At its summer 1987 meeting, the Executive Committee of the Transportation Research Board decided that, because the committee is a unique body composed of high officials from the public and private sectors, it should seek to play a more active role in addressing major policy issues in transportation.

As a first step in that direction, the committee altered the format of its winter meeting in January to include a special Tuesday afternoon session devoted to policy questions, inviting leaders of TRB's Technical Activities Division standing committees and group councils to attend for the purpose of increasing its interaction at all levels of the Board. The list of 10 critical issues developed by the Executive Committee last year (*TR News*, No. 132, September–October 1987, pp. 2–14) provided a springboard for this special policy session.

At this session, six Executive Committee members, representing the perspectives of different modes of transportation, gave presentations focusing on future challenges facing their modes and strategies for meeting those challenges. The session leader was Dr. Herbert H. Richardson, chairman of the TRB Executive Committee. The next day, Dr. Lester A. Hoel, the session's rapporteur, presented a summary at the committee's business meeting, which was followed by a spirited discussion of the presentations and their implications for the committee and for TRB.

A summary, by Lester Hoel and Peter Koltnow, of the January session is presented here to keep the entire TRB constituency informed, to share the committee's preliminary findings, and to elicit responses from those who are interested in this important new development.

*Executive Director*
Transportation Research Board

*Peter G. Koltnow*

*Lester A. Hoel*

*Herbert H. Richardson*

# TRANSPORTATION
## Coming Changes and Strategies

LESTER A. HOEL AND PETER G. KOLTNOW

During 1987, members of the Executive Committee had suggested that its members could benefit from briefings on the experience that the modes represented on the Board have had with strategic planning activities. They believed that it would be useful for TRB's long-range planning to identify key issues that face the transportation industry and government, to outline how these might be resolved, and to consider their implications for research.

On January 12 of this year, six members of the Executive Committee presented a picture of the current status of and the future outlook for

- **Air transportation:** Ted Tedesco, *Vice President, Resource Planning*, American Airlines, Inc.;
- **Rail:** Denman K. McNear, *Chairman, President and Chief Executive Officer*, Southern Pacific Transportation Company;
- **Trucking:** Thomas L. Mainwaring, *Consultant, Trucking Industry Affairs*, Ryder System, Inc.;
- **Highways:** Lowell B. Jackson, formerly *Executive Director*, Colorado Department of Highways, and currently *Deputy Administrator*, Federal Highway Administration;
- **Urban transportation:** Louis J. Gambaccini, *Assistant Executive Director/Trans-Hudson Transportation*, The Port Authority of New York and New Jersey; and
- **Water transportation:** Lt. Gen. E. R. Heiberg III, *Chief of Engineers and Commander*, U.S. Army Corps of Engineers.

The extensive discussions that followed served to identify historical parallels, crosscutting issues, and areas of common concern.

The session could be described as a crash course on transportation issues, problems, and future directions. Most committee members have modal specialties, but the session cut across modal lines and presented a picture of a rapidly changing transportation environment. The United States is served by a complex network of transportation services

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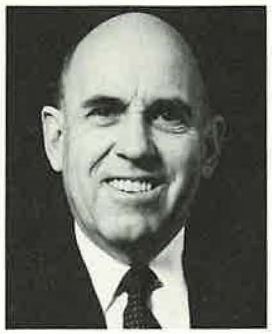
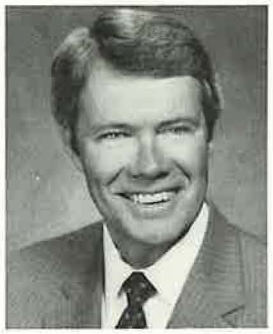
*Ted Tedesco*



*Denman K. McNear*



*Thomas L. Mainwaring*

*Lowell B. Jackson*

*Louis J. Gambaccini*

*Lt. Gen. E. R. Heiberg III*

that is being transformed by the changing nature of both users and providers.

The January meeting was only a first step in clarifying the changes affecting transportation, so that the Board can carry out its responsibilities to both participants and supporters. It is hoped that areas in which research is needed will emerge and that an agenda for future TRB Executive Committee action can be established.

