drawn from state registration files. The sample supported summary tables by state where the vehicles were based or registered. Data on where the vehicles operated were limited to percent miles out of state or in Canada and Mexico.

VIUS information has been used in a variety of national and regional studies. VIUS data on payloads by commodity and vehicle type have been central to converting FAF and CFS tonnages into vehicle movements. VIUS data also are major inputs to models of fuel use, carbon footprint, and the air quality consequences of vehicle activity. They are essential components of truck size and weight studies and highway cost allocation studies. Finally, VIUS provides data on passenger travel for personal and business purposes by pickups, vans, minivans, and sport utility vehicles.

Plans to expand the VIUS to automobiles and buses, providing a complete picture of vehicle use for passenger travel and freight movement by all vehicles except those owned by government, died with the survey as the result of a governmentwide budget rescission to help defray the costs of the war in Iraq and Hurricane Katrina. The cost of restoring the VIUS is about \$10–14 million depending on the scope and whether national- or state-level precision is sought (BTS 2010b).

⁵¹ The HPMS is the data source for the Highway Economic Requirements System (HERS) model, which in turn produces the information for the biennial *Condition and Performance Report* to Congress. HPMS data are also used by the FAF to calibrate base-year assignments and forecast future freight flows (FHWA 2008).

⁵² *Traffic Volume Trends* is based on hourly traffic count data reported by the states on the basis of data collected at approximately 4,000 continuous traffic counting locations nationwide; those data are used to estimate the percent change in traffic for the current month compared with the same month in the previous year. Estimates are readjusted annually to match the VMT reported from the HPMS.

Private Data Sources

Popular concern about highway congestion has inspired the development of several private sources of travel data. Congestion monitoring started with the HPMS and the biennial *Condition and Performance Report* and was refined through the annual *Urban Mobility Reports* of the Texas Transportation Institute. Private firms began capturing speed data directly through traffic reporting services sponsored by local media outlets and through carriers' reports on their geographic locations to communications vendors for dispatching and fleet management services; they now capture these data as well through individuals reporting their locations via smart phones. A recent example is the system developed by INRIX, described in more detail in Chapter 3, which provides congestion information to drivers in return for being able to monitor their speed through their smart phones. While traffic monitoring services provide little beyond speed data, future services may be able to include data on traffic volumes, traveler characteristics, and perhaps even goods carried.

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Abbreviations

BTS	Bureau of Transportation Statistics
CNSTAT	Committee on National Statistics
CTRE	Center for Transportation Research and Education
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
NDC	Navigation Data Center
OTTI	Office of Travel and Tourism Industries
PIERS	Port Import Export Reporting Service
STB	Surface Transportation Board
TRB	Transportation Research Board
USACE	U.S. Army Corps of Engineers

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Study Committee Biographical Information

Joseph L. Schofer, *Chair*, is professor of civil and environmental engineering, associate dean of the Robert R. McCormick School of Engineering and Applied Science at Northwestern University, and director of Northwestern's Infrastructure Technology Institute. He chaired the Department of Civil and Environmental Engineering from 1997 to 2002, and was director of research and interim director of the Transportation Center for various periods until 2008. Dr. Schofer's research interests focus on planning and management of transportation systems, particularly the provision and use of data and information for effective decision making and evaluation of systems, plans, and projects. His current research includes development of measures of highway operational performance under disruptions, sustainability of transportation systems, decision support for infrastructure preservation and rehabilitation, and transportation policy. Through the Transportation Research Board (TRB), Dr. Schofer is actively engaged in the planning and implementation of conferences and workshops focused on data and information resources for transportation planning and management. He is a member of the Strategic Highway Research Program 2 Technical Coordinating Committee for Capacity Research, and he serves on several TRB standing committees and cooperative research program project panels. He chaired the National Research Council (NRC) Committee to Review the Bureau of Transportation Statistics' Survey Programs, which produced the report *Measuring Personal Travel and Goods Movement*. Dr. Schofer is a member of the Capital Advisory Board for the Chicago Transit Authority, the Mayor's Pedestrian Advisory Committee (Chicago), the Transportation Committee of the Chicago Metropolitan Agency for Planning, the Citizen's Advisory Board of Pace (the suburban Chicago bus service provider), and other advisory boards. He earned a B.E. degree from Yale University and M.S. and Ph.D. degrees from Northwestern University, all in civil engineering.

