



June 2, 2005

Ms. Barbara Sisson
Associate Administrator for Research, Demonstration and Innovation
Federal Transit Administration
U.S. Department of Transportation
400 Seventh Street, S.W.
Washington, D.C. 20590

Dear Ms. Sisson:

We are pleased to transmit this first letter report of the Transit Research Analysis Committee (TRAC). The committee was convened by the Transportation Research Board (TRB) in response to a request from the Federal Transit Administration (FTA); the membership is shown in Enclosure A. The committee has been charged with advising FTA as the agency develops a strategic agenda for transit research and with identifying the roles that FTA and industry stakeholders could play in carrying out that agenda.¹

The TRAC is modeled on TRB's Research and Technology Coordinating Committee (RTCC), which was convened in 1991 at the request of the Federal Highway Administration (FHWA) to provide a continuing, independent assessment of the agency's research and technology (R&T) program. The RTCC has characterized research, development, and technology transfer in the highway industry as a prerequisite to identifying gaps and high-priority opportunities for FHWA, and has also examined specific aspects of highway R&T, including the federal role, technology transfer, and local and regional stakeholder involvement. The TRAC, like the RTCC, will provide high-level, strategic guidance rather than advice on individual research projects.

This letter provides guidance to FTA as the agency develops a strategic agenda for transit research. The committee's consensus recommendations identify opportunities for FTA to develop and strengthen its strategic research plan. A preliminary version of this plan was discussed at the first and second TRAC meetings, which were held in Washington, D.C., on April 5–6, 2004, and December 2–3, 2004. Information on the presenters and panelists at the data-gathering sessions of these meetings is provided in Enclosure B. The committee thanks all those who participated in these meetings. The assistance of Lydia Mercado and Bruce Robinson of FTA in organizing the meetings and providing information for the committee is particularly appreciated.

In summary, the committee commends FTA on deciding to develop a strategic research plan and on identifying four major strategic research goals that constitute appropriate high-level objectives for a federal agency. When it is developed to include detailed

¹ In addition, the committee will advise FTA regarding (1) the federal role in transit research, relative to the roles and activities of others (private sector, Transit Cooperative Research Program [TCRP], states, universities, etc.) engaged in transit research; (2) high-priority opportunities proposed by the agency; and (3) processes that should be in place to ensure that the FTA receives the input and cooperation of transit research stakeholders in developing a federal research program.

research efforts linked to the strategic goals, together with timelines and appropriate methods for evaluating research, the plan could be a valuable tool for FTA in working with its many stakeholders to further the national transit research agenda. To this end, the committee recommends that FTA have an augmented version of its strategic research plan available for dissemination by the beginning of fiscal year (FY) 2006. Three areas merit particular attention in developing the plan. First, the four high-level goals (increase ridership, improve capital investments and operating efficiencies, improve safety and emergency preparedness, and protect the environment and promote energy independence) will require disaggregation to determine where the main problems and opportunities lie and what research activities are best suited to addressing them. Second, evaluation methods will be needed to guide and sustain FTA's research projects and programs. While the three-step product development cycle proposed by the agency for evaluation is commendable in its intent, the committee has concerns about its suitability for managing a federal research portfolio. Third, and finally, FTA should take steps to ensure that its strategic research plan provides clear and consistent information for a variety of audiences with differing backgrounds and interests.

The remainder of this report presents the committee's observations and recommendations in four areas: FTA's leadership role in transit research, development of the agency's strategic research plan, performance measures for research, and communication with stakeholders.

FTA's LEADERSHIP ROLE IN TRANSIT RESEARCH

The committee commends FTA on its decision to develop a strategic research plan. Such a plan provides a valuable opportunity for the agency to inform its many stakeholders—industry groups, transit providers, equipment manufacturers and system developers, university researchers, other federal agencies, Congress, and others—about FTA's research objectives and its plans for achieving them. The plan is also an appropriate vehicle for FTA to (1) explain to stakeholders how its research fits into the broader context of transit research conducted by other organizations and (2) position itself as a major player in transit research. The following sections discuss opportunities for FTA to use the plan as a basis for building partnerships and influencing research.

Building Partnerships

The preliminary version of FTA's strategic research plan articulates four high-level strategic research goals:

1. Increase transit ridership,
2. Improve capital investments and operating efficiencies in public transportation,
3. Improve transit system safety and emergency preparedness, and
4. Protect the environment and promote energy independence in public transportation.