Several observations bear some attention at the outset. One is that, in some respects, the public and the private sectors' views of the future differ. For example, the public sector views disinvestment in services that are not cost-effective as difficult; there may be societal reasons for maintaining such services. The private sector views disinvestment as a normal business decision, devoid of anguish albeit sometimes difficult to accomplish.

A second observation is that widespread economic deregulation of the transportation industry has energized the industry and encouraged innovation and modernization. In particular, management in both the public and private sectors has become more customer oriented, more sophisticated in asset management, more aware of costs, and better able to deal with, and even guide, change.

A third and last observation is that the words "terminals" and "transfer points" were mentioned with great regularity. Efficiency improvements for terminals loom large in the strategies of most modal managers. Lack of clear authority for coordinated planning and development of terminals and transfer points may be a natural condition, but if so it calls for a closer look by all transport modes at ways to encourage improvements in efficiency that will have a significant impact on future mobility and commerce.

The presentations and discussions by the Executive Committee and other TRB leaders covered eight broad topics:

- Impacts of government decisions,
- Intermodalism,
- Technology,
- Safety,
- Work force,
- Information,
- Finance, and
- Externalities.

## Impacts of Government Decisions

Major economic deregulation of transportation industries occurred in the late 1970s and 1980s—a time when other changes were also having a substantial effect. The growth of foreign trade, particularly imports, altered the volume and nature of freight. In responding to underlying economic changes, most parts of the transportation industry enjoyed a new freedom of operation.

Private-sector transportation services formerly bound by narrow definitions of mode—rail, truck, airline, and waterway—have been reshaped. Packages are moved by air and highway through integrated services. Oceangoing containers are shifted easily—if not always in conformance with weight limits—from ships to rail cars or trucks. Railroad companies buy trucklines. Old-line delivery services now operate large fleets of aircraft, many to overseas terminals.

Truckers have become "transportation service providers," moving quickly to improve customer relations and offering an assembly line of services. Shippers and carriers are integrating computer systems. Whole new industries such as brokering have emerged in response to a decade of government action. These adjustments are far from over and have barely begun to have their effect on the public sector.

*Cross section of the main span of the I-295 James River Cable Stay Bridge under construction. New investments in infrastructure are needed to fit emerging demands.* (photograph from Figg and Muller Engineers, Inc.)

A different kind of action, however, has resulted from two decades of legislation and regulation dealing with environmental and safety concerns. Many decisions intended to achieve clear and desirable safety and environmental objectives have had unanticipated impacts on transportation. Objectives such as efficiency and productivity have failed to gain the same public understanding and support as the desire for safety and a healthy environment.

This has affected both public and private providers of transportation services. The road builder is affected as much as the automobile manufacturer. It takes at least a decade to build a freeway, and longer to develop a regional airport. What had been essentially marketplace decisions about automobile design or transit station spacing have been replaced to a large extent by public policy decisions.

It is unlikely that this trend will be reversed in the foreseeable future. The Executive Committee discussions indicated a desire for a more informed and balanced approach to environmental and safety regulation. Such an approach will probably require better articulation of the economic costs and benefits of transportation decisions, and the injection of those economic considerations into the public policy debate. The leadership and staff of government agencies that make decisions that result in substantial impacts on transportation will need to have a better understanding of transportation.

## Intermodalism

Although competition will always exist, traditional lines between modes are blurring in the face of shippers' desires to see goods moved swiftly, safely, and economically. The intermodal segment of the railroad industry (about 20 percent) is its fastest-growing segment. Airport operators are equally concerned about landside and airborne services. Intermodalism is not new to water transport users—literally all of their cargoes move intermodally.