Joseph G. B. Bryan joined Halcrow in 2008 as vice president of the Economics and Business Solutions group. He leads Halcrow's freight transportation and logistics practice in North America and heads the company's office in Boston. Before coming to Halcrow, he served as managing director of the Trade and Transportation practice at Global Insight and was President of Reebie Associates until Global Insight acquired the firm in 2005. Mr. Bryan has 30 years of experience in freight carrier management in multiple modes, associated with truckload, less-than-truckload, air, and rail freight companies, and has held senior positions in marketing and operations. He assists private- and public-sector clientele in strategy development, policy and operations analysis, and market assessment, working at the urban, corridor, and national levels. Mr. Bryan was co-principal investigator for the National Cooperative Highway Research Program's (NCHRP) 2006 *Report 586: Rail Freight Solutions to Roadway Congestion*. At Reebie Associates, he directed the creation of the TRANSEARCH[®] county-to-county database, the first countrywide database of freight traffic flows in that form, and was his firm's lead member for the federal Freight Analysis Framework study, a seminal effort in national freight planning. Mr. Bryan serves as chair of the TRB Urban Freight Committee and is a member of two other TRB standing committees—the Committee on Freight Planning and Logistics and the Freight Systems Group. He holds a B.A. from Princeton University and an MBA from the Tuck School at Dartmouth College.

Anne P. Canby is president of the Surface Transportation Policy Partnership (STPP), a national advocacy coalition for transportation reform. She served as Delaware's transportation secretary from 1993 to 2001, and is recognized nationally both as a progressive leader in the transportation field for transforming a traditional highway agency into a multimodal mobility provider and as an advocate for integrating land use and transportation planning. Prior to serving in this post, Ms. Canby led a consulting practice focused on institutional and management issues, with particular emphasis on implementation of federal surface transportation legislation enacted in 1991. She has served as commissioner of the New Jersey Department of Transportation, treasurer of the Massachusetts Bay Transportation Authority, and deputy assistant secretary of the U.S. Department of Transportation. Ms. Canby is a past member of the TRB Executive Committee, a board member of the Mineta Transportation Institute, and a member of the Women's Transportation Seminar (WTS). She has been recognized for her leadership by the American Public Transportation Association (APTA), the Association of Metropolitan Planning Organizations, the Delaware Chapter of the American Planning Association, and WTS. Ms. Canby received the 2006 Carey Distinguished Service Award for outstanding leadership and service to transportation research and to TRB. She has twice received the Woman of the Year Award from WTS. She holds a B.A. from Wheaton College.

Anand Desai is professor and chair of doctoral studies in the John Glenn School of Public Affairs at The Ohio State University. He also holds a courtesy appointment in the Management Science Department of the Fisher College of Business and is a faculty member of the Environmental Science Graduate Program. Dr. Desai's research interests include measurement of performance and evaluation of the provision of public services. He has worked on methods for measuring effectiveness and efficiency in the public sector and the use of statistical, operations research, and computational models for public policy analysis. Dr. Desai is on the editorial board of several journals, including the *International Journal of Society Systems Science* and the *International Journal of Sustainable Society*. He is on the Board of Directors of the Association of Public Policy Analysis and Management and a member of the Institute for Operations Research and Management Sciences. Dr. Desai holds a B.S. from the University of Delhi, India, and the University of Leicester, U.K., and an M.S. in operations research and a Ph.D. in public policy analysis from the Wharton School at the University of Pennsylvania.

Mortimer L. Downey III is senior advisor to Parsons Brinckerhoff, where he previously served as chairman of PB Consult and as a principal consultant. Before that, he served as deputy secretary of the U.S. Department of Transportation from 1993 to 2001 and for 12 years before that as executive director and chief financial officer of the New York Metropolitan Transportation Authority. Earlier in his career, he was on the staff of the Committee on the Budget of the U.S. House of Representatives and worked for the Port Authority of New York and New Jersey. Mr. Downey is a member of the Board of Directors of the Eno Foundation and of the Industry Leaders Council of the American Society of Civil Engineers. He was elected to the National Academy of Public Administration, where he served as chairman of the Board of Directors. Mr. Downey was a member of the TRB Committee for the Study of Funding Options for Freight Transportation Projects of National Significance. He has received the Frank Turner Lifetime Achievement Award from TRB and lifetime achievement awards from APTA and the Council of University Transportation Centers, among others. Mr. Downey received a master's degree in public administration from New York University and a bachelor's degree in political science from Yale University.