Each of these goals potentially encompasses an extensive range of research activities. The American Public Transportation Association (APTA), for example, recently identified its research priorities in the area of increasing ridership. They include methods for attracting discretionary riders, service types and alternatives, better analytical tools for measuring boardings and alightings by location, and the relative merits of advertising and operational investments from the perspective of return on investment. Clearly, there are many other possible research areas within the broad context of efforts to increase transit ridership.

FTA manages a research budget that comprises an FTA appropriation and an FHWA/Office of the Secretary of Transportation (OST) appropriation. The budget totals approximately \$100 million annually. The budget data for FY 2003 are shown in Table 1.

TABLE 1 Research Budget Managed by FTA, FY 2003

| Budget Component and Section | Total (\$ millions) | Earmarks (\$ millions) |
|--|--------------------------------|-----------------------------------|
| <i>FTA Annual Appropriations</i> | | |
| 1. Transit Planning and Research | | |
| a. Research and Technology | | |
| i. National Research Program | 31.3 | 16.3 |
| ii. National Transit Institute | 4.0 | 4.0 |
| iii. Transit Cooperative Research Program | 8.2 | 8.2 |
| iv. Rural Transportation Assistance Program | 5.3 | 5.3 |
| 2. University Transportation Centers | 6.0 | 6.0 |
| 3. Capital Investment Grants | | |
| a. Bus and Bus Facilities | | |
| i. Bus Testing Facility | 3.0 | 3.0 |
| ii. Fuel Cell Bus | 5.1 | 5.1 |
| <i>FHWA/OST Annual Appropriations</i> | | |
| 1. Intelligent Transportation Systems Joint Program Office | 37.7 | 33.3 |
| 2. Urban Magnetic Levitation Transit Technology Development Program (Maglev) | 5.1 | 5.1 |
| 3. OST—WestStart-CALSTART Flywheel | 1.3 | 1.3 |
| Total | 107.0 | 87.6 |

Source: FTA.

Given the disparity between the scope of research covered by FTA’s four strategic research goals and the size of the agency’s research budget, it is clear that FTA cannot achieve its research objectives by working alone. The preamble to the draft plan notes that the agency will “work in partnership with [its] customers and stakeholders to achieve [its] research goals.” Public- and private-sector research budgets in general are under pressure, and individual organizations have insufficient funds to support all the research they would like to undertake. Consequently, FTA is well positioned to encourage stakeholders to work with the agency on research aimed at common needs and to help guide the direction of such research through participation in a variety of partnerships. Examples of successful partnerships in transportation research are given in a number of recent reports (see, for example, Harder 2003 and TRB 2001).

The structure and direction established in FTA’s strategic research plan should help the agency build research partnerships with its stakeholders, particularly as the plan is developed to articulate detailed research efforts linked to the high-level goals. FTA’s role in these partnerships will vary, depending on the partners. Some stakeholders, such as APTA, already have research agendas that could form a basis for establishing coordinated and cooperative efforts with FTA. Others, including some university recipients of earmarked research funds, would welcome the agency’s leadership and guidance in identifying areas where their work

could contribute to FTA's objectives.² The traditional federal government role of supporting longer-term, higher-risk research unlikely to be undertaken by the private sector may be an important consideration as FTA works with its partners to develop joint research activities. It is possible that some research areas will attract more prospective partners than others. Thus, FTA will need to develop criteria for allocating resources that take account of contributions from research partners and ensure overall balance among the four strategic goals.

Influencing Research

The strategic research plan provides FTA with an opportunity to influence a particularly important group of stakeholders—members of Congress. In recent years, FTA's research budget has been heavily earmarked. In FY 2003, for example, the total research budget managed by FTA, comprising FTA and FHWA/OST appropriations, was \$107.0 million, of which \$87.6 million (82 percent) was earmarked by Congress (see Table 1). As a result of this level of earmarking, FTA has faced major challenges in coordinating its overall research program.