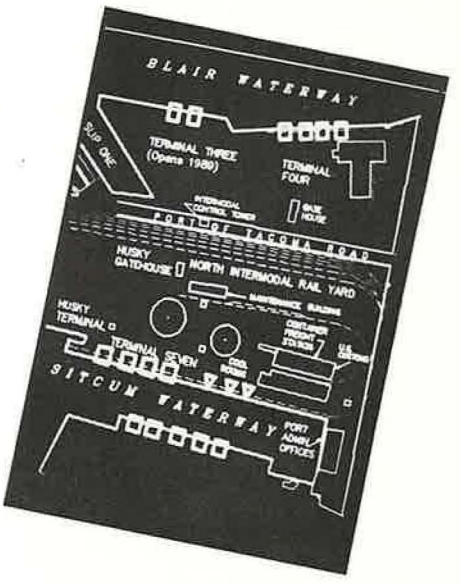
Shippers and service purchasers are mixing and matching transport services to effect greater efficiencies and cost advantages. In many cases, out-of-pocket transportation charges are secondary to measures of service. As shipping agents have become asset managers and transportation has come to be viewed as part of the production process, shippers have become increasingly sophisticated about purchased transportation and more willing to take full advantage of each mode.

Greater freedom of choice for the shipper has been mirrored by new attitudes on the part of carriers. Modal managers are becoming more attuned to the needs of their customers. There is a rapid expansion of service provision and customer interaction. For example,

- Waterway operators have "user boards" to stimulate interchange and terminal information sharing with industry,
- Port operators advertise user responsiveness,
- State highway agencies have established motor carrier advisory committees, and
- Rail and truck operators provide direct computer links to customers.

Intermodalism is also affecting terminal productivity. As shippers and carriers use each mode for what it does best, an increasing share of freight is moving through transfer points. The traditional emphasis on line-haul aspects of transportation has been at the expense of transfer technology and management.

To some extent, improvements in terminal and transfer efficiency are expected to build on the rapidly growing base of compatible computer technology that is shared by shippers and carriers. Still missing is a strong base of information about intermodal transfer and terminal activities, which is needed to guide future developments. Information is likely to flow from increased interaction between engineering and management.




*Computer-assisted design and drafting (CADD) system monitors activities at Port of Tacoma, one of country's largest container ports.* (photograph from Port of Tacoma, Washington, by Judy Gish)

## Technology

Computer use is prevalent within every segment of the transportation industry. Where once the computer was used simply as a rapid calculator, it now has such power and flexibility that it is stimulating new relationships and basic operating techniques throughout the transportation world.

There is substantial use of computers to improve the ability to track the movement of goods. Carriers use computer software support as an element of marketing and to reduce costs to shippers and carriers alike. Computers have allowed them to provide logistics support to shippers, enhancing the ability of transportation providers to widen their range of usefulness. Computers are also used in planning and design functions for new or renovated infrastructure systems.

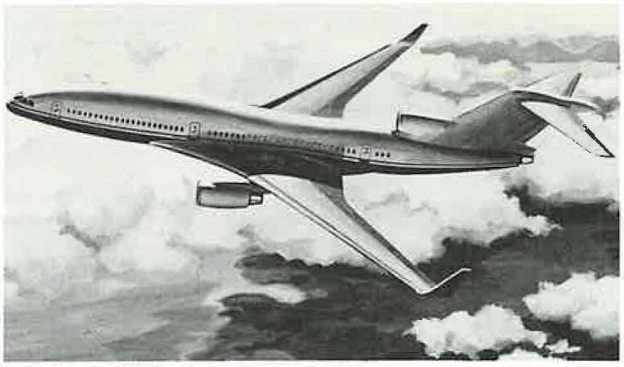
The mode determines how the computer is used. In the trucking industry, computers within vehicles are reducing driver options and permitting management to determine where and how drivers operate. Computers have revolutionized highway design practices and will be applied in the future to intensify the use of value-engineering analysis and improve freeway operations.

Computer use in air transportation is already intensive and lies at the heart of industry efforts to improve fuel efficiency, navigation, and engines, and to support quantum changes in air technology. In all modes the computer is a key element in terminal productivity, regardless of whether changes in modes are involved.

In the rail industry, many changes in equipment, which represents one-half of the assets of railroads, reflect the high level of intermodalism. Technological improvements are reflected in trailer-on-flatcar innovations; container trains, including double-stacking; and trailers that can be used on rail and highway. The possible expansion of domestic containerization is likely to give rise to further technological changes.

