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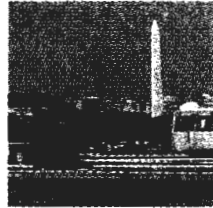
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ISTEA AND INTERMODAL PLANNING



Concept
Practice
Vision

Proceedings of a Conference

Irvine, California
December 1992

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Preface

IN MAY 1992, THE U.S. Department of Transportation (DOT), acting through the Federal Aviation Administration, Federal Highway Administration, Federal Railroad Administration, Federal Transit Administration, and Maritime Administration, requested that the Transportation Research Board (TRB) develop and conduct a conference on the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and intermodal planning issues. The objectives of the National Conference on ISTEA and Intermodal Planning Issues: The Concept, The Practice, The Vision, held December 2–4, 1992, in Irvine, California, were to

- Review the evolution of the planning and funding of the U.S. transportation system,
- Identify the new planning mechanisms developed in ISTEA that mandate transportation improvement programs and intermodal transportation management systems,
- Identify issues that need to be addressed in order to achieve more economically and environmentally efficient transportation systems through the optimum combined use of various modes, and
- Assess how these issues need to be integrated into the planning process.

TRB appointed a National Research Council steering committee to plan the conference, requiring that membership include appropriate areas of expertise and a balance of perspectives on the study issue.

The steering committee developed a conference framework to integrate the issues facing each modal component of the nation's transportation system. Because intermodal planning is a new mandate under ISTEA, the committee sought first to convene at the conference the widest range of expertise available in intermodal planning and then to rapidly disseminate the conference findings to support state and local intermodal planning initiatives.

The conference was structured around several commissioned papers and presentations in order to frame the diverse agenda inherent in intermodal planning. These papers were presented to the 150 conference invitees, who represented a cross section of the nation's transportation leaders. The participants then met in small workshop groups to prepare an action agenda intended to support the emerging local, state, and federal intermodal planning processes. The conference participants recognized that a shift to intermodal planning would occur incrementally and that this conference represented a critical early step to define issues and strategies.

The conclusions of the workshop groups and their analyses of intermodal partnerships, multimodal planning, cross-modal comparisons, intermodal management systems, and vision and potential for intermodalism are synthesized in the conference findings. Complete workshop reports, the text of each formal presentation made at the conference, and a summary of a panel discussion on modal planning discussion are included in these proceedings.

The conference and this report are the product of the discussions and insights of the steering committee, chaired by C. Michael Walton of the University of Texas. A compressed schedule for conference development required extraordinary effort to compile and coordinate conference information and was possible only through the dedicated efforts of each of the liaison representatives and TRB staff specialists. Christina S. Casgar and James A. Scott arranged conference details and prepared the report under the supervision of Robert E. Spicher, Director, TRB Technical Activities Division, and the steering committee. Members of the steering committee who acted as group facilitators and recorders were Michael P. Huerta, Lawrence D. Dahms, Albert C. Eisenberg, Jack D. Helton, David Preston Albright, Gloria J. Jeff, Michael D. Meyer, David D. King, M. John Vickerman, Thomas L. Hardeman, Gregory P. Benz, and Kenneth H. Murdock. The findings and recommendations were developed by the conference participants. Hank Dittmar and Keith Mattson of the Metropolitan Transportation Commission, Oakland, assisted with on-site report preparation. Field trips for conference participants to the Commuter Rail Service and the Alameda Freight Corridor Project were arranged by Sarah J. Siwek of the Los Angeles County Transportation Commission and Gil Hicks of the Alameda Freight Corridor Project, respectively. Jeffrey A. Fantine assisted with conference logistics and provided word processing support. The final report was edited and prepared for publication by Luanne Crayton, Assistant Editor, under the supervision of Nancy A. Ackerman, Director, TRB Reports and Editorial Services.

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Chairman's Summary

C. MICHAEL WALTON

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Chairman, Steering Committee for Intermodal Planning Issues Conference

THE NATIONAL CONFERENCE ON the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and Intermodal Planning Issues was a landmark occasion: it was the first Transportation Research Board conference to be cosponsored by all five modal administrations of the U.S. Department of Transportation. Accordingly, conference participants represented every mode of transportation, and their contributions were the essence of this endeavor. The synergy of intermodal planning ideas that emerged proved to be as exciting as ISTEA itself and certainly as challenging. The words "intermodal" and "efficiency" in ISTEA offer a promising and challenging combination of planning concepts, requiring broad vision tempered by wide expertise. This language suggests nothing less than visionary approaches to the planning, funding, and delivery of transportation programs and services. The diversity of the conference participants and their harmonious efforts to shape an intermodal planning agenda demonstrated that pooled expertise must be the new, if not yet affirmed, approach to addressing the vision for transportation.

Conference participants agreed that ISTEA framed an initial architecture for transportation initiatives and planning, which includes recognition that the needs of transportation consumers are changing. Travel patterns, markets, and logistics are rapidly changing and, more dramatically, becoming globalized. The logistics of goods and passenger transport force new transport activities that in turn necessitate planning initiatives to meet diverse objectives. Although maximum mobility for both goods and passengers is a goal of transportation, it must now be accomplished with profound respect for the environment. Intermodal efficiency requires to-

day's transportation professionals to infuse the planning process with state-of-the-art technical systems and to further develop systems that are compatible with and include consideration of overarching environmental and social concerns.

Partnerships between the public and private sectors and between local and federal agencies are integral to this new mandate. As an example, conference participants heard how the operations of one private-sector freight carrier were restructured to achieve intermodal efficiencies. Drawing on this example, participants concluded that partnerships, albeit challenging and demanding, must be customized and will vary according to the specific or targeted objectives of the partners. Nonetheless, there was a consensus that, from the U.S. Department of Transportation (DOT) to state DOTs and metropolitan planning organizations, partnerships need to be developed in order to include their input with transportation consumers in the planning process.

Conference participants agreed that freight interests should be more fully integrated into the transportation planning and programming process because they represent significant transportation partners. Private-sector freight operators have introduced and used the concept of seamless transportation, and their experiences may well serve to guide new public-sector initiatives. Personal mobility is now intertwined with goods mobility, and the twin concepts demand equal attention.

Intermodal planning, although recognized as a goal, is an evolving dynamic practice, not a static targeted concept. A framework tempered by experience is needed to enhance the practice or application of such planning. Conference participants concluded that a planning approach should include a "system" inventory, development of a mobility index, identification of intermodal performance measures, large-scale training and education on intermodal planning, analysis of national freight corridors, and development of an informational infrastructure to predict transportation flows over time.

ISTEA is the harbinger of a new era in transportation. In creating ISTEA, Congress recognized that a new framework had to be established for transport systems planning and implementation that would take into account the demands of global economic and environmental sensibilities. The act outlines a new agenda and recognizes that flexibility in planning and funding requires that imagination and innovation be included in solutions to transportation problems. Inherent in the quest for those solutions will be the need to test new planning models and to analyze how resources are applied to those solutions. This 3-day conference established the beginning of an intermodal action agenda.

Participants recognized that transportation professionals are embarking on an evolutionary journey and that the impressive successes of the existing transportation network will be further improved by a phased program of technical and institutional innovation. Collective efforts to realize the vision of ISTEA will determine the transportation system for the 21st century.

Conference Findings

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THE INTERMODAL SURFACE Transportation Efficiency Act of 1991 (ISTEA) presents challenges and opportunities for the transportation community. At its most fundamental level, the legislation defines the structure of transportation programs for the federal government and for every state and metropolitan area in the United States. However, not only does ISTEA provide opportunities to the transportation community by encouraging multimodal planning, congestion management systems, enhancements, and a strong link to air quality planning, but it also presents significant challenges in understanding new relationships and determining how transportation decision making should occur in a new policy environment. The legislation reads, "The National Intermodal Transportation System shall consist of all forms of transportation in a unified, interconnected manner, including transportation systems of the future, to reduce energy consumption and air pollution while promoting economic development and supporting the Nation's preeminent position in international commerce." One of the most significant opportunities and challenges will be to incorporate the concept of intermodalism into the thinking of transportation officials and professionals.

On December 2–4, 1992, 150 individuals interested in intermodal transportation attended the National Conference on ISTEA and Intermodal Planning Issues in Irvine, California, to discuss the concept of intermodalism, identify examples of good practice, and provide recommendations for research and technical guidance. In many ways, this conference was a historic event. It represented the first time that all five federal modal agencies—the Federal Aviation Administration (FAA),

Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), Federal Transit Administration (FTA), and Maritime Administration (MARAD)—cosponsored a national transportation conference. For many, the conference provided the first opportunity to hear representatives of the private sector discuss transportation planning and policy making. Similarly, it was the first time for many public-sector representatives to hear how to form successful coalitions between private sector and public sector groups. Finally, the conference offered the first formal opportunity for discussion on defining intermodal management systems.

The specific objectives of the conference were to

- Review the evolution of the planning and funding of the U.S. transportation system,
- Identify the new planning mechanisms developed in ISTEA that mandate transportation improvement programs and intermodal transportation management systems,
- Identify issues that need to be addressed in order to achieve more economically and environmentally efficient transportation systems through the optimum combined use of various modes, and
- Assess how these issues should be integrated into the planning process.

This conference was the third national conference sponsored by the Transportation Research Board following the enactment of ISTEA. The first conference, *Moving Urban America*, held in May 1992 in Charlotte, North Carolina, focused on the institutional aspects of urban and regional planning as outlined in ISTEA (TRB 1993a). The second conference, *Multimodal Transportation Planning and Programming*, held in July 1992 in Seattle, Washington, examined new and current approaches to the technical aspects of planning and programming under ISTEA (TRB 1993b). The findings of these conferences provided an important context for a more focused discussion on intermodal issues.

At this conference, workshops were organized to enable participants to engage in group discussions on key intermodal issues. The workshops focused on intermodal partnerships, multimodal planning, cross-modal comparisons, intermodal management systems, and vision and potential for intermodalism. Questions were prepared for each group to guide discussion. After each workshop, conference participants once again met in plenary sessions to hear the conclusions of the workshops and discuss their importance for intermodal planning. Resource papers prepared for the conference by professionals in the field were also presented in plenary sessions, and speakers with expertise in intermodal transportation ad-

dressed the conference. Because the steering committee expected that bridging the gaps between the many players involved in intermodal planning would be a key issue discussed at the conference, a panel discussion was organized to present reactions to the conference from the perspectives of a state department of transportation (DOT), a metropolitan planning organization (MPO), and the private sector. These important remarks are found at the end of these proceedings.

Several themes and concepts arose repeatedly during conference discussions; they merit special attention and are summarized here. Complete summaries of the findings of the workshop groups are presented later in these proceedings.

“INTERMODAL” DEFINED

One of the first topics addressed by conference participants, and one that encouraged a great deal of discussion, was the definition of “intermodal” and how the term relates to multimodal planning. Multimodal planning provides the general context within which intermodal planning occurs. Multimodal planning is focused on system choices, whereas intermodal planning emphasizes the most efficient way of moving from point to point through the system. From an analysis and evaluation perspective, multimodal planning means adopting a generic, non-mode-specific approach to problem definition and problem solving. In intermodal planning, key interactions between modes, including not only transfers but also the policy and service interactions between alternative modes, are identified.

An intermodal transportation system should be viewed from the perspective of the total trip. Therefore, not only are the points of connection between modes important, but so too are the links that connect these points. Conference participants generally agreed that the intermodal transportation system includes points of connection (e.g., ports, transit terminals, airports, and warehousing centers), but voiced differing opinions on whether the links that connect these points should also be included in the intermodal system. Some believed that these links (e.g., a freeway connecting a port with an inland city) are part of the U.S. transportation system and thus should be the subject of state transportation plans and not part of the intermodal system. A majority, however, believed that the intermodal system should be viewed from the perspective of the total trip and that the efficiency of freight movement from a ship through a port to a truck and then 300 mi to a warehouse could be greatly influenced by each element of the trip. Consequently, they agreed that the intermodal system should be defined to include both the points of connection and the links between them. Furthermore, the contribution of the intermodal system to

optimizing the U.S. transportation system should be based on significant economies of scale.

PARTNERSHIPS

A theme that served as the foundation for most conference discussions was the need for effective and continuing partnerships among all the key participants in intermodal planning. These participants include any group that is affected by, or is involved in, the intermodal system, for example, FHWA, FTA, MARAD, FRA, FAA, U.S. Department of Defense, state DOTs and other state agencies, MPOs, transit agencies, local governments and port authorities, service providers, shippers, receivers, and the other major stakeholders in the transport chain.

Partnerships were described by conference participants as working relationships reflecting long-term commitment, a sense of cooperation, and shared risks and benefits among the participants. Identification of mutual benefits, those that would not result through independent action, is critical to forming partnerships. For intermodal planning, such benefits were identified as more effective use of transportation funding, improvements in transportation development that could lead to innovation, sharing of risk, and the development of a positive working environment.

Two of the key characteristics of successful partnerships are sharing of knowledge among partners and developing an understanding of the strengths of each partner. An in-depth understanding of the intermodal planning process and the role that each partner can and should play is required at the outset. In addition, as Jack D. Helton of Sea-Land Service noted at the conference, partnerships should not be formed to correct weaknesses, but instead should be based on the unique strengths of each partner.

Perhaps the most important conclusion on partnerships was that they require nurturing after they have formally been created. Given the need for identifying mutual benefits in early partnership discussions, once the partnership has been formed, its members must eventually see these benefits occurring. This often requires strong organizational links among partners, such as information exchange and integration, and the establishment of a planning process that is understood and accessible to participants. Several strategies and actions may be used to sustain partnerships, including education and training for key participants, joint planning activities, monitoring and performance evaluation, team building, a strategic human resource strategy aimed especially at mid-level management, and the application of information and communications technology.

TRANSITION

ISTEA was recognized by conference participants as an important turning point in the history of transportation policy. Speakers repeatedly referred to the “promises” of ISTEA and the changes in processes and products that will likely occur. One of the most obvious process changes will come about through the requirement for an intermodal management system to support transportation investment decisions. For both process and product, conference participants emphasized that desired changes would take place during a transition period and that early efforts would focus on putting something in place quickly, while subsequent efforts would build on these initial steps to make the intermodal planning process and management system a valuable part of transportation decision making.

This transition period is a critical phase in the development of the intermodal planning process and the partnerships that accompany it. Without the strategies discussed here for nurturing the partnerships, they will fail. **Without the commitment from participants to make the process relevant to their needs, they will lose interest. Without periodic reaffirmation from the federal government that intermodalism will continue to be a cornerstone of transportation decision making, the intermodal planning process and partnerships could fade away.**

Thus, during the transition phase, education and training, research, and outreach activities should occur. These activities should be focused on the positive benefits of intermodal partnerships, examples of good practice, and development of innovative processes and analytical approaches for addressing intermodal planning issues. Conference participants believed that there was an important role for the U.S. DOT during the next several years in identifying the most effective education and training and research strategies to enhance the likelihood of success in intermodal planning and decision making. However, participants from all modes and at all levels should continue to share experiences so that others may learn which approaches are most effective in solving intermodal transportation problems.

INTERMODAL PLANNING AS A PROCESS

Intermodal planning is comprehensive planning—an iterative, interactive, and continuous process. The process involves stakeholder participation, development of information on interactions between modes, an evaluation framework, trade-off analysis, and coalition building. In several instances, most conference participants agreed that process is one of the most important products of intermodal planning. The definition of intermodal planning as a process is important because one of the key barriers to effective

intermodal planning is participant misunderstanding of process characteristics. Intermodal planning, as in any good planning effort, is the process of defining goals, identifying problems, establishing evaluation criteria, performing analyses, and establishing priorities. This process can be time-consuming, and when participants do not understand why certain things must be done or why it takes so long to do them, they often become frustrated.