Lance R. Grenzeback is senior vice president at Cambridge Systematics, Inc., a consulting firm specializing in transportation policy, planning, and economics. He has served as program manager for many major consulting studies that have provided policy, program, and technical support to federal, state, and local governments and international clients. His primary areas of interest include freight planning and intermodal policy, transportation operations, intelligent transportation systems (ITS), and economics. Mr. Grenzeback is currently a member of the TRB Committee for a Study of Potential Energy Savings and Greenhouse Gas Reductions from Transportation. He is also a former member of two TRB standing committees—the Urban Freight Transportation Committee and the Regional Transportation Systems Management and Operations Committee—and served as a member of the TRB Committee for a Future Strategy for Transportation Information Management. Mr. Grenzeback is a charter member of ITS America. He holds a bachelor's degree in government and a master's degree in city planning and economics, both from Harvard University.

Hermann Habermann is a consultant on the modernization of national statistical systems. In this capacity, he has worked for the United Nations, The World Bank, and the International Monetary Fund, as well as private-sector consulting organizations. He also works part time for the NRC Division of Behavioral and Social Sciences and Education. He is former deputy director and chief operating officer of the U.S. Census Bureau, director of the United Nations Statistics Division, and chief statistician and deputy director for budget at the Office of Management and Budget. Dr. Habermann is a fellow of the American Statistical Association and the National Academy of Public Administration and a past member of the NRC Committee on National Statistics. He holds a Ph.D. in statistics from the University of Wisconsin-Madison.

Timothy A. Henkel is an assistant commissioner with the Minnesota Department of Transportation and directs the Modal Planning and Program Management Division at the Minnesota Department of Transportation (MnDOT). In his current position, he manages the Offices of Passenger Rail, Investment Management, Freight and Commercial Vehicle Operations, Transit, Aeronautics, and Transportation Data and Analysis. Mr. Henkel's 28-year transportation career includes working with local government and the private sector. At MnDOT he has worked in the areas of planning, program management, and highway and rail project development. Mr. Henkel is currently a member of the American Association of State Highway and Transportation Officials' (AASHTO) Standing Committee on Planning. He received a B.S. from Bernidji State University and a certificate in civil engineering and land surveying from Dunwoody College.

Charles E. Howard, Jr., is transportation planning director for the Puget Sound Regional Council (PSRC), a position he has held since February 2005. Prior to joining PSRC, Mr. Howard worked with the Washington State Department of Transportation for 18 years, most recently as director of strategic planning and programming. Before that, he served as a planner for the Federal Highway Administration, with posts in Juneau; Boston; Washington, D.C.; and Olympia, Washington. He has been involved in state and regional transportation issues for the past 28 years, and he played an active role in developing and implementing the State of Washington's growth management act. Mr. Howard is outgoing Policy Committee chair for the Association of Metropolitan Planning Organizations and a current Policy Committee member. He is also section leader of the TRB Transportation System Policy, Planning and Process

Section, and is a member of the Washington State Commute Trip Reduction Board. Mr. Howard is a graduate of the Ohio State University, and holds a master's degree in city and regional planning from Harvard University.

James M. Lepkowski is a research professor at the Institute for Social Research and professor in the Department of Biostatistics, both at the University of Michigan, as well as a research professor at the Joint Program in Survey Methodology at the University of Maryland. He is a survey methodologist specializing in sampling and survey analysis, developing new survey sampling methods and applying them to diverse problems. Dr. Lepkowski's current research focuses on telephone sampling methods, methods to compensate for missing survey data, and methods for analyzing survey data taking into account the complexity of the survey sample design. He has served on a variety of national and international advisory committees on survey research methods for such organizations as the National Academy of Sciences, the National Center for Health Statistics, the Food and Drug Administration, the Bureau of Labor Statistics, and the World Health Organization. Dr. Lepkowski has been a member of two NRC committees dealing with transportation data—the Committee to Review the Bureau of Transportation Statistics' Survey Programs and the Panel on Bureau of Transportation Statistics International Trade Traffic. He holds a B.S. in mathematics from Illinois State University and an M.P.H. and Ph.D. in biostatistics from the University of Michigan.

