

Developing Support for Transportation Research

"The need for transportation research continues for the pragmatic reason that we have new transportation priorities. It is also necessary because we have not provided the ultimate in mobility to serve our industries and our citizens, and because we need frontiers for the mind."

The evolving role of transportation research, as described by Thomas D. Larson, Secretary of the Pennsylvania Department of Transportation and 1981 Chairman of the TRB Executive Committee, was examined and discussed at a special session held during the Board's 61st Annual Meeting in Washington, D.C. The consensus of the panel of experts was that research will play a different yet equally important part in tomorrow's transportation. Therefore, it deserves the continued, and possibly increased, support from government and the private sector.

Larson spoke of the distinctions—real or imaginary—between basic, applied, and developmental research. And, as an example, pointed to how the U.S. Department of Transportation (DOT) categorized its 1980 R&D expenditures (see Table 1).

"Many sponsors would support this distribution while academicians in particular might decry it. In my opinion, the definitions on which any such categorization is made are imperfect," said Larson. "Very often, basic versus applied is a point of view rather than a fact."

Larson observed that to transportation agencies, research is a means for improving performance, but to academic researchers, it is a fundamental source of salary and facility support, student training, and academic standing. The capability of U.S. universities to produce the necessary technological talent to support this nation's future transportation need is being severely weakened, particularly by the shortage of qualified faculty. In 1980, only 6 percent of all U.S. degrees were in engineering compared with 37 percent in West Germany and 21 percent in Japan. The Soviet Union graduates four engineers for every one in the United States.

PARTNERSHIP

Through a remarkable partnership between the private sector and federal, state, and local governments, a transportation system that is being emulated throughout much of the world has been created. In creating this system, answers were researched and found to such

Table 1. Comparison of U.S. DOT's overall R&D budget with governmentwide average for FY 1980.

Category	Percentage of DOT Total Research	Average Governmentwide (%)
Basic research	0	15
Applied	17	23
Developmental	83	62

questions as, How do you design a highway to give the highest vehicle-carrying capacity and the safest travel experience? What runway configuration will best handle high-speed, high-volume take offs and landings? How do you plan the freeways to accommodate traffic 20 years hence? Or, more prosaically, which concrete mixture will be the most durable for runway, highway, or waterfront?

In the 1980s, Larson noted, transportation circumstances changed. A mature system exists now—but one that must be maintained and upgraded incrementally to serve future needs. What, if any, are the attitudinal and real research requirements for this new environment?

"First," said Larson, "a new management attitude and emphasis must be fixed in place. Ensuring that existing systems continue to provide necessary services does require a significantly different mind set than that required to put facilities in place. Can a nation steeped in the tradition of moving on to build at the next frontier really accommodate itself to caring for what must be the last frontier—at least in the physical sense?"

From a research perspective, there is a new set of questions. How can the scaled bridge deck be restored at least cost and under traffic? How can a low-friction runway be made safe? What is the best way to maintain an aging bus fleet? Should safety appurtenances be retrofitted to accommodate bigger trucks and smaller cars? And, if yes, how? Although some of the answers to these questions are known, more cost-effective answers must be developed through ongoing research.

Larson concluded, "Research activities are being questioned as a result of fiscal pressures on all sides. This questioning is appropriate and should lead to more tightly targeted, individual research efforts, but more importantly, to new approaches and greater participation in cooperative research—logically [one avenue for this is] through an expanded Transportation Research Board program. A wider sharing of information that exists in files throughout this country and the world is, and will remain, a most effective way to exert leverage on research investments. TRB is the best instrument for improved transportation sharing."

CONSEQUENCES OF REDUCED TRANSPORTATION R&D

Inadequate research funds invested in the nation's trans-

portation systems will result in a system characterized by physical and environmental degradation; delay, damage, and spoilage of goods; congestion, delay, accidents, and fatalities for users; and failure to serve the economic and social goals of a growing population.

This scenario was presented by L. Gary Byrd of Byrd, Tallamy, MacDonald and Lewis. He said, "We must develop ways to optimize the use of our existing highway systems. We must improve and increase the utilization of alternative modes of transportation, and we must maximize the technology transfer from other sciences to transportation."

He outlined several basic changes, already under way, that will necessitate new research activity. The highway systems of the future will see smaller, lighter passenger vehicles and larger, heavier trucks in the traffic stream. Such changes will affect sight distance, geometric design, appurtenances (e.g., breakaway posts, impact attenuators, etc.), and vehicle performance criteria (e.g., speed, acceleration, and turning radii).

The future highway will be physically old. The era of dramatic new construction of highways is ending, and future programs will focus primarily on maintenance and rehabilitation. These changes will affect pavement conditions, bridge conditions, travel time and costs, roadway work sites, and alternative travel modes.

The future environment in which transportation systems operate will be a crowded one. Increases in population, urban development, age of users, high-density housing, and environmental restrictions will affect air quality, noise pollution, right-of-way availability and costs, parking space and costs, user demand, alternative travel modes, and communications alternatives to travel, such as electronic mail and teleconferencing.

Byrd said, "The future transportation systems will have the opportunity to utilize major technological advancements in electronics, computerization, telecommunications, miniaturization, and lightweight high-strength

materials. These changes will affect traffic control and management; vehicle weight, performance, and fuel efficiency; user information and education, e.g., holograph, television, and radio; and transit innovations such as dynamic scheduling and routing, preferential signal control, and reserved lanes.