Process means structure, which entails formal organizational links between participants, resulting in timely and useful exchange of information. Process means decision support. The intent of intermodal planning is to provide information that may be helpful when transportation resources are allocated. Process means data, data, and more data. One critical impediment to effective intermodal planning is a lack of good data on intermodal movements. In some cases, such data do not exist. In others, the data are considered proprietary and thus are not available for planning purposes. As a process, then, intermodal planning must provide a structured approach to identifying and solving intermodal transportation problems.

FREIGHT MOVEMENT IN PLANNING

Intermodal transportation includes movement of both passengers and freight. Although conference participants believed that, in general, intermodal transportation has not received sufficient attention at the state or MPO level, freight movement has been the most neglected aspect. Given the importance of the movement of freight to the economy and to a community's quality of life, one would expect ensuring the effective and efficient movement of goods to be one of the most important considerations in transportation planning. Conference participants believed that such issues are not taken seriously in most transportation planning processes. Few transportation planners know much about freight or its transportation needs, and seldom do transportation policy boards or other decision-making bodies include representatives from shippers or carriers, some of the primary customers of transportation agencies.

State transportation agencies and MPOs need to better incorporate freight considerations into transportation planning, not only in the problem identification stage of the planning process, but also in the goal setting and in the analysis and evaluation. This increased attention might entail education or training of transportation professionals and certainly means examining today's college transportation curricula to better prepare tomorrow's professionals.

EMPHASIS ON PERFORMANCE

The focus of intermodal planning is on improving the performance of the intermodal transportation system. As was pointed out by many of the conference participants, some of the key bottlenecks in moving from one place to another, for both passenger and freight transportation, are at connection points (e.g., terminals, ports, airports, transfer stations, and the facilities leading to them). The participation of private-sector groups in the intermodal planning and decision-making process provides added importance to the concept of defining and monitoring system performance. As noted previously, these groups in particular need to see the benefits that will occur through their participation and the consequences of the decisions that are made. The implication of this emphasis on performance is that intermodal planning and intermodal management systems in particular should be based on a set of system performance measures. These measures should provide information on how the system is doing over time and where problems exist. The following are examples of performance measures:

- Level of service,
- Convenience,
- Flexibility for accommodating additional intermodal travel,
- Quality of travel,
- Safety,
- Cost of travel, and
- Reliability.

Conference participants concluded that some performance measures would probably be more important than others and that, in some cases, measures could be combined into one factor, for example, an intermodal mobility index.

INTERMODAL MANAGEMENT SYSTEMS

Evolution will clearly occur in the development of intermodal planning. Nowhere is this more likely than in the development of intermodal management systems. Some states will likely devote substantial energy and resources to developing a comprehensive intermodal management system that will represent a state-of-the-art application of the concept. Others might take a more incremental approach to the development of such a system, in which the early developmental stages represent simply the first step in a multiphase approach.

Conference participants viewed the intermodal management system as follows:

- A continuous process of, as well as a tool for, supporting policy and investment decision making by
 - Including all modes of transportation in both system definition and strategy formulation,
 - Facilitating the cooperation of public- and private-sector players in identifying and improving the transportation system for overall economic and public gain, and
 - Addressing both passengers and freight;
- The necessary actions for states to optimize connections, facilitate choices, and promote cooperation among the modes; and
- One of many information sources that feed into the decision-making process and the development of a state intermodal transportation plan.

The following elements of an intermodal management system should be considered as basic desired elements of a system that could take some time to implement:

- Inventory of modal and intermodal elements, including institutions, markets, operations, and physical infrastructure;
- Identification of an intermodal system, which will become the focus for the intermodal management system;
- Use of performance measures that will provide feedback on how the system is doing over time and where problems exist;
- Identification of strategies and actions that will improve intermodal transportation efficiency and effectiveness, including such noninvestment options as pricing, regulatory changes, and the like;
- Analysis and evaluation of these strategies and actions from the perspective of intermodal concerns (e.g., economic value to system users, cost, improvement to system interconnectivity);
- Establishment of priorities among strategies and actions within the context of the overall planning effort; and
- Establishment of mechanisms for including users and providers (e.g., advisory groups) in the planning process.

ISTEA requires that states and MPOs develop six management systems. Given that management systems should be designed to inform decision making, it is important that they be integrated to maximize the usefulness of the information provided. The different management systems overlap clearly in the following areas:

- Cross-referencing of data (e.g., bridge conditions),
- System definitions,
- Policy trade-offs that would affect more than one system,
- Performance measure definition,
- Management and coordination of data bases,
- Users of systems, and
- Economic benefits and costs.

Of particular interest to conference participants was the interrelationship between intermodal management systems and congestion management systems. Intermodal management systems are applied on a greater scale, that is, at the state level, with the intent of improving the connectivity of the system. Clearly, many of the connection points and thus the locations of trouble spots for the intermodal system will be in urban areas. Therefore, designers of both management systems need to be especially careful in interrelating the two.

BARRIERS TO EFFECTIVE INTERMODAL PLANNING

Conference participants identified numerous barriers that would likely hinder the development of an effective intermodal planning process. These barriers ranged from cultural biases to lack of unbiased tools for analyzing the transportation system. Some of the barriers identified more than once include the following:

- Institutional barriers:
 - Traditional modal biases of transportation agencies,
 - Organizational responsibilities within agencies for developing management systems,
 - Lack of coordination at all levels of government on what should be done,
 - Inconsistent or biased information on the various modes,
 - Regulatory decisions (e.g., size and weight limitations on trucks), and
 - Lack of management information systems and intermodal expertise in the profession;
- Proprietary nature of information;
- Consistent and meaningful definition of system performance;
- Participation from the private sector;
- Insufficient resources to solve problems;
- Inadequate analytical tools;

- No clear process for accomplishing intermodal planning system;
- Inadequate consideration of vehicle (truck, automobile, train, container) specifications as they affect the intermodal system; and
- Lack of understanding and relationships.

Barriers to effective intermodal planning are presented in Table 1 in the workshop report *Vision and Potential for Intermodalism*. Each row in this table identifies an intermodal planning objective, and the column heads give the types of barriers that would likely interfere with its achievement. To address these issues, it will be important for states and MPOs to develop institutional mechanisms for incorporating private interests into the planning process; for example, intermodal advisory committees could be established. State and MPO technical systems and data collection activities should also be coordinated and perhaps integrated. Human resources training is needed to educate staff and decision makers on the importance of intermodal systems because, in many cases, the statutory framework for undertaking intermodal planning and decision making is of a single-mode perspective instead of an intermodal one.

RESEARCH AND GUIDANCE

Each workshop group was asked to identify specific research topics that would enhance knowledge of intermodal planning and to recommend the type of guidance that might be necessary to help the transportation community implement such planning. The suggested research projects were as follows:

1. Document ongoing efforts by MPOs, states, and the private sector to conduct intermodal planning and cross-modal analysis. Special consideration should be given to identifying successful efforts and confronting and resolving institutional barriers.
2. Document progress of the states in the development of multimodal plans and intermodal management systems. The research should examine broad issues of statewide concern, such as rail, air, and highway corridors affecting the state or a group of states, and identify techniques for addressing these issues.
3. Quantify the costs and benefits of modal alternatives, life-cycle costs, long-term subsidy requirements, and external costs in present value terms.
4. Develop multimodal and intermodal performance measures and standards that can be used for planning and for monitoring the performance of the intermodal system. This includes the possible development of a mobility index.

5. Develop tools to identify and measure the impacts of intermodal operational improvements on the transportation system. With regard to planning tools, special consideration should be given to the use of geographic information system technology.

6. Update research in consensus-building techniques and conflict resolution.

7. Examine the application of improved electronic technology for enhanced decision support, service provision, and reliability.

8. Examine the impact of intermodal operations on facility designs, curbside management, and transportation corridor use.

9. Examine nontransportation mobility options (e.g., telecommunications and paperless record keeping) and the impact of land use planning in an intermodal context.

10. Document regulatory and institutional issues that affect the creation and ongoing operation of intermodal transportation planning, including cost and labor effectiveness, jurisdictional issues, and stakeholder participation.

11. Examine various approaches to developing an intermodal management system, and develop effective strategies for implementing them. As part of this effort, the data and data collection needs of such systems should be examined carefully.

The following were also suggested as steps that could be taken to enhance the prospects of intermodal planning in the United States:

1. The federal government, probably through the U.S. DOT and its new Office of Intermodalism, should identify a limited number of high-priority national freight corridors to complement the National Highway System. In this study, improvements needed to facilitate global competitiveness should be identified, and a process for involving states, MPOs, governmental agencies, and the private sector in multistate efforts to plan and improve these corridors should be recommended.

2. Educational materials that explain the intermodal policy and substantive provisions of ISTEА should be developed and widely distributed.

3. Intermodal and multimodal players should convene their interest groups to develop a broad-based advocacy agenda for building on the multimodal and intermodal aspects of ISTEА.

4. Aviation reauthorization legislation should establish planning links between airport system and master plans and ISTEА state and regional plans. Consistency should be required, as should cooperation and consultation.

5. Technical guidance materials should recognize the different institutional structures and decision-making environments that exist throughout the United States. Subsequent regulations and technical guidance should provide flexibility in terms of the type and timing of response that is considered acceptable. However, the technical guidance that follows should provide some level of consistency across the many different responses.

6. On the premise that the best way to further a concept is to demonstrate it, case studies and demonstrations of good intermodal planning practice should be developed. It was noted that FHWA has already funded case studies and that ISTEA provided funds for state intermodal planning demonstrations. However, these case studies and demonstrations might not be reflective of what is needed to advance understanding of intermodalism. An example of such a demonstration might be the integration of an urban area's congestion management system with a state's intermodal management system.

7. To further advance intermodalism in future years, educational materials appropriate for college transportation programs should be developed and disseminated to educators.

CONCLUSION

Although much progress was achieved at this conference, much remains to be done. Significant learning experiences need to be shared, and important analytical tools and evaluation methodologies need to be developed. Most important, a new vision of transportation and how it fits into communities needs to be developed. This conference was a major point of departure for this vision. The conference showed participants how far transportation professionals have come in their thinking toward true intermodal transportation systems. However, it also challenged the participants on how far they have yet to go.

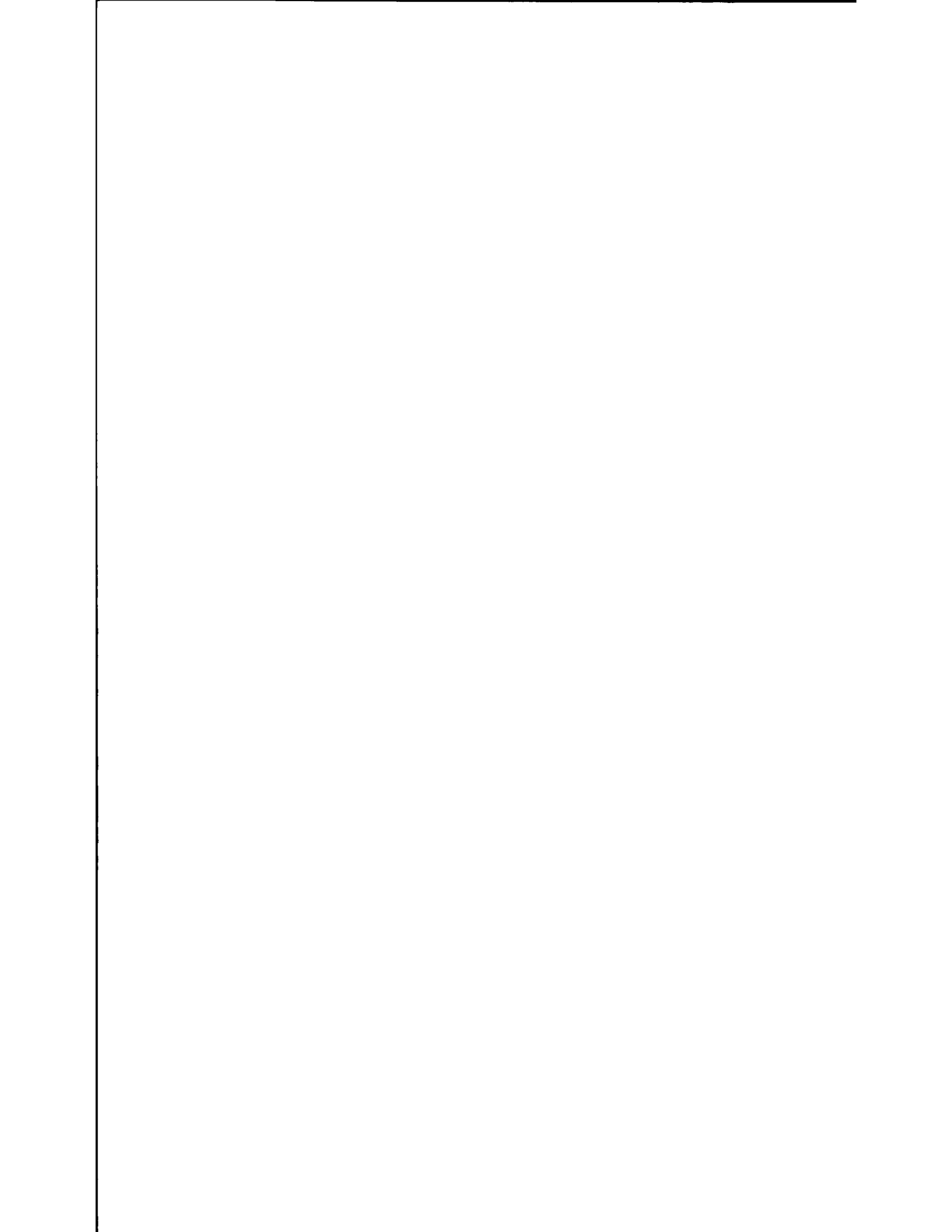
REFERENCES

ABBREVIATION

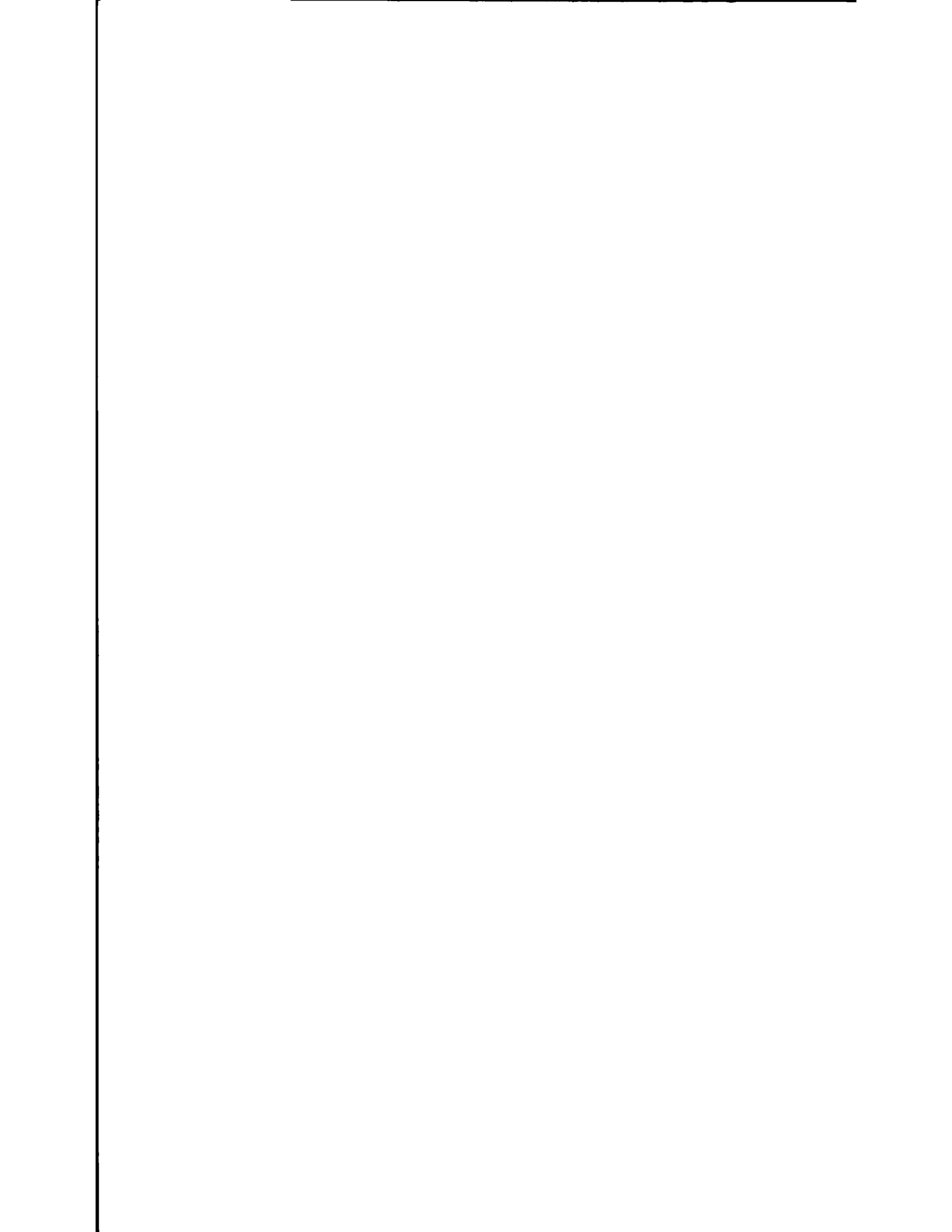
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Workshop Reports