In air transportation, some technological changes are in response to external forces. The industry is pressed to meet increasingly stringent noise-emission standards. Other technological changes are designed to reduce fuel consumption, which still looms large among the costs of operation. More dramatic changes are likely to be seen as the industry experiments with hypersonic aircraft, structural life improvements, wing design, and tilt-rotor technology.

Air transportation will also rely on incremental technological changes to support the introduction of substantially larger aircraft that may carry from 500 to 600 passengers and have operating ranges of 8,000 to 10,000 miles. The use of these million-pound and heavier aircraft will have obvious landside implications for both capacity and pavement design.



*Subsonic airplanes are expected to reach speeds close to Mach 0.95 early in the 21st century compared with jets that now cruise at Mach 0.8. This type of large-bodied aircraft may carry 500 to 600 passengers.* (photograph from The Boeing Company)

Technological changes in waterway transportation are likely to be incremental, probably concentrated on ways to make the United States an equal partner in vessel technology. Perhaps the waterway industry's greatest technological needs are a better understanding of commodity movements, forecasts of fleet size requirements, and analyses of intermodal mechanics.

The desire on the part of all or most modes to increase the size of the payload, regardless of the existence of substantial overcapacity, is apparent. Despite this paradox, it is likely that technology will result in increased productivity, the benefits of which will ultimately flow to the consumer.

## Safety

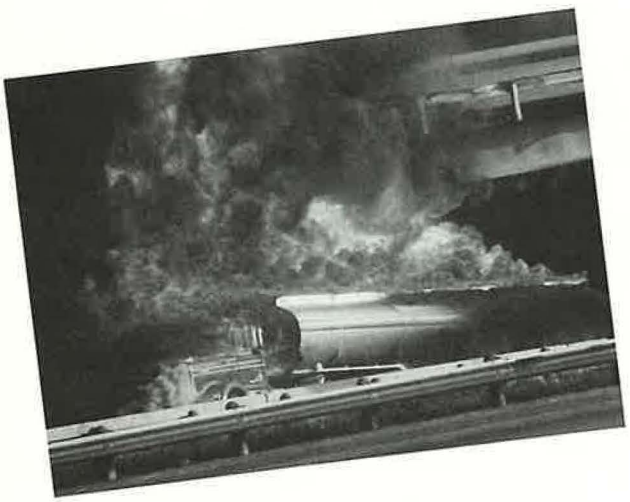
Transportation safety is a continuing concern. For most modes, transportation safety has a visible impact on the public, regardless of whether the public is directly affected. Safety regulation has not been diminished during the period of economic deregulation. The transportation industry is being challenged by safety problems in three ways: internalized costs, laws and regulations that affect operating practices, and public impressions of transportation safety.

Several speakers expressed a need for better data on transportation accidents and described efforts under way to build a better base of information. The shortcomings are particularly great in the area of truck transportation; reduced federal reporting requirements are limiting information on travel that would be useful in understanding accident exposure.

Although the magnitude of the accident problem varies from mode to mode, all have efforts under way to meet future safety needs. One of the most prominent of these is in manpower training. The trucking industry must respond to recent changes in federal laws that will

reduce the pool of available drivers by discouraging or eliminating unsafe operators. Unfortunately, the incoming pool of drivers may be inadequate to meet the industry's requirements. Air industry representatives raised the question of the availability of air traffic controllers to meet future needs.

Many industry representatives believe that there is an inevitable tradeoff between safety and efficiency and are frustrated when the costs of safety improvements are not as clearly portrayed or understood as their benefits. In the arena of public debate, the issue is complicated and intensified by increasing sensitivity to the movement of hazardous materials, which hold the potential of expanding the definition of "injured party."



*There is a continuing need for better data on accidents, particularly in truck transportation.*

## Work Force

Labor issues appear to be clear enough when the availability of drivers, mechanics, controllers, and designers is discussed. Many industry spokesmen, however, were concerned about a growing number of labor-related issues that will be important to transportation. Demographic changes that reduce the availability of labor, competition from other industries for limited personnel, and the image of transportation as an undesirable field of endeavor all have obvious implications for labor availability.