Earmarking of transportation research programs was the subject of a TRB workshop held in Washington, D.C. on October 29, 2004. One of the messages to emerge from the workshop discussions was that earmarks vary considerably both in their designation of funding recipients and in the degree of flexibility they give an agency to influence research activities. A major criticism of earmarking is that it bypasses competition for research funds and merit review of proposals. These processes are widely recognized as the best ways of ensuring the maximum return on investment of research funding and addressing strategic national transportation system goals (TRB 2001). Some earmarks, such as the TCRP, do not violate the principles of competition and merit review. In this case, the named recipient organization (TRB) allocates the funds competitively and a consensus process (involving FTA) is used to identify research topics. In contrast, other earmarks designate a recipient, a funding amount, and a research area or project. In the case of FTA's research budget, some of the earmarks are for non-research activities, such as planning studies for transit projects, purchase of equipment, construction of facilities, and operating expenses.³

The committee's discussions at its second meeting with the U.S. Department of Energy's (DOE's) Office of Science suggested that describing research activities (including research management) in ways that are meaningful for members of Congress may help an office or agency achieve more influence over its research budget than if members are ill-informed about how funding is being used. Thus, a constructive dialogue about funding for FTA's research could ensue if FTA is able to demonstrate to members of Congress that its strategic research plan has a clear structure and direction; has been developed on the basis of an open and transparent process; has the support of other stakeholders; and coordinates the agency's own research activities effectively with transit research conducted by APTA, manufacturers, universities, and others. With a better understanding of FTA's research strategy, members may be more inclined to direct future earmarks toward areas of greatest relevance to FTA's overall research goals.

In their discussions with the committee, FTA staff focused almost exclusively on the National Research Program component of the agency's research budget—the only component of FTA's

² A representative from the Oklahoma Transportation Center attended the second TRAC meeting and shared some of the center's perspectives on transit research with the committee.

³ For further discussion of earmarking of transportation research programs, the reader is referred to an article based on a working paper presented at the TRB workshop (Brach and Wachs 2005).

annual research appropriation that includes any discretionary funding. Over the 10-year period from FY 1995 through FY 2004, total annual funding for the National Research Program averaged approximately \$29 million. The discretionary portion of this funding ranged from \$2.5 million in FY 1997 to \$16.0 million in FY 2002. The committee recognizes that this modest and highly variable discretionary research budget poses difficulties for FTA in implementing a robust research strategy through sustained funding of a portfolio of research activities. Consequently, it sees potential benefits for FTA in looking beyond the National Research Program and exploring opportunities to influence earmarked programs so that they support FTA's overall research objectives.

Recommendation 1 To maximize achievement of its four research goals, FTA should set itself a fifth goal of assuming a leadership role in transit research in the United States. In particular, the agency should (1) encourage stakeholders to make effective use of limited funding for transit research by working with FTA to achieve shared objectives and (2) seek to influence research activities beyond the discretionary program that is under FTA's direct control.

DEVELOPMENT OF FTA'S STRATEGIC RESEARCH PLAN

In the committee's judgment, the four strategic research goals in FTA's plan that were listed in the preceding section clearly articulate appropriate high-level objectives for a federal research program. Nonetheless, the plan's general discussion of each high-level goal does not lead intuitively to relevant research initiatives. As a result, the preliminary plan is too abstract to facilitate dialogue among FTA and its stakeholders about the details of research partnerships and funding requirements. The following discussion addresses the development of detailed research efforts linked to the plan's high-level goals, considers some distinguishing features of the transit ridership goal, and examines resource issues related to plan development.

Detailed Research Efforts

If the plan is to have greater credibility and form a robust basis for discussions among FTA and its stakeholders, it should be developed into a more substantive document. In particular, each strategic goal should be disaggregated to determine where research opportunities lie, what research these opportunities entail, what lessons were learned from any previous research in this area, what other activities could contribute to meeting the goal, who should be involved in these activities, and similar items. Timelines, resource requirements, and evaluation methods should be included in the augmented plan. In developing detailed research programs, it will be important to ensure relevance and accountability while at the same time providing the flexibility needed to stimulate creativity and innovation.

Many recent contributors to the field of research evaluation have used a logic model to describe the complex process whereby a research investment may affect the targeted clients. Such a model describes inputs, activities, outputs, a logical sequence of outcomes, and the external context for a program or organization.⁴ The relevance of a logic model to the development of

⁴ Renault, C. S. 2004. Assessing State S&T Investment: New Techniques and Old Challenges. Presentation to the Transit Research Analysis Committee, Washington, D.C., December 2. See also Jordan and Malone, 2002.

FTA's research plan is illustrated by two examples drawn from the discussion of the transit ridership goal in the draft plan.

The first example relates to FTA's proposed analysis of rider behavior and choices and highlights the importance of setting appropriate goals for a research project and making a clear distinction between research outputs and possible subsequent outcomes. Thus, research aimed at developing a better understanding of what creates a superior transit system in the minds of potential riders may allow transit providers to take actions that result in increased ridership. The direct result (output) of the research, however, is an improved understanding of factors that may affect ridership. The desired outcome (increased ridership) is a possible consequence of the research output. Whether this outcome is achieved will depend on actions by transit providers and on external factors.⁵ To avoid misunderstanding about the potential benefits of research, FTA's plan should address the distinction between outputs and outcomes.