Intermodal Partnerships

RELATIONSHIPS AMONG THE MANY modes involved in transportation planning and decision making will greatly benefit all those who desire an effective and efficient transportation system. A relationship, however, does not necessarily mean that a partnership is required or, for that matter, desired. A partnership should not begin until the potential partners agree on a clearly defined and understandable set of values and commitments. Thus, partnership development requires an initial assessment period to determine whether the partnership is feasible. Based on this understanding of the process, the workshop groups concluded that there would be benefits associated with intermodal partnerships.

There are many bases on which partnerships could be formed. The workshop groups accepted those mentioned by Jack D. Helton of Sea-Land Service and suggested that of the four he discussed—technological, managerial, economic and regulatory, and strategic—the partnerships inspired by the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) are mainly managerial and economic and regulatory.

RESEARCH AND GUIDANCE

Partnership Development

The challenges created by ISTEA are still too new to permit anyone to outline with great certainty the specific steps that need to be followed to create effective partnerships. However, workshop participants believed

that it was possible to discuss the goals of partnerships and how these goals relate to the process of building partnerships.

The first goal is to create an environment conducive to intermodal partnerships. This process is aimed primarily at developing trust among the potential partners, which may be accomplished through a program that allows the private sector to educate public sector officials, and vice versa. The results of early efforts to form partnerships indicate that there is some action item that usually coalesces the group; this clearly illustrates the mutual benefit that can accrue from joint action. First, however, the potential partners have to go through a process of communication and negotiation to determine whether the partnership will work. Potential partners must understand the scope of decision-making responsibility—the likely basis of decisions and who will be making them.

The second goal is to identify shared values. This process does not occur only at the top of the respective organizations but needs to occur at every level. One can enter into a partnership at any level if there is a perceived need for it. However, the process is expedited if there is at least a titular leader who can act as a catalyst for bringing the key players together. This must occur at all levels of decision making, including those in the federal government, and could be an important task for the U.S. Department of Transportation.

The third goal, and one of the most important parts of the partnering process, is to identify opportunities, needs, and customers. Who are the customers of intermodal planning and decision making, and, ultimately, of the intermodal transportation system that results? Identification of customers and their needs necessitates that each partner understands both who consumes the transportation service and what they require as a transportation product. Can synergy of the partnership continue to satisfy these needs and ideally enhance the transportation product? The partnership synergy may well open new market opportunities. At the most general level, the major customer is the general public, whether it be those who consume freight transportation services or those who consume passenger transportation services. The key customers of each member in the partnership need to be identified.

Once the customers have been identified, the fourth goal is to identify who benefits and who does not. Although the best-case scenario is a partnership in which everyone benefits, there are degrees of benefits. In assessing the desirability of entering a partnership, each potential partner should examine the opportunities the organization may forego by entering into the partnership.

The final goal in building a partnership is determining the public policy consequences. This step involves addressing the additional impediments

that are created between public and private organizations as they try to solve the problems of the different modes in the transportation system.

Roles and Responsibilities

For a partnership to be successful, the expectations of each partner for its role in the partnership and the duration of that role must be clearly defined at the outset. A partnership under ISTEA may have short-term benefits, but it is a long-term relationship. The partners need to commit that time; otherwise, the likelihood of success is minimized.

A particularly important aspect of this definition process is identifying the representatives to the partnership. For large constituencies, one might have to work through associations. Examples include the American Automobile Association, which serves passenger interests, and the American Association of Port Authorities, which serves freight and passenger interests. Identifying potential associations or groups thus becomes part of the process of forming truly representative partnerships. This practice is not unusual in the private sector.

One of the primary purposes of the partnership is to influence decisions. Therefore, the partners need to determine how this influence will occur or how they will gain access to the decision makers. Key decision makers, those who will be accountable for the resulting decisions, and the role metropolitan planning organizations (MPOs) will play in the process must be identified. Which partners will play what role in the entire planning process should also be determined. Familiarity with the organizational structure for planning and decision making is required. Partners must determine where the intermodal group fits into the structure and who will be responsible for marketing, outreach, and community awareness.

Monitoring and Assessment

Monitoring and assessing periodic and long-term progress toward the partnership goals is a critical part of the partnership process. In many ways, the credibility of the process depends on demonstrating achievement of goals. In particular, it is important for partners to determine at the outset how they will know when they have been successful. One useful technique for establishing this monitoring is for partners to enter into a memorandum of understanding, contract, or verbal agreement. Experience has shown that the negotiation of such an agreement is perhaps more valuable than the product itself because it helps the partners to understand each other and to clarify the points that have been agreed on by the

partners. This agreement also should establish the tools that will be used for the evaluation.

Analytical Tools

Tools to assess the trade-offs among different modes and between freight and passenger transportation improvements need to be defined. Then data need to be developed and productivity measured for each mode. Of particular interest is examining the entire length or trip components of the intermodal chain and identifying the bottlenecks and where the most important improvements can be made. A baseline study needs to be undertaken; one objective of such a study would be to identify the social benefits of different transportation modes.

Potential Impediments

Many areas offer potential for fruitful research in the area of partnerships. Certainly, the concept of public-private sector partnerships on intermodal issues needs to be examined from many different perspectives. Of particular interest are the issues associated with who sets priorities for the funding and the process for establishing these priorities. What possibilities are there for the private sector to participate in funding some of the intermodal transportation improvements?

Organizational and jurisdictional issues arise in a potential partnership, especially among the different public agencies likely to be involved. The organization of the MPO and its willingness to involve private sector representatives could be a significant issue. Finally, there is the issue of how a diverse group of constituencies can be involved in the decision-making process.

SUMMARY

A partnership is not a partnership until the potential partners have (a) agreed on shared values, commitments, and risks and benefits, and (b) negotiated and prepared in writing the terms and conditions of the proposed partnership.

Transportation professionals need to identify good examples of successes in intermodal partnerships. These examples need to provide details on how these partnerships were structured, how consensus was reached, and what the partners expected to gain from the arrangement.

Multimodal Planning

WORKSHOP PARTICIPANTS SPENT considerable time discussing the difference between multimodal and intermodal planning. Each of the three groups discussing multimodal planning approached the definition differently. Marked semantic differences were evident among the groups. In general, multimodal planning was defined as the process of (a) describing a transportation problem in a non-mode-specific manner, (b) identifying more than one modal option to solve the problem, and (c) evaluating the options in a manner that provides for an unbiased estimation of each mode's contribution to solving the problem.

Intermodal planning, by contrast, is focused on identifying key interactions between modes, defining strategies for improving effectiveness, and evaluating the effectiveness of these strategies.

One group attempted to simplify the definitions of multimodal and intermodal planning by suggesting that multimodal planning is focused on system choices, whereas intermodal planning is focused on the most efficient way of moving from point to point through the system. Participants finally decided not to dwell on the definition. Usually, an agreement on a common definition facilitates group discussion; however, in this case, participants believed that the debates had the opposite effect.

LEVEL OF PLANNING INTEREST

The scale of analysis and application of policy choices greatly influences the level of interest of participating organizations. Two major scales of application merit attention.

Large Scale

On the large scale of application, the focus is on the way in which public policy affects market decisions. On this broad scale, freight interests seek advocacy partnerships with transportation interests on such issues as taxation, weight limits, punitive local or state regulation, and the like.

A concern for large-scale policy issues raises a question of the appropriate role for the federal government. Limited federal standards may be needed to ensure consistency among the states, and the federal government might act as a facilitator for multistate planning. The workshop groups tended to agree that the appropriate federal role would extend beyond funding of specific improvements to include policy emphasis on certain key national freight corridors. One example might be a midwestern rail corridor. In addition, the federal government has an important role in funding research in the intermodal field, particularly to develop the analytical framework for examining multimodal trade-offs.

Small Scale

On the small, or metropolitan, scale, the different modes seek to be involved in the partnership to influence planning on such topics as congestion, project selection, project delivery, and the development of program consensus.

Although at the metropolitan planning organization (MPO) level there is much discussion on the more immediate, small-scale issues associated with the intermodal transportation of passengers and freight, there is considerable concern about and interest in such broad policy questions as taxes and weight limits. This raises the important policy question of whether MPOs and states as transportation advocates should join in support of these policy positions. Although this has not traditionally been a concern for many MPOs, the intermodal partnership underlying the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) might cause some public agencies to consider such a course.

MULTIMODAL PARTNERSHIPS

ISTEA creates the potential for a broad-based, new private-public partnership to extend transportation into consideration of broader community values and economic competitiveness. Workshop participants affirmed that the formation of such partnerships is both timely and highly desirable, despite the turf barriers that exist between different units of government and modal interests. The task is daunting, but that should not be used as a

reason to abandon these partnerships. Instead, all groups should be encouraged to take small steps toward establishing these relationships.

Information, particularly information on successes and failures in multimodal partnerships, needs to be disseminated. Various interests need to be included in the process if effective planning is to result.

CHARACTERISTICS OF MULTIMODAL PLANNING

Effective multimodal planning includes the following characteristics:

- Inclusion of public and private constituents and all modes in the development of goals, criteria, measures, alternatives, and recommendations;
- Strong commitment to partnership throughout the process;
- Broad-based goals encompassing community values, environmental interests, economic health and competitiveness, and statewide interests in addition to traditional mobility concerns;
- Integration of all modes and systems; and
- Solid information base that encompasses passengers and freight, demographics and land use patterns, environmental sensitivities, and economic and fiscal issues.

BARRIERS TO MULTIMODAL PLANNING

The workshop groups identified several barriers to effective multimodal planning:

- Lack of commitment to partnership, including ownership interests, turf protection, lack of public or private input, and competition among public agencies and private interests;
- Lack of solid information about freight movement; existence of proprietary data bases;
- Lack of an analytical frame for making decisions about modal options, particularly involving freight versus passengers;
- Lack of data, understanding of mobility, land use, and air quality relationships; and
- Lack of federal guidance on best practices, minimum efforts required, and public consultation and involvement, and confusing schedules in existing guidance.

Of some interest is the second barrier—lack of solid information. There was some discussion that perhaps it is not lack of information that is the problem, but lack of access to the information. Indeed, one of the major

benefits of a partnership may be to improve access to information. With such access, however, comes a responsibility not to undermine the proprietary rights of those who have the data.

The momentum of past practices and plans is perhaps the greatest barrier of all. Most regions have made many project commitments, and it will be difficult to back away from these commitments. However, ISTE A is based on the assumptions that there is no past, there is no present, there is only a future; and in the future, things should be done differently from how they are done today. The fact remains, however, that there is a past, there is a present, and the future may be here before the transportation community determines how to address it.

RESEARCH AND GUIDANCE

The following recommendations resulted from the group discussions.

1. Research needs to be focused on expanding the existing planning model from modal planning to an analytical model that encompasses trade-offs between modes and among the many community and economic factors, as required by ISTE A.

2. A mobility index for both people and freight needs to be developed to allow measurement of these trade-offs in similar units. This index should incorporate broad-based values.

3. The federal government, through the U.S. Department of Transportation's Office of Intermodalism, should consider identifying a limited number of high-priority national freight corridors to complement the National Highway System. Improvements needed to facilitate global competitiveness should be identified, and a process should be recommended for involving the various states, MPOs, and governmental entities with the private sector in multistate efforts to plan and improve these corridors.

4. The Office of Intermodalism should immediately consider commissioning research to identify the critical intermodal links that exist (including transit) and public and private mechanisms for dealing with service voids and interruptions.

5. The Office of Intermodalism should immediately consider developing and widely distributing simple informational materials that explain the policy and substantive intermodal and multimodal provisions of ISTE A. This could be a brochure similar to those produced by the Federal Highway Administration and Federal Transit Administration.

6. A key focus for transportation planning should be intermodal planning, taking advantage of the flexibility allowed in ISTE A. However, this flexibility extends primarily to highway and transit funding and does not

include funding flexibility for other elements of the intermodal transportation system. Aviation reauthorization, for example, should establish planning links between airport system and master plans and ISTEA-required state and regional intermodal transportation plans. Consistency should be required, as should cooperation and consultation.

A final observation made by the workshop participants was that the interests of intermodal transportation are just beginning to be considered in national, state, and regional transportation circles. Given that the next several years will be a transition period in the implementation of ISTEA, is there some action that those interested in intermodal transportation can take to further the intermodal cause? Workshop participants suggested that relevant intermodal and multimodal players should convene interest groups to develop a broad-based advocacy agenda for building on the multimodal and intermodal aspects of ISTEA to develop a true intermodal program. Traditionally, each transportation professional has been oriented toward a single mode. This orientation will not be easy to change. However, it cannot be assumed that the intermodal concept embedded in ISTEA will be sustained automatically. ISTEA mandates substantial change. Are institutions up to it? Will the necessary partnerships be successful? The transportation community must make sure that partnerships are successful and that the intermodal concept is sustained throughout the life of ISTEA and beyond. This can happen only if the transportation community provides the necessary support.

Cross-Modal Comparisons

INTERMODAL PLANNING is an iterative, interactive, and continuous planning process. These characteristics are the basis for its successful evolution. Cross-modal comparisons address some of the most sensitive trade-offs in the planning process and occur primarily at decision points in the process. Intermodal planning consists of five major areas: stakeholder participation, information and research, evaluation framework and methodology, zones of competition or trade-off analysis, and coalition building and decision making.