"An adequate and responsible investment in transportation research and development should see our future transportation systems operating and managed by state-of-the-art technology. Such systems hold promise for improved safety records, maximum service-life return on investment, and optimized mix of transportation modes meeting the challenge of national needs," he concluded.

BUILDING SUPPORT WITHIN STATE DOTs

Three vital ingredients of any successful research program are involvement, continuity, and credibility, said Phillip L. Wilson, State Transportation Planning Engineer, Texas State Department of Highways and Public Transportation.

"Involvement of researchers, managers, administrators, and implementors at all levels is essential. The involvement must be consistent throughout, beginning with identification of a problem or concern; its consideration and prioritization with other programs; its study and the determination of findings; and the implementation of results.

"Regarding continuity, most of our departmental personnel and research personnel have been working together for many years under a legislatively established cooperative research program. There is an established professional respect between personnel that is vital to communication. The two major research agencies, Texas Transportation Institute at Texas A&M University, and the Center for Transportation Research at the University of Texas, have been able to attract and retain top-flight professionals—largely because of the consistency of a fiscal commitment to research. For example, Texas' Federal Highway Planning and Research (HPR) allocation is expected to be approximately \$5 million for this fiscal year. Yet, for research alone, our budget for this fiscal year is approximately \$4.7 million. We have not shortcircuited our planning operations. We have simply recognized that insufficient federal dollars exist to meet our research and planning needs; accordingly, we have, for years, supplemented the federal HPR program with substantial state funds."

Wilson also noted that unless your research program produces credible results, administrators will be reluctant to allocate time, personnel, and money to the program, and users will be equally reluctant to try new methods and products. Once you establish credibility, it becomes easier to demonstrate the value of research to decisionmakers.

FEDERAL VIEWPOINT

Wilson's views were echoed by Charles F. Scheffey, Director of Research, Federal Highway Administration

Session on developing support for transportation research at 61st TRB Annual Meeting drew a big audience. Charley V. Wootan (shown at lectern) presided. Presentations were made by panel of experts (left to right): L. Gary Byrd, Phillip L. Wilson, Thomas J. Kingfield, Charles F. Scheffey, and Kenneth W. Heathington, Jr.



Describing the evolving role of transportation research was the job of Thomas D. Larson, Secretary of the Pennsylvania Department of Transportation and 1981 TRB Executive Committee chairman.



(FHWA), who said that a research program can grow only in proportion to its successful outputs. "Unless there are products which can be utilized by the operating elements after the program has been under way for three or four years, any claims as to the probability of success of new proposals will lack credibility. This does not mean that you cannot undertake research on problems which require the dedication of resources for five or six years to obtain a solution, or long-term basic research, but only that this type of work cannot comprise your entire program. There must be enough short-range work or interim outputs to convince everyone that you are results-oriented."

He described FHWA's structure of input from field offices, state highway agencies, governors' safety representatives, and agencies such as AASHTO, TRB, ASCE, ITE, and ASTM, and outlined new attempts on behalf of FHWA to strengthen inputs and increase cooperation. He concluded, "I believe that it takes a joint effort on the part of both R&D managers and responsible operating officials to create a balanced and effective R&D program. The former may be unaware of significant operating problems which should be addressed, and the latter may not appreciate great opportunities which exist to improve our system as a result of technological developments."

SELLING BENEFITS OF RESEARCH TO CONGRESS

Thomas J. Kingfield, a staff member of the Subcommittee on Transportation, U.S. House of Representatives, said that with the exception of the U.S. Department of the Interior, the U.S. Department of Transportation underwent the largest budget reduction of all govern-

ment departments in the 1982 appropriations. R&D appropriations were cut even deeper than transportation in general.

The reasons? There is basically an inherent conflict between the goals of an R&D program and what legislators perceive as their needs. R&D accomplishments generally take a number of years, and the members of Congress and their constituents are interested in quick results. In addition, the initial product of R&D is frequently a report; members of Congress and their constituents tend to look for something a little more visible.

Too much emphasis is given by the media to what might be described as unimportant or frivolous research, with the result that the really important projects are put in the same category. This problem of communication is more a matter of program description than program content, Kingsfield said.

He added, "Another factor contributing to the reduction in transportation funding is either the inability of the Department of Transportation to produce a coherent and consistent R&D program, or the Department's inability to convince the Congress, and the Appropriations Committee specifically, that such a policy exists."

He described the history of the attempts of the Appropriations Committee and the Department of Transportation to implement such a policy statement, and recommended active involvement by the Transportation Research Board and its members in seeking more money from Congress for R&D research.

DEVELOPING BROADER CONSTITUENCY FOR TRANSPORTATION RESEARCH

"Research and development is a business just like any other, and there are two basic functions of any business—innovation and marketing. If you can't be innovative, you won't stay in business," said Kenneth W. Heathington, Jr., of the University of Tennessee. "Many of the things we do in the transportation research field are neither innovative nor have any marketing possibilities."

"We in the research industry have got to get into innovation and marketing with the products that we develop. This cannot be done by one company, one state agency, or any other single organization. It has got to be a collective and coordinated effort, particularly in the public sector."

"Approximately 20-25 percent of our gross national product is spent on transportation. For many companies, transportation costs represent a substantial portion of their total budget. They have shipping costs, travel costs for their employees, parking facilities, and a host of transportation-related activities that every private industry has to face."

"The Transportation Research Board, state research agencies, university research agencies, and all other umbrella organizations must continue to point out to the general public the rewards that can be gained through transportation research."