The second example relates to the statement in the plan that "on any given weekday, less than 5 percent of Americans ride transit, and less than 2 percent of all trips are made on transit." This example highlights the importance of context in assessing what research related to transit ridership can reasonably be expected to achieve. The inherently stratified nature of transit ridership in the United States means that efforts to increase ridership must be tailored to specific circumstances.⁶ In some corridors in New York, for example, approximately 70 percent of possible travelers use transit. In contrast, many Americans travel in corridors where no transit is available. Thus, research efforts directed at increasing ridership must be developed in the context of transit's role in different communities (urban and rural) and different transit systems (established and start-up). A research project aimed at exploring marketing strategies for a start-up system is likely to differ from a project directed at a mature system, for example.

The Transit Ridership Goal

During their two meetings, the TRAC members discussed ways in which FTA's research program could affect transit ridership and, more specifically, the challenges associated with the evaluation of this research. These challenges arise because increasing transit ridership, while an important goal for FTA, is not an end in itself but rather a means to other ends, such as alleviating traffic congestion, improving access for the transit dependent, and reducing air pollution. Thus, transit ridership is being used as a proxy for a range of societal benefits that may derive from increased ridership. This proxy relationship should inform not only the aims and scope of FTA's research conducted in support of the ridership goal but also the development of appropriate measures of research performance. To be meaningful, these performance measures must capture the various benefits that may accrue from increased transit ridership and avoid reliance on ridership data alone. For example, while the percentage increase in ridership in a given case may be small, its impact in increasing the mobility of a particular demographic group or stimulating growth of the local economy may be significant.

The committee anticipates examining a variety of issues relating to transit ridership research at its future meetings. For example, if one purpose of increasing transit ridership is to reduce traffic

⁵ A 1995 report on transit ridership notes that "external forces—population change, development trends, regional economic conditions, decisions of specific firms, other public policy decisions—frequently have a greater effect on ridership than system and service design initiatives" (Stanley 1995, 1).

⁶ National aggregate data on transit ridership often disguise trends at the system and subsystem levels—for example, in particular corridors, by specific types of users, or for particular trip purposes (Stanley 1995).

congestion, it may be useful to consider how FTA's research on ridership is linked to research in other parts of the U.S. Department of Transportation (DOT) on related topics such as parking policies and congestion pricing.

Resource Issues

Given the importance of the plan to FTA's future involvement in transit research, the committee sees benefits for the agency in developing the plan without further delay. Furthermore, FTA staff met with various stakeholders during 2003 and early 2004 to discuss the agency's process for developing its strategic research plan. In the committee's view, the credibility of this process (and of the plan itself) in the eyes of stakeholders could be enhanced if FTA is able to produce an augmented plan in a timely fashion. However, FTA's many knowledgeable and experienced staff are already fully committed to other tasks. Resource constraints precluded any work on the preliminary version of the plan during the 8-month period between the first and second TRAC meetings. The committee suggests, therefore, that FTA consider engaging one or more consultants to develop its strategic research plan. Given FTA's limited discretionary funding for such an effort, exploring opportunities to channel uncommitted earmarked funds to this initiative could help avoid further delays in augmenting the plan. For example, FTA may wish to consider whether any earmark recipients are suitably qualified to develop the plan and have uncommitted FY 2005 funds that they would be willing to use for this purpose. To encourage FTA ownership of the plan, it will be important for any consultants to engage in frequent dialogue with agency staff.

Recommendation 2a As a matter of priority, FTA should develop its strategic research plan to articulate the detailed research efforts and timelines required to achieve the agency's four high-level research goals.

Recommendation 2b FTA should strive to have its augmented strategic research plan available for dissemination by the beginning of FY 2006. To this end, the agency should consider engaging a consultant with knowledge and experience in transit research to develop the plan.

PERFORMANCE MEASURES FOR RESEARCH

The Government Performance and Results Act of 1993 (GPRA) seeks to improve the effectiveness and public accountability of federal programs by promoting a focus on results, service quality, and customer satisfaction. The act requires federal agencies to set strategic goals and use performance measures for managing and budgeting their programs, including research programs. In the 1970s, federal research organizations such as the National Science Foundation and the National Institutes of Health explored measures of research activity and impact. GPRA renewed and expanded interest in research evaluation and has been a key driver of recent efforts to develop credible and appropriate performance measures for publicly funded R&D programs (Cozzens 1999; Jordan and Malone 2002).

