

Managing Technology Transfer in the Highway Industry

New TRB Special Report

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The Research and Technology Coordinating Committee, a special committee convened by the National Research Council and funded by the Federal Highway Administration, provides continuing guidance to FHWA on opportunities and priorities in highway research and technology. The committee recently prepared a report that examines how FHWA selects research products for technology transfer and transfers those products to the highway industry, in particular the state and local agencies that own, operate, and maintain the nation's highways.

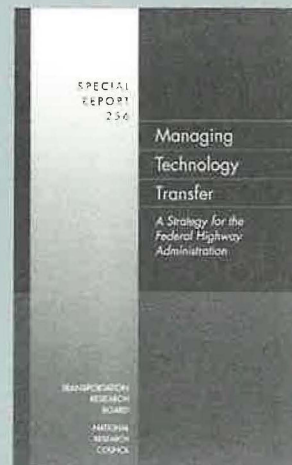
After passage of the Intermodal Surface Transportation Efficiency Act of 1991, FHWA's technology transfer activities were focused in its Office of Technology Applications. However, as part of the agency's reorganization, effective October 1, 1998, OTA was eliminated. Technology transfer is now a staff function in each of FHWA's five new core business units and its Office of Research, Development, and Technology. Because it was too early to estimate the full effect of the reorganization on the agency's technology transfer efforts, the committee focused its review on how FHWA can accelerate innovation in the highway industry. The recommendations presented in the report are directed at organizational and management issues, and are aimed at providing the agency with a strong basis for fulfilling its technology transfer role in an era in which performance and results must be measured.

A key finding of the report is that management responsibility for technology transfer activities has been neglected by FHWA in its reorganization plan. If the agency is to fulfill its stated mission of technology delivery, it will need to assign agency-wide management responsibility for technology

transfer to one of its headquarters offices. The functions of that office would differ significantly from those formerly carried out by OTA. OTA's mission was to implement new technology; the mission of the recommended office would be to provide a strategic focus at the corporate level for technology transfer activities across the agency's core business units. The office should be charged with the following management requirements related to technology transfer:

- ◆ Authority and responsibility for setting agencywide technology transfer priorities
- ◆ Coordination of technology transfer activities across the core business units
- ◆ Maintenance of internal expertise in the process of technology transfer
- ◆ Identification of what works in the long run, in terms of both new technologies and technology transfer methods, for research products and FHWA's customers
- ◆ Means for monitoring and measuring the performance of technology transfer and progress toward goals

In addition, the report notes that FHWA's technology transfer activities lack a strategic focus. The new office should therefore prepare a management plan that articulates a strategy for the agency's future technology transfer activities. This plan should describe how the office will coordinate future FHWA technology transfer activities across the core business units; the Office of Research, Development, and Technology; and the field organization. Specific items addressed in the plan should include how agencywide technology trans-



Special Report 256, *Managing Technology Transfer: A Strategy for the Federal Highway Administration*, can be ordered through the Transportation Research Board's on-line bookstore (national-academies.org/trb/bookstore/) or by contacting the TRB Business Office (telephone 202-334-3213, fax 202-334-2519).

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fer priorities will be set, how individual technology transfer activities will be monitored, and how performance will be measured so the agency can learn what does and does not work.

Having such a strategy would assist FHWA in accelerating innovation by focusing on the why of technology transfer, especially in view of the wide range of technology topics to be addressed, thereby overcoming some of the effects of highway industry fragmentation. A strategy would provide guidance for the allocation of limited resources, aid in making choices about specific activities and target groups, help in monitoring progress toward goals, and assist in determining when a specific technology transfer activity should be scaled back or concluded.

The FHWA strategy should have the following key components: (a) basing technology transfer activities on knowledge of research products and potential technology users; (b) establishing explicit technology transfer priorities; (c) selecting appropriate technology transfer methods, recognizing the need to use methods appropriate for different combinations of technologies and technology users; and (d) measuring the effectiveness of technology transfer activities. The latter component would form the basis for documenting accomplishments within the agency's research and development program and help satisfy agency performance requirements.

The report identifies several characteristics of successful technology transfer that should guide the execution of the FHWA strategy. These characteristics embody the findings and recommendations of numerous studies of technology transfer in the highway industry and elsewhere. The report notes that although these characteristics may appear obvious, there is evidence that they are often overlooked.

Early involvement of potential users in the research planning phase helps ensure that research products respond to user needs. Researchers and research managers should ask potential users what they need, and then develop products with user assistance and input.

Inclusion of field tests, demonstrations, and pilot projects as part of R&D activities helps potential users decide whether to implement new technology and assists developers in refining the technology before widespread implementation.

Incentives such as implementation funds or other forms of financial and technical assistance are favored

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by implementing agencies. Since early adopters of new technology are often watched closely by others, support for the completion of initial or pilot installations is important so that early implementation activities do not fail because of a lack of funds.

Successful innovation always requires *senior management support* and sometimes specific agency management action to organize that support. Previous technology transfer efforts have shown the value of having a champion for a new technology within the user agency; thus early attention should be given to establishing and supporting champions among decision makers in the user agency.

Most new technologies require *technical training*, especially if in-house staff do not have the required expertise. Although user-friendly innovation is a worthy goal of R&D, the problems being addressed often require technologically complex

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solutions. In many cases, extensive staff training is needed for both implementation and operation if a new technology is to succeed. Such training may also address potential internal resistance to change.

Changes to standards and specifications may be needed to accelerate the implementation of certain technologies. Because so much of public-sector procurement is closely governed by standards and specifications, researchers, technology transfer staff, and potential technology users need to identify and work closely with the relevant standards-setting bodies so that if changes to standards and specifications are needed, they can be made quickly and efficiently.

Finally, technology transfer programs must include *careful monitoring of acceptance, adoption, refinement, and satisfaction among users* of the technologies being promoted. Such information is needed for managing technology transfer activities

and for successfully assessing progress toward the goals of those activities.

The report also suggests that FHWA needs to develop strong partnerships with those who use and implement highway technologies, as well as the decision makers who are responsible for funding related to innovation. The agency has initiated efforts to identify and engage its technology partners. These efforts should be continued, with partners being involved in the research phase of technology development activities as early as possible to help define and direct the research effort. The agency's partners, particularly the states, are much closer to the operating environment in which technology must succeed and are essential to the technology's successful implementation.

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