Questions have arisen about a growing legislative agenda dealing with federal retirement practices, work rules, plant-closing legislation, unionization, drug and alcohol testing, and facilities and services for day care. The transportation industries' concerns are not unique. Almost all industries will be affected, although drug and alcohol testing should have more effect on transportation because of the risk of major loss of life.

In some cases transportation providers cope with a desire to reduce labor costs, which rank high as a proportion of all transportation costs, through more efficient use of personnel. The more generalized labor issues noted previously serve as a backdrop to efforts to reduce the size of train and airplane crews, rationalize wage structures designed during an era of substantial industry regulation, and gain greater operating control over employees on the job.

## Information

There was a common perception among the members of the Executive Committee that transportation industries lack important information. Deregulation may have contributed to the decline of the information base on commodity flow and travel. Federal agencies that required certain data no longer do so. There appears to be a general drive to cut federal costs by discouraging collection of certain categories of data. There is also a feeling that computer-driven data have outrun the supply of useful information, particularly as they relate to the cost of transportation.

Several speakers stressed that data needs are the result of new options that must be considered in planning and


*Urban transportation has been innovative in seeking a wider base of financial support through cooperation with business.* (photograph from Washington Area Transit Authority by Paul Myatt)

economic decisions. Only the airline industry indicated that its data base is adequate. In the highway field, it is thought that additional data would be useful in designing for truck travel, in devising new taxes, in calculating user costs and benefits, and in gaining a better understanding of the relationship between travel services and the economy.

Both rail and water spokesmen mentioned that changes in markets, particularly the development of a Pacific Rim economy and the intensification of international trade, have created the need for better information for planning purposes. In some cases, transportation agencies or industries have an opportunity to make new investments in infrastructure to fit emerging demands. In other cases, better information is needed to permit orderly disinvestment. Both the rail and the water industries face the unresolved problem of an unbalanced flow of goods and commodities. Solutions will rely on better information about the scope and nature of this problem. The general lack of information on commodity flow is of concern to all modes.

Additional data were also believed essential to resolving transportation safety problems more effectively. TRB and others have recently emphasized this issue, and new institutions have been created to deal with it. Particular concern was expressed about highway transportation, where information on accident exposure and conditions prevailing during accidents was deemed inadequate.

Data do not come without cost, and future efforts to improve the supply of data for decision making will require that costs be balanced with benefits.

*User fees have been increased at the state level to help finance public highways.*

## Finance

It has been said that industry managers never have enough time, information, or money. Transportation managers are no exception. Recently, money has dominated the thinking and actions of transportation managers.

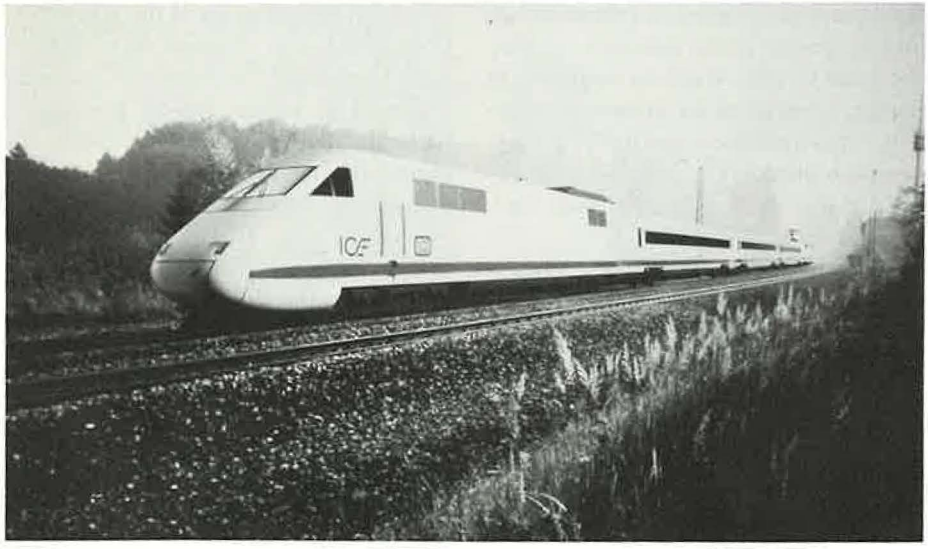
Ways of dealing with problems differ widely among industry segments and between the public and private sectors. Even so, there are some common measures. In air, rail, and trucking there has been substantial industry restructuring to improve profitability and the ability to attract capital. Acquisitions, expansions, joint business arrangements, and bankruptcies have all contributed to some streamlining.