The preliminary version of FTA's strategic research plan recognizes the importance of research evaluation, which the agency proposes to conduct by using a three-step product development cycle. The following discussion highlights features of current best practice in research evaluation and assesses FTA's approach in the context of these practices.

State of the Practice

The difficulties in assessing R&D performance have been widely discussed in the literature on evaluation methods (see, for example, Jordan and Malone 2002; NRC 1999). One of the fundamental challenges is the inherently unpredictable nature of research, which frequently does not produce the expected outputs and may not result in quantifiable benefits until many years after its completion.

The literature on research evaluation describes a range of approaches for evaluating research programs, individual research projects, and portfolios of programs or projects (Cozzens 1999; Jordan and Malone 2002; Ruegg and Feller 2003; and references therein). In this context, an important message from the panel discussion on performance measures at the committee's second meeting (see Enclosure B) was that effective research evaluation requires multiple measures. No single measure is adequate to assess all aspects of a research program, from initial policy decisions through impacts long after completion of the research. Similarly, multiple measures are needed to assess different program stages, from research activities through outputs to subsequent outcomes. Different organizations have drawn on a range of methods (analysis of survey data, case studies, expert judgment, bibliometrics) and supporting techniques (risk assessment, expected value analysis) to devise effective evaluation tools for their specific requirements. Such tools not only assist in effective program or project selection and management but also help an organization respond to questions from its stakeholders about the effectiveness of R&D investments, tangible research outcomes, and the like. For example, DOE's Office of Science has developed quantifiable performance measures that help a range of stakeholders assess and take an informed interest in the office's achievements and progress toward strategic goals. Some stakeholders may not understand the technical details of basic research in applied mathematics, climate change, and nanoscience, but the performance measures enable the office to quantify progress in ways that are responsive to the interests of different groups (members of Congress, senior departmental staff, etc.).

FTA's Approach

At the TRAC meetings, FTA staff presented information on two key aspects of the agency's approach to evaluating its research: the product development cycle and the scorecard. While the intent of these approaches is commendable, the committee had concerns about their practical efficacy, particularly in the case of the product development cycle. Alternative approaches to research evaluation that draw on the extensive recent work in this field could greatly enhance the credibility and effectiveness of FTA's strategic research plan.

Product Development Cycle

FTA's strategic research plan outlines how the agency intends to use its three-step product development cycle of analysis, development, and implementation. In the case of efforts directed toward the transit ridership goal, for example, the first step would involve analysis to determine which best practices and technologies would maximize opportunities for increasing transit ridership in the shortest possible time frame. Once priority areas have been established, FTA would develop research to evaluate the ability of these best practices and technologies to increase ridership (Step 2). In the final step, FTA would work with the transit industry to provide information on research results and assist in technology implementation. At each step in the process, a milestone review would be conducted to assess a project's progress, analyze costs and benefits, and decide whether to terminate or continue.

The committee concurs with FTA's objective, articulated in the preamble to the plan, of "investing scarce public funds in relevant, useful research projects that will improve [the] Nation's public transportation system." Nonetheless, the product development cycle, as described in the plan and discussed with FTA staff, is not a suitable tool for managing a federal research portfolio because of three major deficiencies. First, it lacks the range of evaluation tools required to guide and sustain a balanced portfolio of short-, medium-, and long-term research projects appropriate to a federal government agency. Second, it lacks the flexibility to revise timelines and modify tasks during a project or program to reflect the unpredictable nature of research outputs. Third, it focuses on assessments for informing "go/no go" decisions during milestone reviews and does not place sufficient emphasis on evaluation throughout the research process.

A report to FHWA on managing technology transfer observes that a linear model of innovation "is inadequate for establishing strategies and providing guidance for the management of a technology transfer program" (TRB 1999, 17). In the committee's judgment, the development and implementation stages of FTA's product development cycle, as described by agency staff, fail to take account of the nonlinear nature of the innovation process. Consequently, the agency runs a risk of abandoning valuable research because—consistent with widely documented experience—this research fails to proceed along a smooth and well-behaved path. Alternative models, such as a logic model, are more appropriate to describe the various inputs, activities, outputs, outcomes, and external context characterizing the R&D process.