COMPONENTS OF INTERMODAL PLANNING

Stakeholder Participation

Stakeholder participation is often where the process of dealing with cross-modal comparisons in the context of comprehensive intermodal planning begins. The metropolitan planning organizations (MPOs) are a major element in successful efforts at gaining stakeholder participation. They are uniquely qualified to educate stakeholders. Important decision makers who are not part of the official MPO process also need to be identified. These decision makers could include local officials, airport and port representatives, and influential citizens' groups. The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) requires a new level of public participation in the planning and decision-making process for transportation investments. At what level of planning and decision making should these groups be brought into the process? Who will likely benefit from the

greater consideration of intermodal transportation issues? At what point does this benefit suggest that the beneficiaries should pay for what they receive? This assessment will lead to an understanding of what information and extra research are needed to make the process successful.

Information and Research

The purpose of the information and research component is to develop a baseline on transportation's current status and future goals. This means that transportation planners need to identify goals, describe feasible alternatives, determine the impacts of the alternatives, assess the cross-modal trade-offs, identify the constituencies associated with each alternative, and determine the appropriate role of planners. Each of these steps in developing an information and research base is important and often complex. Taken together under intermodal planning, they represent a true challenge.

Evaluation Framework and Methodology

Developing effective analytical tools, evaluative frameworks, and methodologies for modal comparisons is one of the greatest challenges facing planners. Basic to this process is developing performance measures. Not only is it important to have such measures, but they will likely be weighted or evaluated differently at different levels in the process. For instance, measures could be perceived differently at the state level than at the regional or local levels. The challenge for the evaluation process is to mesh all of these multiple-value systems and establish an approach that is valid for all.

Just looking at the different policy objectives of ISTEA gives some sense of the challenge of the evaluation process. The intermodal transportation system is to be economically efficient and, at the same time, environmentally sound. The National Environmental Policy Act has been in existence for a number of years, and transportation professionals have begun to learn how to deal with environmental parameters. However, there has not been a great deal of experience trading off economic investments and environmental impacts. The system needs to enhance international competitiveness, which, in effect, is an economic spin-off. Energy efficiency and social well-being are also important considerations. Air quality is a specific concern that can be linked to well-being and quality of life and to environmental goals and objectives. These objectives represent a wide range of concerns that should focus the attention of decision makers on the intermodal transportation system. This challenge suggests use of a multiobjective, multicriteria framework for evaluating alternatives.

Zones of Competition or Trade-off Analysis

Focusing on the zones of modal competition, or range of competition, is one way of identifying components of the intermodal system that are critical to the planning process. It is important that the components of the intermodal system be understood so that coalitions can be created to support transportation objectives and minimize conflicts. Analyzing individual components provides mechanisms of identifying constituencies and building general support for the intermodal system as a whole. As in any endeavor, institutional issues arise in understanding who the decision makers really are, what organizational processes they use, and what the turf issues are.

Market-driven innovation versus public policy objectives is a key issue in cross-modal comparisons. ISTEА is not an attempt to move planning in the direction of reducing the free choice of informed customers on what mode of transportation to use. However, it is difficult to plan ahead. Technological change and innovation cannot be anticipated. The best solution is to establish a system that allows technological change and innovation to occur and provides enough advanced warning so that strategies can be developed to take advantage of real opportunities for intermodalism.

Coalition Building and Decision Making

Given that the earlier steps have been successful, a coalition can be created and decisions can be made. In many ways, the process is the product. Workshop participants believed that the development of the plan is the critical exercise. It is de facto desirable because the process that gets people to make decisions in an intelligent way, where goals are identified and accepted, leads to some kind of mutual social contract. The job of planners is to facilitate this process. By so doing, they create the opportunity for breakthroughs in the future. Of course, each metropolitan area is different. Each MPO is different, and each area will have different priorities. Given the mandate of ISTEА and many state laws, something different needs to be done. However, these forces for change often run into such constraints as implementation feasibility, budget limits, regulatory limits, and other legislative constraints.

Each of these areas by itself offers significant challenges, and all are interrelated. In each case, after the development of the basic information base, a feedback loop is provided to the stakeholders because of the importance they play in establishing effective intermodal planning and cross-modal comparisons.

BEST PRACTICES

The workshop group discussed recent experiences with comparative analysis of modes in several areas—ISTEA implementation in the San Francisco Bay Area, Northern Virginia, and Dallas–Ft. Worth; the private sector setting of capital priorities; priority setting in the aviation industry; and the work of the U.S. Department of Defense Transportation Command. The following three major characteristics were identified in each of these cases:

1. The process should be inclusive, involving all relevant players from goal setting to criteria definition to evaluation to selection.
2. Although it may be difficult to compare modes, it can be done on the basis of output, efficiency, externalities, and the like, just as apples and oranges are compared in terms of freshness and nutrition.
3. The process must have a clearly understandable timetable and a mutual goal or endpoint.

Cross-modal analysis needs to occur at three stages in the transportation planning and programming process: at the level of setting goals and objectives or policies, in the development of system plans or corridor plans and strategies when the focus is on optimizing a mix of modal options, and at the programming stage when states and MPOs must choose among modal nominations for limited funding. It is important to remember that different kinds of analysis and measures are required at each stage.

RESEARCH AND GUIDANCE

Workshop participants developed the following recommendations for research:

1. The Transportation Research Board (TRB) should document ongoing efforts by MPOs and the private sector to conduct cross-modal analysis in plans and programs and to incorporate broad multimodal considerations in policies. The study should focus on what is successful and what is not, on confronting and resolving institutional and analytical barriers, and on incremental achievable results instead of on ideal case studies.
2. TRB should survey the state of the practice in state multimodal plans and management systems and document the progress being made at the state level in partnering, public participation, and cross-modal analysis since the enactment of ISTEA. Broad issues of statewide concern, such as the effect of rail, air, and highway corridors on states, should be examined, and techniques for addressing these challenging issues should be identified. An independent analysis could be made of the multimodal demonstrations.

3. Research should be conducted to quantify the costs and benefits of modal alternatives—life-cycle costs, long-term subsidy requirements, and external costs—in present value terms for use by states and MPOs in comparing modal options.

4. Cross-modal analysis should be based on measures that reflect the value set of the transportation customer or consumer. Research should be conducted to develop five or six multimodal performance measures that reflect customer desires instead of system measures important only to planners.

5. Research should be conducted to develop tools to identify and measure the impacts on the transportation system of operational improvements such as tow patrols, ramp metering, grade crossing improvements, smart streets, and the like.

6. Perhaps most important, TRB should sponsor a symposium on techniques for consensus-based decision making, conflict resolution, public involvement, and mediation in transportation, focused particularly on the new multimodal decisions. Substantial research in this area conducted in the 1970s needs to be updated.

Intermodal Management Systems

THE INTERMODAL MANAGEMENT system is one of the six management systems required by the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). As such, this system needs to be considered in the context of how the management systems relate to one another and the role that each plays in providing information for resource allocation decisions at the regional and state levels. Workshop participants viewed intermodal management systems as follows:

- A continuous process of, as well as a tool for, supporting policy and investment decision making by
 - Including all modes of transportation in both system definition and strategy formulation,
 - Facilitating the cooperation of public and private sector players in identifying and improving the transportation system for overall economic and public gain, and
 - Addressing both passengers and freight;
- The necessary actions for states to optimize connections, facilitate choices, and promote cooperation among the modes; and
- One of many information sources that feed into the decision-making process and the development of a state intermodal transportation plan.

ELEMENTS

There will clearly be an evolution in the development of intermodal management systems. Some states will likely devote substantial energy and

resources to developing a comprehensive intermodal management system that will represent a state-of-the-art application of the concept. Others may take a more incremental approach to the development of such a system, in which early developmental stages simply represent the first step in a multiphase approach. The following elements of an intermodal management system should thus be considered as basic desired elements of a system that could take some time to implement:

- Inventory of modal and intermodal elements, including institutions, markets, operations, and physical infrastructure;
- Identification of an intermodal system, which will become the focus for the intermodal management system;
- Use of performance measures that will provide feedback on how the system is doing over time and where problems exist;
- Identification of strategies and actions that will improve intermodal transportation efficiency and effectiveness, including such noninvestment options as pricing, regulatory changes, and the like;
- Analysis and evaluation of these strategies and actions from the perspective of intermodal concerns (e.g., economic value to system users, cost, and improvement to system interconnectivity);
- Establishment of priorities among strategies and actions within the context of the overall planning effort; and
- Establishment of mechanisms for including users and providers (e.g., advisory groups) in the planning process.

DEFINITION

The workshop groups discussed at length the components of the intermodal system. Workshop participants generally agreed that points of connection (e.g., ports, transit terminals, airports, and warehousing centers) should be in the system. However, differences of opinion were voiced on whether the links that connect these points should also be in the system. Some participants believed that these links (e.g., a freeway connecting a port with an inland city) are part of the transportation system and thus the subject of state transportation plans. Consequently, they believed that there was no need to put these links in the intermodal system. A majority, however, believed that the intermodal system needs to be viewed from the perspective of the total trip, and that the efficiency of a freight movement from a ship through a port to a truck and then 300 mi to a warehouse could be heavily influenced by each element of this trip. Thus, to truly provide the information to decision makers that

it is supposed to provide, the system must be defined to include the links between the connection points.

One of the first steps, then, in the development of an intermodal management system is the definition of an intermodal system. The majority of group participants believed that this system should include points of connection and links between those points.

This system designation needs to be developed on a reasonable order of magnitude. Neighborhood culs-de-sac would not likely be on the system. The designation should equate to some sense of importance regarding optimization of the investment and performance of the U.S. transportation system at some level of application relevant to the state transportation agency.

SYSTEM PERFORMANCE MEASURES

One of the primary purposes of the intermodal management system is to identify problems in the intermodal system. To do this, there needs to be an understanding of what constitutes a problem and how this problem is changing over time. Therefore, intermodal management systems should be based on some performance measures that can be used to provide this information to decision makers. Workshop participants identified several system performance measures:

- Level of service,
- Cost of travel,
- Convenience,
- Environmental impact,
- Opportunity for expansion of intermodal capabilities,
- Trip time,
- Safety,
- Amount of capacity,
- Flexibility in accommodating additional intermodal travel,
- Quality of travel,
- Reliability, and
- Energy use and efficiency.

Each of these performance measures provides useful information on the operation of the intermodal system and its impact on users and society. It is likely that some of these measures would be more important than others and that some could be combined into one variable, for example, a mobility index.

RELATIONSHIP TO OTHER MANAGEMENT SYSTEMS

Given that the working definition of all six management systems is that they be designed to inform decision making, it is important that they be integrated in such a way that maximizes the usefulness of the information provided. There are clear areas of overlap among the different management systems, including the following:

- Cross-referencing of data (e.g., bridge conditions),
- System definitions,
- Policy trade-offs that would affect more than one system,
- Performance measure definition,
- Management and coordination of data bases,
- Users of systems, and
- Economic benefits and costs.

Of particular interest in the discussion was the interrelationship between intermodal management systems and congestion management systems. In addition to defining the overlapping areas, the workshop group believed that it was important to make the distinction that intermodal management systems are applied on a greater scale (that is, at the state level), with the intent of improving the connectivity of the system. Clearly, many of the connection points and thus the locations of trouble spots for the intermodal system will be in urban areas. Therefore, designers of both management systems need to be especially careful in how the two management systems interrelate.

DATA NEEDS

The effective use of the intermodal management system will require a significant amount of data and types not normally collected by states and metropolitan planning organizations (MPOs). The group recommended that the results of the May 1992 Transportation Research Board conference on data needs be considered in the identification of data needs (TRB 1993). However, the most important input for intermodal management will be origin-destination data, fairly finely disaggregated along several dimensions such as time of travel, commodity type, mode, and the like.

BARRIERS AND INSTITUTIONAL REQUIREMENTS

Several barriers will likely be encountered in the development of intermodal management systems, including the following:

- Institutional barriers:
 - Traditional modal biases of transportation agencies,
 - Organizational responsibilities within agencies for developing management systems,
 - Lack of coordination at all levels of government on what should be done,
 - Inconsistent or biased information on the various modes,
 - Regulatory decisions (e.g., size and weight limitations on trucks), and
 - Lack of management information systems and intermodal expertise in profession;
- Proprietary nature of information;
- Consistent and meaningful definition of system performance;
- Participation from the private sector;
- Insufficient resources to solve problems;
- Inadequate analytical tools;
- No clear process for accomplishing intermodal planning system;
- Inadequate consideration of vehicle (truck, automobile, train, container) specifications as they affect the intermodal system; and
- Lack of understanding and relationships.

To address some of these issues, it will be important for states and MPOs to develop institutional mechanisms for incorporating private interests in the process. For example, advisory committees could be established. State and MPO technical systems and data collection activities should also be coordinated and perhaps integrated. Human resources training is necessary to educate staff and decision makers on the importance of intermodal systems. In some cases, the statutory framework for undertaking intermodal planning and decision making also needs to be examined.

EXAMPLES OF GOOD PRACTICE

Several examples were identified that appear to reflect the desired types of intermodal integration. However, in each case, it is unknown what type of decision-making support was provided or if some form of intermodal management system is in use. The examples are as follows:

- Port activities in Rotterdam, The Netherlands;
- Handling of freight and passengers by the United Parcel Service, Federal Express, and airlines;
- Switzerland's transportation system, especially Zurich Airport;

- Public utility electric grid;
- Port of Tacoma, Washington;
- Melbourne, Australia, Port Authority;
- Interlining capability of current freight handlers; and
- U.S. Department of Defense Transportation Command.

In each case, an examination of the decision-making process and how the decision was supported and continues to be supported may be worthwhile.

RESEARCH AND GUIDANCE

The research agenda reflects the barriers that were identified earlier and should thus be focused on the following:

- Identifying the purpose of intermodal management;
- Examining alternative definitions of performance;
- Defining performance measures with sensitivity analyses;
- Identifying data and data collection issues;
- Addressing institutional issues, including participation of private sector and other players;
 - Developing analytical tools;
 - Developing relational data bases, with particular concern for quality;
 - Assessing technology; and
 - Forecasting needs and elasticity analysis.

The following recommended guidance for federal officials began with an understanding that it will take time for intermodal management systems to be developed and used. The phasing in of such systems will likely begin with immediate reaction to the regulations, and then a more cautious and perhaps manageable approach will be taken to developing a usable system. It is important that the intermodal management system be a useful tool and not simply a response to regulation. Therefore, the workshop group recommended the following actions:

1. Recognize the different institutional structures and decision-making environments that exist throughout the United States. Regulations should provide flexibility in terms of the type and timing of response that is considered acceptable. However, these regulations and the technical guidance that follows should provide some level of consistency across the many different responses. Some participants believed, for example, that the regulations should define the key elements of an intermodal management system.

2. Federal officials should reaffirm the national interest in enhancing intermodal system efficiency in light of global competition. This important contribution of ISTEA must not be lost in the transition in federal leadership.

3. Case studies and demonstrations of good practice should be developed. It was noted that the Federal Highway Administration has already funded case studies and that ISTEA provided funds for state intermodal planning demonstrations. However, these case studies and demonstrations might not be reflective of what is needed to advance understanding of intermodalism. An example of such a demonstration is the integration of an urban area's congestion management system with a state's intermodal management system.

REFERENCE

ABBREVIATION

TRB Transportation Research Board

TRB. 1993. *Transportation Research Circular 407: Transportation Data Needs—Programs for a New Era*. National Research Council, Washington, D.C., 90 pp.