Daniel C. Murray is vice president of research for the American Transportation Research Institute (ATRI), where he is responsible for developing and directing ATRI's portfolio of trucking- and transportation-related research and training initiatives. He previously served as director of technology research and senior policy analyst for ATRI and its predecessor, the American Trucking Associations (ATA) Foundation. Among his data-related projects is a current joint effort with the Federal Highway Administration (FHWA) to collect travel performance data on major freight corridors from truck-equipped automatic vehicle location equipment. Prior to joining the ATA Foundation, Mr. Murray worked for the Minneapolis-St. Paul Regional Transit Board as project administrator in public policy, legislative programs, and contract management. He also spent several years working in economic development for the Chicago Civic Committee, a Fortune 100 business consortium. Mr. Murray has represented industry research interests on several transportation-related boards, including the Minneapolis-St. Paul metropolitan planning organization, the Midwest Transportation Alliance, and the Transportation Policy Institute. He currently chairs the National Cooperative Freight Research Program Project Panel on Strategies for Measuring the Costs of Freight Transportation and is a member of the TRB Research and Technology Coordinating Committee (FHWA) and two TRB standing research committees on Intermodal Freight Transport and Trucking Industry Research. Mr. Murray holds a B.A. from Gustavus Adolphus College and an M.S. from Northwestern University.

Alan E. Pisarski is a consultant in private practice. His specialties include travel behavior and statistics, transportation policy, and tourism. Over the last 30 years, he has participated in all of the major policy planning efforts by the U.S. Department of Transportation. He has also served on the United Nations (UN) Group of Experts on Transport Statistics and, more recently, supported the UN World Tourism Organization in assessing and expanding national travel statistical measurement. Mr. Pisarski previously chaired the TRB Committee on National Transportation Data Requirements, and was the first chair of the TRB Data Section, with

cognizance over all of TRB's statistical activities. He has chaired or co-chaired a number of other TRB committees, including a Steering Committee for the Conference on Information Needs to Support State and Local Transportation Decision Making into the 21st Century. He also chaired a recent joint task force of TRB, FHWA, and AASHTO that examined long-term transportation policy research needs. In 1999 he was invited to deliver the Distinguished Lecture at TRB, which was based on the linkages among transportation policy, planning, and data. In 2007 he received TRB's lifetime achievement award for his career work in research. Mr. Pisarski holds a B.A. in sociology and economics from the City University of New York.

Steven E. Polzin is director of mobility policy research at the Center for Urban Transportation Research at the University of South Florida. Dr. Polzin directs and carries out research in mobility analysis, public transportation, travel behavior, and transportation policy for clients at the local, state and federal levels. He coordinates the center's involvement in the university's educational program and teaches graduate courses as an adjunct faculty member. He is on the editorial boards of the *Journal of Public Transportation* and *Transportation* and serves on several committees of TRB and APTA. He serves on the board of directors of the Hillsborough Area Regional Transit Authority (Tampa, Florida) and has served with the Hillsborough County metropolitan planning organization. He worked for transit agencies in Chicago (Regional Transit Authority), Cleveland (Greater Cleveland Regional Transit Authority), and Dallas (Dallas Area Rapid Transit) before joining the University of South Florida in 1988. Dr. Polzin is a civil engineer with a BSCE from the University of Wisconsin-Madison, and a master's and Ph.D. from Northwestern University.

Johanna P. Zmud is a senior policy researcher at the RAND Corporation in the Transportation, Space, and Technology Program. Prior to joining Rand, she served as founding owner and president of NuStats, a U.S.-based survey science consultancy specializing in complex and large-scale transportation research studies. Dr. Zmud has 25 years of experience in survey research design, implementation, and statistical analysis. She has directed more than 30 household travel surveys and 100 other surveys, including surveys on freight issues, tolling and road pricing, and bicycle and pedestrian mobility. She has published papers on a variety of survey-related topics, including research among non-English-speaking populations, mitigation of survey nonresponse, application of new technologies, and travel survey instrument design. Dr. Zmud credits her long history of active engagement in TRB activities for her continued focus on emerging needs for and sources of both passenger and freight data. She serves as incoming chair of the Technical Activities Council's Policy and Organization Group, having previously chaired its Data and Information Systems Section and its Travel Survey Methods Committee. She is co-chair of the International Steering Committee for Travel Survey Conferences and co-editor of *Transport Survey Methods: Keeping Up With A Changing World* (Emerald, 2010). Dr. Zmud is a current member of the NRC Committee on Equity Implications of Alternative Finance Mechanisms. From 2003 to 2006, she served as a founding director of the Central Texas Regional Mobility Authority, an independent government agency created to implement innovative, multimodal transportation solutions. Dr. Zmud earned a B.S. from East Carolina University, an M.S. from the University of Maryland, and a Ph.D. in communication research from the University of Southern California's Annenberg School for Communication.



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