GPRA requires federal agencies to demonstrate the value of their research investments. At the first TRAC meeting, FTA staff reported that the agency is seeking to justify its requests for continued research funding by using the product development cycle to demonstrate a return on investment in research projects. This approach focuses on providing success stories at the end of a project or program rather than on attempting to evaluate progress throughout the research process. The committee is concerned, therefore, that short-term, low-risk projects will be favored at the expense of longer-term, higher-risk research because the product development cycle lacks the complexity and subtlety needed for effective assessment of the latter activities.

Long-term projects represent an important investment in the future even though they may have no immediate tangible benefits. They can help inform long-term investment strategies by providing important insights into the needs of the transit industry 10 to 20 years from now. "Horizon research," for example, could examine issues associated with an aging population or population shifts from urban to suburban areas. FTA, as the federal agency responsible for transit, has an important role to play in supporting research that is unlikely to be undertaken by the private sector, including studies on policy issues, models, and travel behavior, as well as long-term, high-risk investigations of new technologies.

Scorecard

FTA has recently started to use a scorecard to guide project selection within its research program. Each proposed project is evaluated by FTA staff against a series of questions—for example, to what extent does this project support the attainment of DOT and FTA goals? Does this research need to be carried out by the federal government? Is similar research being carried out in other projects or by other organizations? The scorecard also requests information about time frames for the project itself and for implementation of the technology or practice by the transit industry. In developing a project's overall score, the scores for individual questions are weighted according to FTA's priorities. For example, the committee was advised that the "preferred" answer to the question about project time frame (short-, medium-, or long-term)

would depend on the agency's current priorities. These priorities change over time and are not articulated in the strategic research plan.

Future Directions

In the committee's judgment, stakeholder perceptions of FTA's role in transit research could be enhanced by effective management and performance measurement of both the discretionary and the earmarked parts of the agency's research portfolio. To this end, evaluation methods should be embedded in proposed programs and projects in the augmented version of FTA's strategic research plan. A range of methods appropriate to research activities, if properly applied, would permit more meaningful evaluation than the three-step product development cycle and would be more effective in ensuring efficient use of scarce resources.

With regard to the scorecard, the committee commends FTA on its initial efforts to develop an evaluation system for project selection that aims to provide clarity and consistency in establishing a research portfolio. Nonetheless, the committee cautions that, for maximum effectiveness, such a system should be transparent to stakeholders and avoid the use of obscure weighting factors or other ill-defined evaluation criteria. Experts in the field of evaluation frequently highlight transparency, clarity, and credibility as key characteristics of measures that are effective not only for program management but also for answering a wide range of stakeholder questions.

All federal agencies with research programs face similar challenges in responding to GPRA and to the Program Assessment Rating Tool (PART) introduced recently by the Office of Management and Budget. PART promotes the use of performance information in budget decisions, and PART reviews address a program's purpose and design, strategic planning, management, and results. Participation in the activities of groups such as the Washington Research Evaluation Network⁷ would provide opportunities for FTA to learn from the experiences of other federal agencies in research evaluation and PART reviews, thereby informing development of the agency's own strategic research plan.

Recommendation 3a FTA should ensure that its strategic research plan includes evaluation methods that can be used to

- **Manage the overall program and individual projects within the agency,**
- **Meet requirements for external accountability,**
- **Assist in responding to stakeholder questions, and**
- **Help promote interest in and support of the agency's research.**

Recommendation 3b In developing evaluation methods, FTA should draw on recent work by federal government agencies and others on performance measures for R&D. In particular, FTA's approach to evaluating its research should incorporate multiple methods and techniques and should reflect best practices for ensuring clarity, transparency, and credibility.

⁷ www.wren-network.net.

COMMUNICATION WITH STAKEHOLDERS

The development of FTA’s strategic research plan should take account of the various audiences and the reasons they require information about the agency’s research. Table 2 lists some of these audiences and their reasons for needing information. The committee encourages FTA to take account of the diverse interests of these (and other) audiences in developing the plan.

TABLE 2 Audiences for FTA’s Strategic Research Plan and Their Reasons for Needing Information

| Audience | Reasons for Needing Information |
|--|--|
| Equipment manufacturers and systems developers | To assess their own research activities and priorities against the backdrop of FTA’s policy and technology priorities and help them work with FTA to identify high-risk, precompetitive research that may be appropriate for federal funding |
| FTA staff | To establish goals and objectives for in-house research and awards of funding to external researchers |
| Industry groups/ associations | To identify research areas of common interest and opportunities to work in partnership with FTA and to avoid duplication of effort |
| Other federal agencies | To work with FTA in identifying areas of common interest/overlap and opportunities for collaborative research |
| Transit providers | To help them make use of the results of FTA’s research and inform their own research activities |
| Congress | To help inform funding decisions |
| University researchers | To identify research activities that are not only of academic merit but also relevant to FTA’s research strategy/priorities (and may, therefore, have a chance of being funded by the agency) |
| Wider research community | To learn about FTA’s priority research areas and identify areas of common interest |