Vision and Potential for Intermodalism

THE VISION AND POTENTIAL for intermodalism under the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) could vary with the different partners involved in the intermodal planning and decision-making process. However, the workshop group agreed that the preamble to ISTEA, which establishes the overall context for an intermodal transportation system, is a good beginning. This general vision statement would have to include a more detailed look at specific benchmarks and objectives for it to be considered a useful statement of policy direction. In developing a more specific statement of an intermodal transportation vision for the United States, workshop participants used a vision statement prepared for the California Department of Transportation and modified it, as follows, to reflect the thoughts and desires of conference participants:

- Intermodal transportation will be an asset to the United States.
- People and goods will move freely, safely, and economically as a result of informed choices for intermodality—choices based on speed, economy, timeliness, flexibility, and quality.
 - Swift and economic movement of goods through U.S. ports will give American business a competitive edge by adding value to U.S. products and services.
 - Intermodal information and services will reduce the need for travel of people and goods.
 - U.S. mobility needs will be accommodated, and, at the same time, congestion will be reduced, air quality will be improved, and energy will be conserved.

- The U.S. transportation system will be a balanced, interconnected multimodal network that provides equal access to all transportation users.
- Innovative, proactive approaches to reducing economic, environmental, and social impacts of transportation will be commonplace. Application of new technology will bring opportunities for better transportation and expanded industry.
- The intermodal system will necessitate a series of appropriate public and private partnerships.

CONCERNS

A hierarchy of barriers relates to the implementation of this vision. These barriers are presented in Table 1. As shown in the column heads, workshop participants believed that at least five types of barriers merited attention—institutional, financial and economic, technological, physical and infrastructure, and cultural. Although each objective may be hindered by all five barrier types, participants marked only those most likely to affect the related objective.

The results of this assessment led to two important conclusions for implementing an intermodal vision. The institutional nature of these concerns is one of the more important dimensions that need to be addressed (see Table 1). The institutional arrangements and statutory structures for transportation decision making are often organized from a single-mode perspective instead of an intermodal one. Participants interpreted this as suggesting the need for the continuing presence of the U.S. Department of Transportation Office of Intermodalism. This organizational unit is needed to promote a balanced intermodal transportation policy-making process at the highest level of government through strong advocacy for intermodalism. In addition, the table suggests the need for analytical tools that can support investment decisions on the basis of mobility. For example, a generic mobility index would allow a comparison of different modal alternatives with consideration of their most basic contribution to society. Also, the participants believed that there is a need for a study of possible national approaches to transportation policy based on systematic considerations of intermodalism as it relates to national objectives.

RESEARCH AND GUIDANCE

Many research issues were identified in the workshop group's discussion of vision. They were categorized into five different areas—information, operations, analytic tools for modal comparisons, nontransportation options, and regulatory and institutional issues.

TABLE 1 Barriers to Intermodal Planning Objectives

Objective	Institutional	Financial/ Economic	Techno- logical	Physical/ Infra- structure	Cultural
Lack of modal bias	X				X
Level field/objective evaluation	X				X
Development of analytical tools	X				X
Elimination of congressional bias	X				X
Education of decision makers	X				X
Efficiency for global competitiveness	X	X			
Optimal modal efficiencies	X	X	X	X	X
Customer service quality/ choice	X	X	X	X	X
Improved information flow/ sharing	X		X		X
Continual innovation	X		X		X
Ethical system (see paper by Gilbert Carmichael)					X
Integration and coordination of people, goods, and information	X		X		X
National approach to planning	X	X	X	X	X
Safety			X	X	
Competitiveness	X	X	X	X	X
Seamless intermodal movement	X	X	X	X	X
Universal vision (conception to delivery)	X	X	X	X	X

Information

Two major areas of research were identified under the general topic of information: planning and electronic options. Under planning, the participants believed that there is great potential for the use of geographic information systems. To enhance mobility, route identification, selection of bottlenecks, and investment decisions based on improvements in these system characteristics are important capabilities for any level of government. Such tools would seem to be an important prerequisite for the goal of providing seamless connectivity opportunities. Under electronic options, the research needs are in providing better decision support tools for

individuals and firms making travel decisions. For example, information could be provided to potential customers via electronic dissemination of alternative modes, service options, costs, and mode availability.

Operations

Research in operations relates to the design and management of intermodal space. For example, in facility design better information is needed on multi-use and shared use of transportation facilities and on how a user friendly approach to service provision can be incorporated into the facility design. Curbside management is an important area of research for goods movement. For example, of the last 70 buildings built in Boston and New York, only a few have been built with a single facility for off-street goods delivery. Airport terminal access is another area of intermodal research. From a transportation corridor perspective, significant issues of ownership and shared use provisions arise when intermodal considerations are incorporated into planning. The basic research consideration in the operations area is how to provide seamless connectivity opportunities.

Analytic Tools

Research is sorely needed in the development of analytical tools that will allow investment decisions to be examined from the perspective of mobility instead of modal characteristics. This methodology includes the ability to better understand congestion and congestion-reduction strategies, including pricing mechanisms, and the impact of intermodal investment strategies on communities.

Nontransportation Options

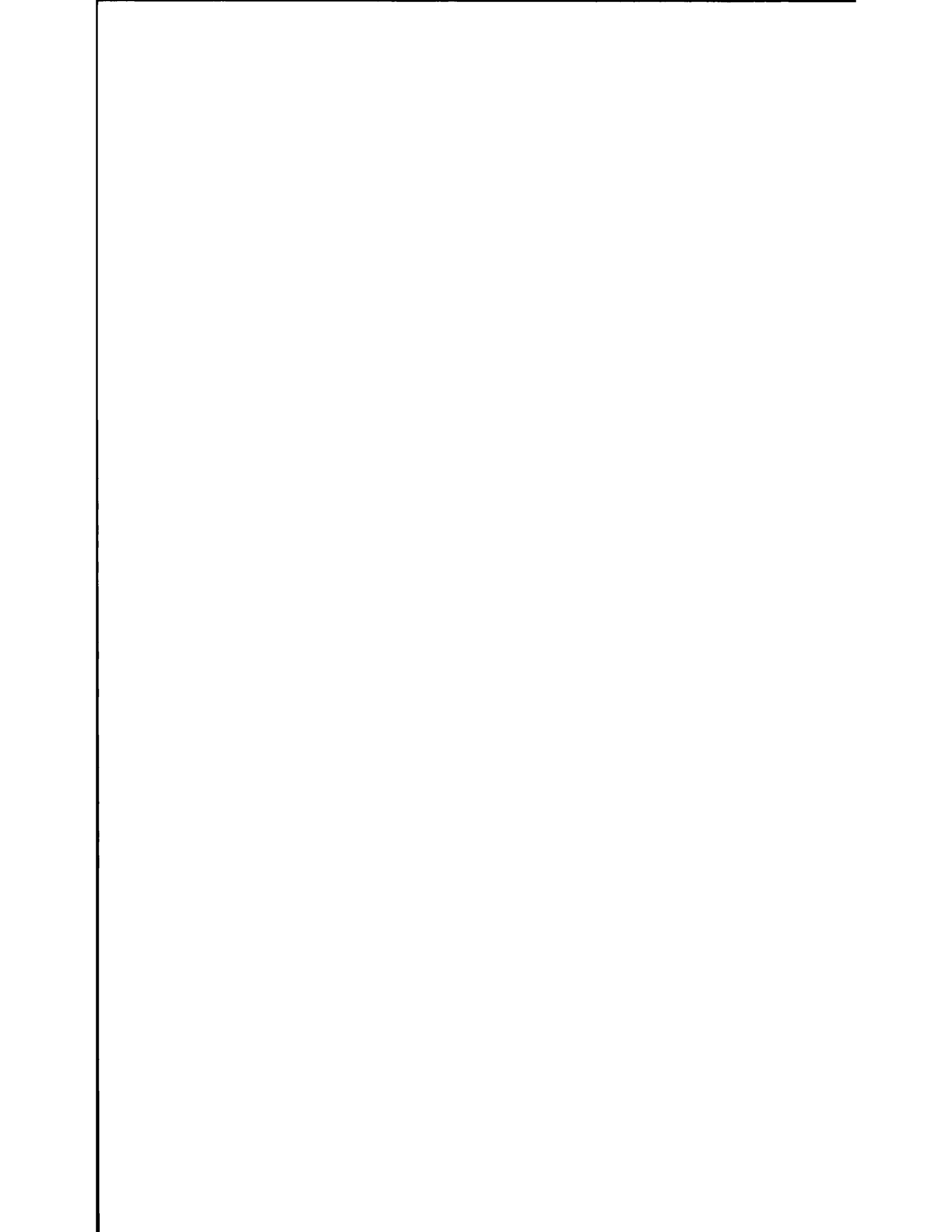
Nontransportation options offer potential for achieving many daily objectives. For example, using telecommunications in place of physical transfer of goods and people will likely be an important phenomenon in the 21st century, and paperless record keeping techniques will go a long way toward reducing red tape. One of the most important options in this category is improved land use planning in the context of intermodalism.

Regulatory and Institutional Issues

Workshop participants identified three areas for research in the regulatory and institutional category. First, concern is growing about the cost and effectiveness of labor in service-oriented industries. In the context of inter-

modal service provision, research should be undertaken on improved labor and cost-containment strategies. Second, given a more international perspective and world market, jurisdictional issues, including ownership and control of assets, trade issues, and customs and immigration concerns, may need to be examined. Finally, intermodalism requires the creation of partnerships. Effective partnering would be eased if better information were available on the institutional and regulatory issues of concern to the stakeholders. This focus is on both the private and public sectors and on all levels of government. Mutual understanding and education will be critical for successful partnerships to be formed.

Resource Papers



Perspective from the Office of Intermodalism

ROBERT MARTINEZ

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I WOULD LIKE TO DISCUSS the role of the Office of Intermodalism and attempt to secure continuing support for the work of the U.S. Department of Transportation (DOT). I also would like to speculate about potential significant changes in policy under the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) in the areas of planning and technology that will affect transportation under President Bill Clinton's administration.

If President George Bush's approach to transportation policy were to be dissected, a few guiding principles would be revealed. These principles include belief in a new federalism, support for development of intermodalism as key to transportation efficiency, belief in the fundamental role played by markets, and a strong desire to effectuate good government. Effectuating good government includes stewardship of one of the nation's key resources, a resource that provides essential services for the people, the economy, and the way of life in the United States. ISTEA is probably the crowning achievement of the past several years in the transportation field.

ISTEA represents the most revolutionary approach to thinking about transportation systems since the creation of the Interstate highway system. It offers a holistic approach to transportation problems that breaks with all precedent. ISTEA is particularly worthy of being called revolutionary for three reasons: (a) it designates states and localities as the primary determinants of how transportation priorities are set; (b) it provides unprecedented flexibility to transfer funds from one category to another to achieve transportation goals determined by state and local officials; and (c) it places a new emphasis on intermodalism. ISTEA authorizes spending of

more than \$155 billion over 6 years (through fiscal year 1997) for highways, highway safety, and mass transit.

ISTEA's unparalleled funding flexibility allows states to spend transportation funds on programs, projects, and modes that are significant to them because, simply put, the transportation priorities of California differ from those of Connecticut. Under ISTEA, highway funds can be spent on mass transit or vice versa to meet a region's transportation needs efficiently. More than \$300 million of highway funding has already been shifted to transit projects as a result of requests from states.

Intermodalism—a cornerstone of ISTEA—is on the cutting edge in the development of competitive transportation systems. The Office of Intermodalism was mandated under Title V of ISTEA, but curiously, and perhaps wisely, “intermodal” is not defined in ISTEA. Consequently, one of the first actions in the Office of Intermodalism was to assemble a DOT working group to define the term. The working definition developed has three main components.

First, intermodalism means connections: the convenient, rapid, efficient, and safe transfer of people or goods from one mode to another (including end point, pickup, and delivery) during a single journey to provide the highest quality and most comprehensive transportation service for cost. The traditional concept of intermodalism is typified by the process of loading a container from a ship to a truck that hauls it to a train for transcontinental movement or the piggyback movement of a trailer on a flatcar. However, the DOT working group did not believe that this narrow definition properly addressed the broad concept of intermodalism in ISTEA and consequently expanded the concept.

The second aspect of intermodalism is choice: the provision of transportation options through competition among different modes, independently or in combination. For example, when I travel from downtown Washington to attend a meeting in midtown Manhattan, I have several options: I can take a train, fly, or drive. Each option involves several combinations of modes: a taxi or the Metro to the airport or train station in Washington and a taxi or bus or the subway to the final destination in New York.

Choice also means that decision makers in the future need to consider alternative systems before investing in infrastructure and affecting the market by their decisions. How much mobility can be purchased and at what cost? What are the environmental externalities associated with each? What would the marketplace dictate? If the market itself would not produce any particular result on its own, do decision makers at least understand what makes the most market sense?

The third component of intermodalism requires coordination and cooperation among transportation organizations to improve transportation

service, quality, safety, and efficiency for all modes or combinations of modes and to do so in an environmentally sound manner. ISTEA enhances the role of the states and metropolitan planning organizations (MPOs). With this expanded authority, however, goes increased responsibility and the need for better coordination.

The transportation system is only as strong as its weakest link, and unfortunately that weakest link today is all too often at points where passengers or freight need to be moved efficiently from one mode to the other—truck to plane or ship to train. If the United States succeeds in strengthening these key links between modes, it will succeed in maintaining a competitive edge by providing a flexible, responsive, and market-oriented transportation system. The consideration of intermodal issues mandated by ISTEA offers the means by which the seamless transportation network that is critical to the long-term economic well-being of the United States can be created. Given the tremendous role of transportation in the economy, the potential gains offered by intermodal efficiencies can have a significant impact on economic growth. ISTEA has the flexibility to provide solutions to impediments such as inadequate access to the Interstate highway system, overhead clearance limitations for double-stack trains, and inadequate street design and pavement strength.

ISTEA requires that transportation planners give freight more attention than it has received historically. Clearly, the intent of the legislation is to foster freight as well as passenger intermodalism. I am more than a bit concerned about the inadequate attention being afforded to freight issues generally as ISTEA evolves. The role of MPOs has been enhanced. Given their political composition and the local dynamics at work as a result, understanding freight concerns does not come naturally to most MPOs. In that regard, the Office of Intermodalism is making strong efforts to inculcate an appreciation among MPOs for the movement of freight. Freight is indispensable to the economic well-being of the United States, so it needs to be moved as efficiently as possible.

ISTEA makes large changes in the planning process. No longer can transportation planning be done for one mode of transportation in isolation from the others. ISTEA imposes a number of planning requirements on the states, such as the establishment of six management systems as tools for transportation planning.

The Office of Intermodalism, working in concert with the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) is attempting to address some planning concerns, including maximizing flexibility (which is already well established) and addressing freight concerns (which is not so well established), through the act's resultant regulatory process, specifically in the metropolitan and state planning

regulations and through intermodal management systems. The relevant intermodal objectives of ISTEА, such as key access-related requirements, must be respected during the planning process. In addition to flexibility, complete information on which to base decisions is essential for decision makers. This means that a different kind of access, constituent access during the process, must also be adequately addressed.

The management system for intermodal transportation is supposed to provide for improvement and integration of all of a state's transportation systems, increase productivity, increase the use of advanced technologies, and encourage innovative marketing techniques, such as just-in-time deliveries. It is hoped that the approach adopted for the intermodal management system will be broad and systemwide in scope, instead of limited to the narrower but obviously key connectivity concern. It will need to boost the availability of intermodal data. The demands placed on states by DOT, particularly those for intermodalism, should be flexible because intermodalism is a conceptual approach to transportation and not a concrete object, such as highway pavement or a bridge. Many state transportation professionals are genuinely attempting to understand the implications of intermodalism and are planning accordingly. DOT policy makers cannot be heavy-handed with them. Policy makers must also recognize that not every state has attained the level of sophistication that states such as California and New Jersey have attained. Some states do not even have departments of transportation, much less an appreciation for the ramifications of intermodalism.