As noted earlier, railroads run truck-lines and barge and steamship lines, major air carriers have substantial ownership of feeder lines, and thousands of truck operators have left the business. In some, perhaps most, cases, economic deregulation has made these changes possible.

There has also been a general move toward disinvestment. Several states are considering removing roads from their networks. Railroads have abandoned extensive track mileage and sold lines to regional carriers. Airlines have left some markets or turned them over to feeder lines. Truckers have given up some customers because service has not been profitable.

Individualistic approaches to strengthening finances have also been taken. For example, railroads have stressed new labor contracts and better customer linkages as ways to both cut costs and improve income. Airlines, uncertain of income stability, are establishing business relations with supporting industries, making incremental productivity improvements, and stimulating higher airport activity levels. The trucking industry, facing low growth and low profits, has expanded its range of services beyond traditional transport activities and concentrated on efficiency of terminals. The waterway industry has been encouraging cooperation with users to improve productivity.

Urban transportation has been innovative in seeking a wider base of financial support through greater cooperation with business. Highway agencies have devised a variety of ways to encourage private-sector contributions to



*German Federal Railway's Intercity-Experimental high-speed train. Exchange of innovative ideas across national boundaries can lead to worldwide solutions to transportation problems.*


*Twin trailer units offer increased capacity within existing weight limits made possible by enactment of the Surface Transportation Assistance Act.*


*Changing relationships between ocean carriers and railroads have been enhanced by the rapid growth in double-stack trains, allowing for the efficient and cost-effective movement of containers to inland destinations.* (photograph from American President Companies, Ltd.)

selected improvements and have benefitted from interest in new varieties of debt financing. User fees have been substantially increased at the state level, and there has been greater use of value engineering to provide the most cost-effective solutions to engineering and construction problems.

## Externalities

In addition to safety, where external reactions to transportation conditions are as important as the internal conditions themselves, three other areas in which external conditions are likely to have an impact on all modes were identified.

The first is the general availability and cost of fuel. Most speakers were optimistic about both. The doomsday sentiments of the 1970s have been replaced by general confidence in marketplace mechanisms.

The second is the expectation of substantial differences in growth among various parts of the country. For some modes, this does not create problems; trucking, for example, has the flexibility to meet changing market conditions. Other modes have substantial investments in infrastructure that will be left behind as economic conditions change and new infrastructure is constructed.

Public infrastructure programs often reflect political balances that were designed to serve historical patterns of growth and development. Just as it took time to devise those balances, it may take time to alter them in response to change. In striving for greater productivity, transportation service providers may find themselves saddled with institutional resistance to changing markets and economies.

The third is the increasing importance of international markets. The private sector and waterway interests perceive the shift to a world economy very clearly. Highway and transit interests have not reacted to this change because the impact on roads and public transportation has not been well understood. Current analyses of long-range highway and transit programs may assist in evaluating the impacts of changes.

Interest in international issues may also stimulate the development of worldwide solutions to transportation problems, leading to a more intensive interchange of innovative ideas across national boundaries.

## Closure

Although the program of the Executive Committee was divided into distinct modal areas and this summary has been arranged in logical topical groupings, these distinctions were not readily apparent during the discussions. Almost everything appeared to be related to everything else. It will be a challenge to the Transportation Research Board to interpret the substantial changes taking place in the transportation world so that impediments to useful change can be dealt with one issue at a time.

The presentations outlined the underlying issues and conditions that affect more than one mode. By dealing with some of these in new and innovative ways, the Board can contribute to the development of an efficient, flexible, and innovative transportation industry.