While the content of the plan is of primary importance in determining its value to FTA and the agency’s stakeholders, the presentation of information will influence how the plan is received. A clear, well-organized document is likely to make a favorable impression and send a positive message about FTA’s commitment to transit research and its ability to contribute to this research effectively. Presenting information in ways that are intuitively appealing to the various audiences will also facilitate dissemination of the plan and help FTA engage stakeholders in its research activities.

The committee identified two specific areas for improving the presentation of information on FTA’s research. First, the discussion of alignment of research goals in the preliminary version of the plan is confusing. This discussion seeks to link FTA’s four high-level strategic research goals to DOT’s five strategic goals and to FTA’s four strategic business goals and four core accountabilities. The plan also identifies seven FTA strategic research priorities that are linked to the four strategic research goals. Coherence among departmental and agency goals is unquestionably important. Senior FTA staff should have a clear understanding of the links among different goals, accountabilities, and the like, and they should be able to explain these

links if asked. Nonetheless, the committee suspects that others may also be confused by the plan's discussion of alignment of research goals and could even dismiss the plan out of hand because the introductory discussion of goals is so hard to follow. Simplifying the plan to focus on the four high-level strategic research goals would, in the committee's view, send a far clearer and intuitively appealing message to a range of audiences.

Second, the committee was confused by FTA's discussion of its four recent quick analysis studies.⁸ These studies were presented as comparable activities in terms of time and resources, even though two address broad issues (ridership and capital/operating costs) while the other two focus on relatively detailed topics (non-rail vehicle market and electric drive technology). Although such a mix of activities may be appropriate, a clearer explanation of the rationale supporting the choice of studies could prevent misunderstanding about likely outputs and the need for further investigation of a particular topic. For example, a short study on electric drive technology may go a long way toward identifying key areas for future FTA involvement, whereas a study of comparable magnitude on transit ridership is likely to provide only a limited analysis of this broad and complex topic.

Recommendation 4 FTA should ensure that its strategic research plan provides clear and consistent information about the agency's program to a range of interested parties, including Congress, the research community, industry groups, equipment manufacturers, and transit providers.

CLOSING REMARKS

The committee appreciates the opportunity to review and comment on a preliminary version of FTA's strategic research plan. Your willingness to discuss a broad range of issues relating to FTA's research was invaluable in informing our deliberations, and we hope that the recommendations made in this report are helpful to you in developing the plan. We look forward to continuing to work with you and your staff as FTA develops its strategic agenda for transit research, and would welcome the opportunity to comment on an augmented strategic research plan that provides additional details about research efforts linked to strategic goals, timelines, and evaluation procedures.

Sincerely yours,



Michael S. Townes
Chair, Transit Research Analysis Committee

Enclosure A: Committee membership

Enclosure B: Presenters and panelists at first and second meetings of TRAC

⁸ At the second TRAC meeting, FTA staff reported that the agency is conducting four 6-month quick analysis studies: (1) analysis to develop ridership plan, (2) analysis of capital/operating costs, (3) analysis of non-rail vehicle market, and (4) analysis of electric drive technology.

REFERENCES

- Brach, A., and M. Wachs. 2005. Earmarking in the U.S. Department of Transportation Research Programs. *Transportation Research A*, 39(6), 501–521.
- Cozzens, S. E. 1999. Are New Accountability Rules Bad for Science? *Issues in Science and Technology Online*. www.issues.org/issues/15.4/cozzens.htm.
- Harder, B. T. 2003. *NCHRP Synthesis of Highway Practice 312: Facilitating Partnerships in Transportation Research*. TRB, National Research Council, Washington, D.C. gulliver.trb.org/publications/nchrp/nchrp_syn_312f.pdf.
- Jordan, G. B., and E. L. Malone. 2002. Performance Assessment. Chapter 6 in Washington Research Evaluation Network's Management Benchmark Study. www.sc.doe.gov/sc-5/benchmark/Ch%206%20Performance%20Assessment%2006.10.02.pdf.
- NRC. 1999. *Evaluating Federal Research Programs: Research and the Government Performance and Results Act*. National Academy Press, Washington, D.C.
- Ruegg, R., and I. Feller. 2003. *A Toolkit for Evaluating Public R&D Investment: Models, Methods, and Findings from ATP's First Decade*. Report NIST GCR 03-857. Prepared for Economic Assessment Office, Advanced Technology Program, National Institute of Standards and Technology, Gaithersburg, Md.
- Stanley, R. 1995. *TCRP Research Results Digest 4: Transit Ridership Initiative*. TRB, National Research Council, Washington, D.C., Feb. gulliver.trb.org/publications/tcrp/tcrp_rrd_04.pdf.
- TRB. 2001. *Special Report 261: The Federal Role in Highway Research and Technology*. National Research Council, Washington, D.C. trb.org/publications/sr/sr261.pdf.
- TRB. 1999. *Special Report 256: Managing Technology Transfer: A Strategy for the Federal Highway Administration*. National Research Council, Washington, D.C. trb.org/publications/sr/sr256.pdf.