Hence, DOT needs to provide guidance, but states should also be allowed to develop their own systems to produce desired results and to develop their own means of measurements without overly prescriptive federal requirements.

In the planning area, ISTEА imposes a requirement that transportation plans address the need to meet air quality standards and links transportation to the Clean Air Act. ISTEА increased funding for air quality planning and established a new program to address highway congestion and transportation-related air pollution, with \$6 billion authorized. The need to meet air quality objectives is real: the Environmental Protection Agency could impose sanctions on the expenditure of federal transportation dollars if states do not adequately pursue air quality attainment objectives. The emphasis on the link between transportation and the environment provides opportunities for technological solutions, mass transit, efficient intermodal cargo movement, and other solutions.

Transportation planners must be energetic in addressing worthy environmental concerns and in appreciating the externalities often not picked up by the marketplace, but they also must work at striking the proper

balance between economic and environmental goals. Transportation is critical to the national well-being. Theoretical debates about the environment must not get in the way of clear-headed thinking about meeting the global economic challenges of the coming years.

Within ISTEA, the keystone of the highway transportation network, now and for the foreseeable future, is the National Highway System (NHS). It is the logical next step to the Interstate system. It will be a 155,000-mi network, give or take 15 percent, consisting of the Interstate system, the defense strategic highway network, strategic highway connectors, and principal arterials that will be identified during the next 2 years. Completion of this system is key to economic vitality. ISTEA again breaks ground in establishing essential roles for the states in particular, but also for MPOs, to designate the new highway system.

As a component of the whole vision, NHS was part of the grand compromise that made the legislation possible. If NHS is not supported, it will fail from the start. It must be widely endorsed. FHWA, in particular, is aggressively working to bring NHS to fruition.

From the highway perspective, NHS is arguably the centerpiece of ISTEA and will be the major focus for the federal-aid highway program into the 21st century. It is at the state level that designation of roads as part of NHS will be determined. Designation of NHS is a real issue because such designation for any roadway makes work on that road eligible for 80 percent federal funding.

From the intermodal perspective, because ISTEA requires that full, special consideration be afforded to access to intermodal facilities, ports, and airports, NHS designation can play a major role in addressing existing intermodal shortcomings. Even a road that appears relatively insignificant, but which leads to a port or an intermodal rail yard and is therefore a major freight access route, may be designated as part of NHS by the state. Because, in most instances, such access roads stretch but a few miles to make the efficient intermodal connection, their NHS designation should not have an appreciable impact on states' flexibility for the majority of their targeted mileage and will facilitate crucial economic movements. Efficient cargo movement also means less congestion and can contribute to meeting environmental goals.

I would like to make a few comments about the role of the Office of Intermodalism in three specific areas: (a) regulations, (b) grants and funding, and (c) research, data, and technology.

The marketplace is moving toward intermodalism. The most effective, most competitive transportation companies today are integrated intermodal operators. Institutions, regulations, and policies at the state and federal levels must keep pace and facilitate further movement toward overcoming

obstacles to intermodalism. This will keep American markets competitive and functioning well.

In the regulatory area, early in 1992, President Bush called for a regulatory moratorium, the time frame of which was subsequently extended. Coincident with that moratorium on new regulations was an order for a deregulatory review on the part of federal agencies with a goal of reducing and eliminating outdated and burdensome regulations.

The rail, highway, maritime, and aviation industries have been developed independently, and consequently each has peculiar statutory and regulatory regimes. Regulatory impediments to good intermodalism that are artifacts of that historical development need to be identified and eliminated.

On a related matter, as efforts are made to remove regulatory barriers to efficiency in the marketplace, overly enthusiastic bureaucracies should not be allowed to impose unnecessary or harmful new regulatory burdens under the guise of intermodalism. Let there be no doubt; tremendous potential exists for such regulatory burdens.

As the planning and information requirements evolve under ISTE A, I hope that they can be as unintrusive and burden-free as possible, while achieving necessary, worthy objectives. Unfortunately, ISTE A provides a great number of opportunities for federal malfeasance, and constituents must remain alert and aware of the direction in which Washington policy makers are leading. America is great precisely because of what takes place outside Washington, and not thanks to the government machinations in Washington.

In the grants and funding arena, the Office of Intermodalism is reviewing how DOT allocates its money. Three major DOT agencies—the Federal Aviation Administration, FHWA, and FTA—spend considerable sums of money. Under ISTE A, DOT officials are working to ease any remaining ambiguities in the transfer of funding between highway and transit categories. Over the longer term, the Office of Intermodalism will explore whether any synergies to move the country in the intermodal direction might be achieved in funding for transportation projects.

In looking at research and development and technological applications, the transportation systems of the future must be safe above all else, but also must be affordable, integrated, energy efficient, and environmentally sound. In order to have efficient intermodal connections and reduced congestion on highways and rail, maritime, and air facilities, better use must be made of existing infrastructure, and sound decisions must be made about investments for the next generation.

Transportation is vitally important. Transportation industries represent nearly 20 percent of the U.S. economy. I strongly believe that the country's

flexible, market-oriented transportation system represents an important competitive advantage over its trading partners. A strong infrastructure provides major multiplier effects.

The transportation system is complex, and introducing technological change can be difficult and expensive. Ultimate costs and benefits of research and technological innovation are often difficult to assess during the planning stage, as are resulting impacts of the technology. In all of this investment activity, planners must pay attention to the market.

Full implementation of ISTEA will require a continuing commitment to research and technology. The Office of Intermodalism has a statutorily mandated role in intermodal research, and officials hope to build a strong and close relationship with the Transportation Research Board (TRB). The Office of Intermodalism will also be working closely with the Bureau of Transportation Statistics, which was also mandated under ISTEA and was established at DOT in October 1992. In both these areas, federal officials could use advice from TRB about topics worthy of research and about particular gaps in data that need to be addressed.

In the search for technological solutions to transportation problems, ISTEA has provided a tremendous boost to exploring new means to address the future, for example, intelligent vehicle-highway systems (IVHS) and magnetically levitated trains. IVHS, in particular, holds promise for tremendous advances in safety and exponential progress in addressing traffic congestion. It is a worthy area for research.

I am concerned, however, about government intrusion in the technologies that are promoted throughout this process. The market must remain the driver of this process. If the government assumes the role of "picking the winners" (and consequently picking the losers), the result will be of little or no value, and the United States will have lost the competitive race with Japan and Europe. This is a major issue for American competitiveness. Government is singularly unqualified to develop technologies that are targeted primarily for commercial application, including technologies in the transportation area. That is the purpose of markets. Even under today's fiscal constraints, if the government gets involved, it can afford to commit significant financial resources far exceeding any single private sector effort. As transportation decision makers move forward with important, multimillion-dollar and, indeed, billion-dollar technological choices, the opportunity costs of alternatives foregone should be quantified. Decision makers should understand the modal choice issue and respect market forces.

In addition, a tremendous amount of technological protectionism currently exists. It should be noted that Japan's technological successes have

been achieved from their willingness to seize and improve technologies, including a number of U.S. technologies.

Additionally, as the transportation community works on the technologies that will allow it to forge into the future, more modest advances should not be overlooked. Modest advances may result in incremental progress, which may strongly benefit the transportation system and at the same time be technically feasible and affordable in the current era of fiscal constraints.

The United States has the highest level of absolute productivity of any nation on earth. In fact, as reported by *Fortune* magazine, U.S. productivity is 30 percent higher than productivity in Japan. A McKinsey study of productivity in service industries, released in fall 1992, similarly ranked the United States first in virtually every industry covered. The United States, not Japan, and not Germany, is the world's largest exporter. U.S. exports have doubled in only 6 years and now exceed \$620 billion a year. The gross national product number for growth in the third quarter of 1992 was 3.9 percent. Perhaps more significant, U.S. growth has outpaced growth overseas, including that of Japan and Germany, for more than a year.

What does all of that have to do with us? Strong productivity, vigorous export growth, and a strong economy do not just happen. The conditions must be in place to make them happen. In my view, these conditions require a small government that meets the needs of the people but frees the marketplace to identify the best opportunities to make a strong profit. Movement toward increased government economic imposition and regulation, or industrial policy, will erode recent advances. Transportation will likely be a good barometer for the direction economic policy-making will be taking.

Keynote Address: The Promise of ISTEA

LILLIAN LIBURDI

Port Authority of New York and New Jersey

THE PURPOSE OF THIS CONFERENCE is to create a vision for the future of state and metropolitan areas in the United States, translate that vision into an approach, and develop methods and mechanisms to help transportation professionals use the promise of ISTEA successfully to deal with state and local needs. Data and research needs must be identified, and an agenda for action must be set.

The promise of ISTEA will be discussed, and additional thoughts about freight transportation issues will be offered in this keynote address.

In 1990, the transportation community asked, demanded, pleaded, begged, cajoled, and threatened members of Congress with the ruin of the economy and transportation systems if they failed to pass new legislation. They delivered. They have provided a foundation for the future. It is particularly appropriate to speak of ISTEA in terms of its promise because few, if any, pieces of transportation legislation have promised so much to so many:

- For highway interests, new construction contracts and jobs, jobs, jobs;
- For state and local governments, flexibility and greater local control;
- For transportation planners, a better data base and more modal options to help solve problems;
- For environmentalists and metropolitan planning organizations (MPOs), an implementation mechanism to achieve clean air goals and reduce traffic congestion;
- For truckers and other highway users, adequate infrastructure and intelligent highway systems that could move traffic more efficiently;

- For airport and seaport operators, the opportunity to improve access to ensure greater efficiency for users; and
- For just about everyone, including transit operators, more money.

Consequently, it is not surprising that so many interest groups concluded after its passage that ISTEA was their special act. Today, once proud claims of direct parentage of the act have diminished in light of lower-than-expected appropriations, a host of implementation problems, and other potential pitfalls. After a year of ISTEA implementation experience, some are asking, "Do I really love this new creation? Is this baby really mine?"

I hope that most of us here at this conference are still well disposed to the promise of this landmark legislation, even if we are a bit frustrated and challenged by some of its aspects. Transportation planners must recognize that this act is the beginning of a new way of approaching transportation in this country. It is the first surface transportation bill of the post-Interstate era, and it specifically advances the proposition that transportation functions in an economic context. It recognizes that the domestic and international economies are linked to the movement of people and goods, not by one mode, not by two, but by a number of modes, which are often linked. In this context, the way that transportation professionals plan, build, and operate the connections between transportation modes to form a system requires them to accept responsibility to view their actions from a new perspective and with a new sense of urgency and purpose so that the economy is served successfully.

It is equally important to recognize that the "I" in ISTEA stands for intermodalism. This has significant implications for everyone in the transportation industry, regardless of particular interests or points of view. Managers of intermodal facilities are now special stakeholders in the future.

The act specifically advances intermodal planning and development by its systematic and international scope, by its emphasis on access to airports, seaports, transit facilities, and other intermodal platforms, by its funding flexibility provisions that permit greater multimodal choice and intermodal connectivity, and, most important, by its requirements for multimodal and intermodal plans.

However, some aspects are missing from ISTEA. The term "intermodalism" is not directly defined, and the act does not make new funding resources directly available to advance its central concept of increasing economic strength through improved transportation connectivity. Nevertheless, Congress made it clear that ISTEA should change the way U.S. transportation systems are viewed; existing modal systems must now be

integrated to help the United States compete more effectively in a global economy. The preamble to the act specifically states, "The National Intermodal Transportation System must be the centerpiece of a national investment commitment to create the new wealth of the Nation for the 21st century."

The lack of a definition for "intermodal" obscures the ability of transportation professionals to understand and realize the full promise of ISTEA. Participants at this conference should challenge themselves to develop such a definition for intermodalism in the ISTEA context. Such a definition is important for judging the effectiveness of an activity mandated or encouraged by the new law.

In the previous paper, Robert Martinez of the U.S. Department of Transportation (DOT) Office of Intermodalism explained that the DOT working group has been working on what intermodalism must encompass. The group has developed a conceptual framework for intermodalism that includes connections, choices, and coordination and cooperation.

If transportation professionals can arm themselves with a common definition of intermodalism, they can look more closely at ISTEA as a framework for creating greater system connectivity and choice, as well as greater coordination and cooperation among customers and service providers. Using this approach, one can easily conclude that ISTEA is a great first step toward getting the job done, but that more refinements and steps certainly are needed.

Some of the positives and negatives of ISTEA are examined in more detail in the following paragraphs.

The following are many positives in the promise of ISTEA.

- The focus is on movement of people and goods and not merely on modes.
- Access to intermodal facilities is recognized as a national priority: economic prosperity is tied directly to the strength of domestic and international transportation networks, and transportation plays a pivotal role in national security.
- Support is provided for critical transportation needs, such as state and MPO planning development, reconciliation of transportation projects, and Clean Air Act goals, and safety and overall research and development are emphasized.
- Funding for traditional highway and transit programs is increased, and the need for new programs is recognized.
- Decision-making authority is given to key implementers: states and MPOs.
- Multimodal and intermodal management plans are required.

The following are negatives in ISTE A.

- Significant gaps exist in programs, policies, and funding related to economic competitiveness issues, including improvement in intermodal freight systems. (Intermodal systems development will fail without adequate data analysis and programs aimed at meeting intermodal needs.)
- More change than can be realized under existing organizational structures is proposed. Those who are designated as agents of change in this act, particularly state DOTs and MPOs, need to develop a firm understanding of the dynamic interplay between transportation and economic growth and security.
- Sophisticated performance measures are called for, but concern for necessary data to select improvements or measure progress is insufficient.
- New priorities and institutional relationships that could produce more policy gridlock than create new cooperative results are established. For example, groups that favor more transit projects in the transportation improvement programs (TIPs) of large urban areas have found that these new priorities, possible under ISTE A, are not receiving enough recognition in the early rounds of planning. Some states have insisted on addressing backed-up highway priorities first. This clash could lead to an indefinite delay in the development of TIPs, and it may create long-term conflict. Again, the challenge is not only one of process, but also of moving to a new transportation paradigm that can direct transportation development out of modal categories to the essential task of moving people and goods as efficiently as possible.

Given these positives and negatives, what can be done to realize the full promise of ISTE A? Programs that strengthen the intermodal 3C concept (continuing, comprehensive, cooperative) will strengthen surface transportation as a whole.

The following are some recommendations for consideration.

First an "F" for freight policy should be added to the "I" for intermodal in ISTE A. ISTE A contains few or no program incentives to directly advance goods movement problem identification, analysis, and solutions. This means that the bulk of highway and transit program planning efforts will fail to give sharp focus to the multimodal or intermodal elements needed to fully realize freight issues associated with port and airport connectivity, truck and rail interchanges, and total intermodal systems development. There are no funding provisions for direct rail-related efficiency investments in ISTE A. The new, preliminary intermodal management plan rules only suggest the identification of rail-related connectivity

issues, and ISTEA only provides that highway funds can be used to alleviate crossing and clearance conflicts. The transportation community needs to do much better than that, both in its thinking and in its next efforts in Congress.

Second, efficient movement of goods is critical to the success of the United States in the global economy. Deregulation has saved billions of dollars in freight transportation costs by giving the private sector greater freedom to negotiate its transportation arrangements and rates. In fact, U.S. DOT claims that shippers have saved \$38 billion annually because of deregulation. Now that the bulk of regulatory reform has been completed, the next logical source for transportation cost savings necessarily must come from infrastructure improvements related to freight service systems. These must be seen as immediate, not just long-term, project priorities.

Third, to realize these cost savings over the short term, transportation planners can look for ways to strengthen the ISTEA management systems planning process to better identify and deliver on requisite goods movement systems improvements, including greater private input into decision making on management planning.

Congestion-based inefficiencies in freight systems may be addressed by targeting major regional bottlenecks within the framework of congestion management plans. To advance goods movement, representatives of freight systems need an equal voice in decision making. It can no longer be business as usual through the MPO process. Transportation planners have to go beyond the traditional networks and bring in people with whom they do not usually do business. At the same time, they have to help inform the commuters and transit users why this is essential.

Congestion management should not be overemphasized. If it is, a multiplicity of microsolutions to congestion problems may be produced that, by their very nature, will only move congestion difficulties from one segment of the highway system to others.

Moreover, congestion management solutions tend to be heavily weighted toward passenger-oriented solutions that produce only marginal benefits for commercial transport. Truck movements, which are largely responsive to shipper service demands, are often the target of congestion-based solutions, such as peak-hour service bans, and not the object of efforts to ensure their more efficient use.

By adopting an intermodal management orientation, as opposed to a purely congestion management approach, transportation professionals can work to overcome the significant obstacles to the transfer of people and goods, especially within metropolitan regions. Transportation systems often do a good job of providing mobility into and through metropolitan regions, but do a woefully inadequate job of providing opportunities for

transfer between modes within a region. Taking an intermodal point of view forces transportation professionals to think overtly about these needs, and allows them to define these problems and develop solutions.

Fourth, the best hope for progress on a long-term freight-oriented agenda lies in developing realistic and effective intermodal systems management plans.

It is within this planning framework that states, MPOs, ports, airports, carriers, and shippers can focus on the nation's freight needs in a truly systematic way. It is in the freight area that intermodal systems development has advanced furthest. This development has been based on maximizing the inherent advantages of individual modes and then uniting them for synergistic results.

This is exactly the same challenge faced by public-sector agencies that have been developing infrastructure along individual service lines. Those in the public sector need to look to new combinations and connections within these systems to advance transportation efficiencies. The intermodal system planning process offers MPOs and states a means to reach out to the private sector to better understand freight needs and target realistic solutions. If the trucking and rail industries can produce new combined services from which both profit, why cannot those who must now set priorities through MPO processes try to work out a new agenda?

Fifth, over the long term, reforms or additions to ISTEА should be considered to allow for the flexibility available for movement of passengers to extend to freight intermodal projects. The ISTEА model may be applied to identify intermodal systems of national and regional significance, such as airport and seaport service networks, double-stack service routes, and new service networks responsive to the North American Free Trade Agreement.

Sixth, an intangible, an agreement to work cooperatively to make the new ISTEА planning scheme work successfully, should be applied. Any number of incremental improvements in ISTEА processes can and will be identified, but the desire to make the new system work is absolutely essential. The Interstate construction era is over; it is time to retool mentally and organizationally to meet the new challenges.

Finally, beyond thinking intermodally, transportation professionals need to act intermodally, which has implications for the way that they look at structure, from the federal to the local levels.

To reduce administrative and legislative gridlock and modal bickering on transportation issues, consideration should be given to revamping the handling of transportation at the federal and state levels. In the executive branch, it may be time to establish a Surface Transportation Administration to encompass highway, railroad, and transit functions. In Congress,

where transportation issues are often fractured into committees divided by mode-based jurisdiction, intermodal understanding and implementation need to be advanced so that transportation funding is fully applied to intermodal priorities.

In the final analysis, ISTEA is like a sketch for a large mural that will be painted by many different artists. If properly coordinated, with the right sense of purpose, the individual efforts will blend together to make a richly diverse and beautiful work of art. However, there is a serious risk that the individual efforts will amount to an incoherent, clashing painting that diminishes its overall impact.

ISTEA is an act that fits the times. On a societal level, the national dialogue has been focused on concepts such as change, empowerment, quality, and responsibility. These ideas are embodied in ISTEA. In good part, it is this resonance between the act and the new direction of society that has made ISTEA appear so promising. What remains now is to fulfill the obligation to make it work by developing a vision for the future.

Let us work during this conference on (a) planning mechanisms—strategic links between transportation and the economy and between government and business; (b) methods to ensure private sector involvement in priority setting and decision making; (c) data development to help frame policy choices; (d) research, including a better exposition of the relationship of the economy, defense, and transportation systems; and (e) environmental solutions that are the result of a collaboration among the public sector, the private sector, and the public at large.

U.S. Transportation Command and Intermodal Planning

LIEUTENANT GENERAL JAMES DANE STARLING

U.S. Department of Defense

Lieutenant General Starling was unable to present his paper because of the crisis in Somalia, but it is included here to underscore the importance of efficient intermodal systems in serving defense needs.

IT IS AN EXCITING TIME to be a part of the U.S. military; things have certainly changed since the Cold War ended. The military is now faced with the challenge of doing its job better, but with fewer dollars. Many transportation organizations face similar situations.

For the military, an integral part of meeting this challenge is cooperation between the commercial sector and the U.S. Department of Defense (DOD). This cooperation has increased significantly during the past 3 years. Just witness the results of the partnership during the Persian Gulf War (Desert Storm) that moved more than half a million passengers, 6 million tons of refined petroleum products, and more than 4 million tons of equipment and sustainment cargo to the Persian Gulf. To do that, 54,000 commercial trucks, 16,000 rail cars, and 459 ships were required.

These days, there are constant reminders that the world has changed and DOD is going to get smaller. As DOD does get smaller, the commercial transportation industry will be asked to assume an increasing role in the U.S. defense transportation system.

In January 1992, the Chairman of the Joint Chiefs of Staff issued the new national military strategy. With it, he outlined DOD's approach for coping with the new world order. The new strategy embodies such key principles as strategic agility and power projection. It is centered on a smaller, predominantly U.S.-based force that must get to a crisis quickly to make a difference. The linchpin of power projection, the ability to rapidly apply decisive force anywhere in the world, is strategic mobility—transportation.

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) will go a long way toward achieving this goal. It will also serve as a guide for members of President Bill Clinton's administration in addressing intermodal issues that must be resolved if a truly integrated transportation system is to be achieved.

An integrated system requires an integrator—a single manager for defense transportation. That role is filled by the U.S. Transportation Command (TRANSCOM). The command was created to be DOD's single manager for common user transportation and was organized to support commanders on the front lines. Desert Storm proved that centralized transportation management is the most effective and feasible way to manage and coordinate air, sea, and land movements.

The mission of TRANSCOM is clear. It is responsible for ensuring that the defense transportation system is prepared to meet the demands of the emerging national defense strategy. To accomplish the job, TRANSCOM exercises day-to-day operational control over the Military Traffic Management Command (MTMC), Military Sealift Command, and Air Mobility Command.

TRANSCOM brings to the process an unbiased perspective and a common philosophy to the system as a whole. This centralized command function can define roles and requirements, maximizing the inherent capabilities of each of the various modes and act as a champion for defense transportation. TRANSCOM also has the authority to articulate requirements and priorities to the Chairman of the Joint Chiefs of Staff, the Secretary of Defense, Congress, and other government agencies.

Creating TRANSCOM was the first and most crucial step in striving to achieve true intermodalism within DOD. The focus of this paper is the perspective on ISTEA and the intermodal initiatives at TRANSCOM.

At TRANSCOM, intermodalism means more than just the traditional concept of downloading a container from a rail car and uploading it to a ship. Intermodalism includes the connections between modes, the technology that helps track cargo, and automated systems that communicate across complex data networks. It also includes traffic management—the task of deciding which mode offers the best value for the money.

Just as transportation professionals are looking to and planning for the future of commercial transportation, TRANSCOM is looking ahead to the issues and events that will shape the defense transportation system. Achieving a more capable, flexible, and responsive mobility force will require some improvements and modifications to the current system.

As part of these modifications, TRANSCOM is striving for commonality with commercial shippers in the way cargo is transported. Industry is

moving toward a common container system to ship cargo by various modes of transportation in the same container.

TRANSCOM is also working toward the increased use of containerization for military cargo. Desert Storm was the first military deployment in which a significant number of containers was used, yet 95 percent of the ammunition for the operation was transported the same way that ammunition was transported during World War II—in breakbulk ships. The experience demonstrated that containerization substantially increases throughput, decreases costs, and gets supplies to the destination faster. The ammunition for Desert Storm could have been transported by using just six container ships, and probably could have been delivered 4 weeks earlier.

The effective use of containers for military purposes will depend on improving the ability to receive containers in war zones and to determine the contents of containers. TRANSCOM's global transportation network (GTN) is a system designed to provide those capabilities. It will provide pipeline visibility and transportation resource management by gathering transportation users and providers into an integrated network.

During Desert Storm, the military had to open about 40 percent of the containers that went through the port of Dhahran, Saudi Arabia, to determine their destination. Because documentation was sometimes nonexistent, some containers had to be opened two or three times to determine their contents and destination. GTN will eliminate such problems in the future.

A related containerization issue is the need for a West Coast container ammunition port. A mobility requirements study conducted by DOD shortly after Desert Storm is the definitive statement of DOD's mobility requirements for air, sea, and land transportation for the next decade. The study has been submitted to Congress and is the foundation for the implementation of the new military strategy. Among its many recommendations, which include additional sealift capacity and continuation of the C-17 program, was the validation of the need for a West Coast container ammunition port. Such a port gives DOD flexibility in that ammunition will no longer have to be outloaded from one port. It will also allow the United States to respond much faster to a crisis around the Pacific Rim. The Secretary of Defense is currently working with the Army to identify a source of funding.

With or without increased containerization, it is the surface transportation infrastructure that allows the military to move to the seaports of embarkation. A high value is placed on the nation's 60,000 mi of strategic highways and 30,000 mi of strategic rail. Through the Highways for National Defense and the Railroads for National Defense programs, MTMC works with the federal highway and railroad administrations

and state transportation authorities to ensure that defense requirements are integrated into civil highway and rail programs. One measure of MTMC's success has been the designation of the strategic highway and rail networks.

ISTEA has simplified procedures for DOD to work with surface transportation administrations that cross state lines. When the author was Commander of the MTMC Eastern Area, MTMC dealt with virtually every state government to coordinate strategic road and rail usage, and it was at times cumbersome and frustrating.

ISTEA is an unprecedented approach to establishing transportation priorities in states and federal agencies. It gives DOD a more effective interface in developing and using the nation's transportation infrastructure.

The act will help to create a seamless transportation network by providing the flexibility and funding to improve the nation's transportation infrastructure. It also provides congressional leverage to get funding for necessary improvements. Over the next 6 years, ISTEA will authorize spending of more than \$155 billion for highways, highway safety, and mass transit. This is a tremendous investment in the country's defense transportation system.

Related to ISTEA, but as part of a separate legislative package, Congress approved a \$70 million bill for refurbishing port facilities and railheads, updating transportation communications, and purchasing equipment to improve cargo handling. During the next several months, TRANSCOM, the Office of the Secretary of Defense, and the armed services will be developing a list of priorities for spending this money.

Another important issue that surfaced during Desert Storm involved the movement of ammunition in dromedaries. Some states classify truck-tractors with dromedary boxes as trucks, whereas others classify them as tractors. States have different length limitations for tractors and trucks combined with semitrailers. Some state law enforcement officials stop and ticket drivers for exceeding the limits. This seriously disrupted the flow of ammunition and explosives during the war.

The Federal Highway Administration (FHWA) resolved the problem temporarily by issuing an emergency ruling that prevented states from imposing an overall length limit on truck-tractors equipped with dromedaries. That ruling expired in August 1991. For more than a year, TRANSCOM has been working with carriers and the U.S. Department of Transportation (DOT) to get the issue resolved. In June 1992, FHWA concluded that federal intervention is no longer warranted. However, DOT will exempt DOD munitions carriers from state length limits during another national emergency, if necessary.

This has been a superficial look at some of the significant areas of intermodalism being addressed at TRANSCOM. It is clear that dramatic changes are ahead. Debates will continue in the Pentagon, Congress, and the media on roles and missions, force levels, and weapons systems. However, no weapon system is of value if it cannot be delivered to the battlefield on time. Desert Storm demonstrated that DOD will only be able to do this through a partnership with private industry.

In these proceedings, Jack Helton of Sea-Land Service discusses the need to build such a partnership. He notes that a successful partnership will find ways to improve the efficiency of existing systems and provide input from a broader base for future planning. That is the kind of partnership with the transportation industry that TRANSCOM desires—one that will be mutually beneficial to all partners.

This conference is an indication that the transportation industry is moving in the right direction. It is up to transportation planners and providers, military and civilian, to ensure that the country's strategic mobility needs are met. The emphasis on strategic mobility is of necessity the strategy of the future. Smaller defense budgets will dictate greater mobility for armed forces in terms of sealift and airlift. In order to achieve this mobility, the top priority must be improvement of rail, highway, and port facilities to enhance defense transportation capabilities.

The author applauds the efforts of the past and encourages commitment to the future. The nation's security depends on it.

Intermodal Experience of the California Department of Transportation

ALLAN HENDRIX

California Department of Transportation

THOSE OF YOU WHO ARE experienced in the field of transportation should not be surprised when I tell you that I will not be discussing successes in the intermodal transportation arena. There are not that many successes to discuss. The California Department Transportation (CalTrans) has been working in the area of intermodalism, however, and I will present some thoughts on intermodalism and the prospects for successes in intermodalism in the future.

There are three key dimensions to intermodalism. The first, of course, is the modal dimension; this is the one with which transportation professionals are comfortable. The term "multimodal" comes from the modal dimension of intermodalism. The second dimension is the market segment or trip purpose. The third is connectivity, which is the dimension that traditionally has been called intermodal, a term that is used in freight transport.

Intermodal planning is really a process of expanding and synthesizing these three dimensions into a system that accommodates freight and passengers and, at least in the view of CalTrans officials, also deals with some nontraditional transportation options, such as information technology.

VISION FOR TRANSPORTATION

To provide a sense of the perspective of CalTrans officials on intermodal transportation, the vision for transportation adopted by CalTrans is presented here.

The first principle of the vision is that transportation will be, on balance, an asset to California and not a problem. Those who live in and visit the state know that transportation in California is often viewed as a problem. CalTrans officials want to turn that around.

The second principle in the vision is that people should be able to move freely, safely, and economically. They should be able to make informed choices for transportation on the basis of speed, economy, timeliness, flexibility, and quality. Swift and economic movement of goods through ports and throughout the state will give California businesses a competitive edge by adding value to the state's products and services. Transportation of information and services will reduce the need for mobility of people and goods. This is an important concept in California, the concept that mobility per se is not the goal. Why do people need to move if information or services can be moved instead?

The third principle is achieving good transportation while maintaining or enhancing the quality of the natural environment and of life. The mobility needs of California's increased population will be accommodated at the same time that congestion is reduced, air quality is improved, and energy is conserved. The quality of life, both economic and environmental, is important in California. The state's transportation system will be a balanced, integrated, multimodal network. It may be necessary to add capacity to streets, roads, and highways and to improve the maintenance and management of these valuable resources. However, streets, roads, and highways will be complemented by a fully developed rail service that accommodates urban commuter and intercity passenger needs and includes high-speed rail links among major urban centers and a healthy freight rail industry. Mass transit will be modern, swift, and comprehensive and will include bus service on guideways in major urban areas that interconnects with other modes. Air travel will be safe and affordable with adequate capacity and emphasis on interstate and international routes. Significant problems in California in air travel are, on the land side, getting to and from the airport and, on the air side, congested air corridors. In the future, surface transportation alternatives to short-haul intercity air movement in California will be emphasized, particularly for passengers.