ENCLOSURE A

TRANSIT RESEARCH ANALYSIS COMMITTEE^{a,b}

Michael S. Townes, *Chair*, Hampton Roads Transit, Hampton, Virginia
Karen Antion, Karen Antion Consulting, LLC, Stamford, Connecticut
J. Barry Barker, Transit Authority of River City, Louisville, Kentucky
David Bayliss, Halcrow Group, London, England
Ronald L. Epstein, New York State Department of Transportation, Albany
Santo A. Grande, Delmarva Community Services, Inc., Cambridge, Maryland
Delon Hampton, NAE,^c Delon Hampton and Associates, Chartered, Washington, D.C.
Paul E. Jamieson, Wabtec Corporation, Spartanburg, South Carolina
Brian Macleod, Gillig Corporation, Hayward, California
Clarence W. Marsella, Jr., Denver Regional Transit District, Colorado
Michael H. Mulhern, Massachusetts Bay Transportation Authority, Boston
Nigel H. M. Wilson, Massachusetts Institute of Technology, Cambridge

^aThe committee was composed and reviewed according to National Academies procedures and was judged to be free of potential conflicts of interest.

^bJudith M. Espinosa, University of New Mexico, Albuquerque, was appointed to the committee but was unable to attend the first two TRAC meetings and did not participate in the preparation of this report.

^cNAE = National Academy of Engineering.

ENCLOSURE B

PRESENTERS AND PANELISTS AT FIRST AND SECOND MEETINGS OF TRANSIT RESEARCH ANALYSIS COMMITTEE

First Meeting, April 5–6, 2004, Washington, D.C.

Charge to the Committee and Sponsor Expectations for the Study

Robert Jamison, Deputy Administrator, FTA, Washington, D.C.

Transportation Research Board Experience with Similar Reviews of Research Programs

Robert E. Skinner, Jr., Executive Director, TRB

Historical Overview of FTA's Research Program

Barbara Sisson, Associate Administrator for Research, Demonstration and Innovation,
FTA, Washington, D.C.

Key Features of FTA's Draft Strategic Research Plan

Barbara Sisson, Associate Administrator for Research, Demonstration and Innovation,
FTA, Washington, D.C.

Overview of Transit Cooperative Research Program (TCRP) Activities

Chris Jenks, Manager, TCRP, TRB

The American Public Transportation Association's R&T Strategic Plan

Lou Sanders, Director, Research and Technology, APTA, Washington, D.C.

Panel Discussion: The FTA Role in Transit Research

Lou Sanders, Director, Research and Technology, APTA, Washington, D.C.
Charles Dickson, Associate Director, Community Transportation Association of America,
Washington, D.C.
Alan Abeson, Director, Easter Seals/Project ACTION, Washington, D.C.

Second Meeting, December 2–3, 2004, Washington, D.C.

FTA's Strategic Research Plan

Barbara Sisson, Associate Administrator for Research, Demonstration and Innovation,
FTA, Washington, D.C.

Panel Discussion: Performance Measurement in R&D Programs

Rosalie Ruegg, Managing Director, TIA Consulting, Inc., Emerald Isle, North Carolina
Bill Valdez, Director, Office of Planning and Analysis, U.S. Department of Energy's
Office of Science, Washington, D.C.
Cathy Renault, Program Manager, Research Triangle Institute, Research Triangle Park,
North Carolina

FTA Criteria for Selecting Research Projects

Bruce Robinson, Transportation Systems Manager, FTA, Washington, D.C.

FTA's Research Analysis and Upcoming Research

Barbara Sisson, Associate Administrator for Research, Demonstration and Innovation,
FTA, Washington, D.C.