Finally, innovative approaches to reducing economic, environmental, and social impacts of transportation will be commonplace. Application of new technology will provide opportunities for better transportation and expanded industry. CalTrans officials are focusing on innovation in transportation in California and in the way CalTrans does business. Traditionally, the purpose of CalTrans was to build highways and ensure that they functioned. Highways are no longer in the mission statement. Economic vitality will be promoted and the quality of life for the people of

California will be enhanced by providing for the mobility of people, goods, services, and information. This is a real change in perspective.

KEY EVENTS AND ISSUES

Key events and issues that are affecting implementation of the vision for transportation in California are discussed in this section. The first key issue is the California transportation plan. Officials in other states are accustomed to having a transportation plan to guide them in their multiyear capital programs. California does not have a transportation plan, has never had a transportation plan, and, until recently, it looked like it never would have a transportation plan. However, one of the lasting legacies of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) will be the requirement for states to have such a plan. CalTrans officials asked the state legislature to enact legislation enabling development of the transportation plan required by ISTEA. After much debate, the bill finally passed, and CalTrans was given the authority to develop a transportation plan. The plan is due to the legislature as a final recommendation in 1993, and no more than \$1 million may be spent preparing it. The plan must be a synthesis of all the regional transportation plans in California: the transportation plans prepared by metropolitan planning organizations (MPOs) and by agencies in areas of the state that are not metropolitan areas, but which must have new transportation plans under state law.

Someone asked how much the transportation plan for California would cost. The last attempt to develop a plan was during the early 1970s, and about \$90 million was spent. CalTrans officials decided that \$10 million was a more reasonable estimate; however, the original enabling legislation specified only \$2 million, and when nobody argued on behalf of CalTrans, the legislature cut it further—to \$1 million. In addition, federal guidelines for preparing transportation plans will come after the June 1993 deadline for completing a draft of the plan has passed.

Another key activity is the development of the state's intermodal transportation management system, another ISTEA requirement. CalTrans is working on all six of the required management systems, but has progressed furthest on the intermodal system. The approach is to synthesize existing data, not create new data. However, problems are certain to arise. One problem is that data on goods movement are often quite sparse. In addition, a lot of the data are proprietary, which creates additional problems in obtaining it.

CalTrans is also actively working on the National Highway System (NHS) designation proposal. Final recommendations from the state's regions should be submitted soon. It is critical that NHS and other designa-

tions be driven by the policy considerations and not by availability of money. CalTrans officials are advising constituents that they should not seek new money with the NHS designation. Highways should not be included in that system simply to receive 80 percent federal funding. Particularly in California, state legislation drives the programming of projects, which is on the basis of policies and priorities and not on the availability of federal funds.

Little emphasis has been placed on goods movement in the past, but that has changed during the past year. Goods movement was discussed by private-sector representatives, port authorities, and shippers at a conference sponsored by CalTrans. CalTrans subsequently established a high-level task force to address the issues of goods movement in California and what the government role is.

Another aspect of transportation in California is that CalTrans works in partnership with a number of other organizations. MPOs and other transportation planning agencies in California are critical partners, as are cities and counties. CalTrans officials are trying to establish partnerships with a wide range of other interests—environmental, the full spectrum of private ones, and those representing the social equity considerations of providing transportation. Developing effective partnerships requires serious consideration from everyone involved.

Another significant issue in California is rail electrification, which is driven in large part by clean air objectives but by goods movement objectives as well. Extensive cross-border planning is being conducted with other states, the government of Mexico, the Federal Highway Administration and other U.S. government agencies, and various other state government agencies. Maritime issues are another current topic. There are a number of ports in California and a lot of attendant issues, both on the sea side and on the land side. One example is dredging. Channel depth is a major issue in California, and CalTrans officials are getting involved. Truck, rail, and barge access to ports is another topic of concern.

CalTrans is also focusing on modal alternatives, particularly the wide spectrum of opportunities in information technology. Intelligent vehicle-highway systems have been discussed at this conference. CalTrans is examining information systems that would provide information to users so they can make informed choices, real-time choices in how to get from New York to Ohio, for example. Such systems have a lot of potential.

An allied topic is market-like mechanisms for managing the transportation system. Congestion pricing was mentioned earlier at this conference. I do not talk about congestion pricing. Instead, I talk about market-like mechanisms. According to economists, it is a more accurate term. The

issue goes far beyond congestion: it reaches into social equity and the equities of the competitive marketplace.

ISSUES AND CHALLENGES FOR THE FUTURE

Progress is being made in California. However, CalTrans officials are also facing some real problems. Many of the partners in this new transportation planning approach have objectives that are quite unlike those of CalTrans. For example, ports are not in business to provide transportation.

The first issue that comes to mind is the optimum relationship between the public sector and the private sector, for example, with respect to modernization of transportation systems. Consolidation of freight lines in California is under consideration, as is provision of special purpose facilities for truck access to ports and other terminals. What kind of relationship should government have with the private sector for development of such facilities? How much control should the government have? How much investment should be made? What is the private sector's responsibility? What are the opportunities? As Robert Martinez of the Office of Intermodalism discussed, to what extent does government act as an inhibiting factor in addressing such issues? These are serious questions for CalTrans.

The second issue is the trade-offs between accommodating and managing demand. Traditionally, planners try to accommodate demand. Is it possible to build a way out of the problem? The answer is no. Transportation professionals need to manage the demand, but what are the trade-offs, and how can politicians be persuaded to make tough decisions? California has the reputation of being a state where both congestion and regulation inhibit market activity and economic development. Whether or not these issues are real, CalTrans officials need to be concerned with them as they address the issue of accommodating or managing demand.

California's population has grown tremendously during the past couple of years. An increase of another 10 million people is expected in the next 15 years. If that increase occurs, the state's population will have roughly trebled in size during a 40-year period. That kind of growth is difficult to accommodate, particularly given the levels of investment made during the same period in transportation and other infrastructure.

Another issue is the development of a system, especially one incorporating new technology, within the constraints of a limited budget. How can such a system be developed in an economy that is in the throes of a recession? Given competing demands for public money and the limitation of private-sector financing in transportation, where will the necessary funds come from? California is committed to public-private financial

partnerships as a way of developing its infrastructure, but how can that be accomplished under these limitations?

Finally, the ultimate challenge is to develop a transportation planning process that achieves two things at once. The first challenge is to provide pragmatic guidance for near-term investments in the system that will make incremental progress toward the long-term goals in a 7- to 10-year financial planning horizon. Second, this process needs to provide the kind of visionary leadership that will lead to the modern technological advances and seamless, effective transportation systems that are needed by the beginning of the next century.

Putting together a plan that will do that and performing the analysis that will provide the information to the decision makers are real challenges. I hope that this conference allows participants the time to concentrate on these issues and provide some good answers.

Federal Railroad Administration Perspective on ISTEA

GILBERT E. CARMICHAEL

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THE INTERMODAL SURFACE Transportation Efficiency Act of 1991 (ISTEA) represents an exciting breakthrough for new approaches for meeting the demand for transport services in the United States in the 21st century. For the first time, alternatives to highway and aviation projects have a good chance of being considered and implemented. Several of those alternatives involve rail transportation, which offers distinct advantages to a nation grappling with gridlock.

ISTEA contains several specific provisions that involve railroad projects. At the same time, it places a new obligation on local and regional transportation officials to take into account the operation of private-sector freight railroad systems as they plan for the future.

The specific rail-related elements of ISTEA are concentrated on three themes: (a) commuter rail lines, (b) passenger corridor improvements, and (c) intermodal connections.

One provision of the act earmarked funding for the identification of five corridors for high-speed routes. The corridors are as follows: San Diego-Los Angeles-San Francisco-Sacramento; Seattle-Portland-Eugene; Milwaukee-Chicago-St. Louis and Detroit; Washington, D.C.-Charlotte; and eastern and central Florida. The focus of federal and state investment will be on the removal of grade crossings, which are safety hazards and major obstacles to efficient operations.

The initial plan is to improve the conventional service of the National Railroad Passenger Corporation (Amtrak), and then, as market expansion justifies it, perhaps to move on to service using tilt-train technology or high-speed rail.

Perhaps the most significant single category of opportunity in ISTEA involves commuter railroads. Commuter rail is eligible for funding under both the Surface Transportation Program (STP) and the Congestion Mitigation and Air Quality Improvement (CMAQ) Program, and there is nationwide interest in promoting these projects.

Under the CMAQ Program, a variety of rail-related projects may be eligible for funding if they provide congestion relief. Railroad relocations and consolidations, which are designed to avoid bridge replacements, close grade crossings, facilitate the development of other transportation projects, or reduce congestion, also could be eligible for funding under STP or congestion mitigation funding categories. Funding eligibility depends on the type of benefits and the nature of the project.

Intermodal passenger terminals, if publicly owned, are eligible for funding under either program. It is the view of the Federal Railroad Administration (FRA) that where the congestion mitigation and air quality improvement provisions are applicable, an intermodal freight terminal also would qualify if pollution or congestion reductions could be documented. One of the most important objectives should be the tying together of intercity commuter and rail systems with other transit operations linking airports.

A number of cities are developing hubs to facilitate this intermodality in passenger operations. I call them city terminals. In most cities, the Amtrak station is the logical hub because of its location and ability to serve both intercity and commuter rail. These intermodal connections are important to the future of transit systems and urban areas.

As mentioned previously, federal, state, and local transportation officials now must take into account the impact of their plans and decisions on the U.S. freight transportation system. This is a requirement for states and metropolitan planning organizations. It is more than common sense to do so—it is imperative.

Few government officials have much experience in dealing with infrastructure owned by the private sector. They have tended to conduct analysis and research on the condition of public infrastructure and the volume of traffic using it. For highways, traffic volume was the great predictor of future needs and capital investment priorities.

In contrast, railroad infrastructure is built and maintained by the private sector. The volume of traffic carried by a railroad is not as important as the value or commodity type being transported in the containers, boxcars, or hoppers. An understanding of commodities, their origins and destinations, and their time sensitivity is essential to appreciate the economic value of a rail line.

Furthermore, many public-sector policy and planning officials view transportation in terms of passenger operations. They ride in the automobiles, buses, planes, and trains. They do not often think about such things as the concept that passenger systems serve population centers, whereas freight systems serve individual shippers.

Why is this important? In a time of tight budgets, all the resources the private sector can provide are needed, and railroads represent proven private-sector service. Railroads also have excess capacity, which allows them to take on a more significant role in the movement of goods and people. For every person who moves on America's transportation system, a ton of freight moves.

Railroads can relieve freight pressure from crowded highways. In many cases, they can be conduits for commuter rail lines or intercity Amtrak service. However, this potential benefit is at risk, for freight railroads must compete in the marketplace against subsidized public infrastructure. Government decisions affecting public infrastructure have powerful implications for private railroad systems.

In the traditional evaluation of highways, government officials at all levels seldom saw these trade-offs and impacts. One reason is that they were not apparent. Another is that officials were not looking for them because traffic volume alone was driving the capital spending decisions.

This process will not get any easier because officials now must take into account both the nature of freight movements and the global environment in which transportation operates. The global economy is a reality. It affects everyone locally and directly.

Change, and rapid change, is inevitable. Consider the following examples. If manufacturing in the Pacific Rim moves southward, worldwide shipping patterns could change. North American free trade will create a truly continental transportation system, bringing more balance to a surface system that was mainly east-west in its origin in both the United States and Canada. As a result of these developments, some transportation routes and port facilities will gain business. Others may become obsolete.

These trends already have created a side effect: excess capacity in manufacturing facilities worldwide. Therefore, in the coming years, manufacturers and distributors will have more factors to consider regarding plant location and expansion. The quality and cost of transportation will be a factor. Poor quality or high costs could drive them away.

That poses some practical issues at the local and regional decision-making levels. For example, in many cases the excess capacity of the rail system lends itself to supplementing freight transportation with commuter or Amtrak runs, but sometimes these services are not compatible. Just-in-time freight service is difficult to maintain on a corridor that handles

frequent passenger train operations. If commuter service is found to be more important than freight service, the result may be twofold. First, jobs will be in jeopardy because the shipper will be forced to another location. Second, it is difficult to believe that urban gridlock would be reduced by forcing more freight onto the highways while trying to take passengers off.

There are solutions and exciting opportunities, and FRA officials can provide technical assistance. The most important step for state and urban area transportation officials is to initiate a dialogue with the freight railroad operators in their areas. A dialogue with shippers—the users of rail, highway, air, and waterway systems—is also important. The businesses that require freight service are regional economic drivers, and they cannot be ignored in the process of planning and decision making. By touching these bases, state and local transportation officials will be able to take advantage of opportunities and avoid embarrassing and messy mistakes.

The 1990s will be an exciting time for the development of intermodal solutions for the nation's transportation needs and for the application of railroad alternatives. America's mainline railroad system is emerging as a high-density, high-speed network that can serve freight and passenger operations. It is roughly defined by the routes that carry significant volumes of containers and trailers on flatcars. Many of these routes represent the backbone of Amtrak's medium- and long-distance system. If present trends are allowed to continue, I foresee a steady growth in rail freight traffic and the easing of truck congestion on the highways, but there always will be a delicate balance in this highly competitive marketplace. It should be the goal of public officials to strengthen that marketplace, to build on the competitive attributes of each mode, and to tie them together. Ill-informed decisions can destroy the necessary private-sector investment.

Let me leave you with this thought and challenge. As transportation professionals, we must build an ethical transportation system. As citizens, we strive to be ethical and contribute to a society that enhances the collective quality of life. An ethical transportation system uses all modes of transportation and builds on their strengths.

The parameters of an ethical system are as follows. First, an ethical transportation system does not kill. It must be safe. It must have zero fatalities. The Train à Grande Vitesse (TGV) in France and the bullet train in Japan have operated for years and carried millions of passengers with no fatalities, so it is possible. Furthermore, if a system has on-time delivery and zero defects in delivery, it is both safe and efficient. At a more practical level, grade crossings, which are the greatest safety hazard and the greatest deterrent to speed and efficiency, must be eliminated. Allowing streets, country roads, and highways to cross railroad tracks is ludicrous because the two modes are incompatible. Highway department officials have

known this for a long time—witness the 43,000-mi grade-separated Interstate highway system.

The second parameter is the environmental one. Ethical transportation must not pollute; if nothing else, it must be benign toward the environment. Another consideration is energy efficiency. The United States cannot waste British thermal units (BTUs), particularly petroleum BTUs.

Sometime in the next century, a national policy to electrify the entire railroad system may be developed. No petroleum products, except grease, will be required.

Consider these ethical parameters of transportation: safe, nonpolluting, energy efficient, and competitive. For transportation to be competitive, two or more modes must be joined, and all modes of the system must operate at their optimum. The railroad mode fits within those parameters pretty well and can be made a key component of an intermodal system.

U.S. Department of Transportation Modal Administration Panel

Given the unique nature of this conference, the steering committee believed that it was important to give representatives of each sponsoring U.S. Department of Transportation modal agency an opportunity to offer a perspective on intermodalism and invited representatives of the Maritime Administration, Federal Highway Administration, Federal Aviation Administration, and Federal Transit Administration to participate in a panel discussion. The Federal Railroad Administration was represented at the conference by Gilbert E. Carmichael, whose address is presented elsewhere in these proceedings. Key points made by each panel member are summarized here.

FEDERAL HIGHWAY ADMINISTRATION

GARY MARING

Robert Martinez of the Office of Intermodalism presented an overall U.S. Department of Transportation (DOT) perspective of the provisions of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). Some of these provisions will be addressed here; provisions important for the Federal Highway Administration (FHWA) will be highlighted. There has been a new spirit and focus on intermodalism at DOT. I was involved in the development of the National Transportation Policy and some of the outreach activities. One of the significant benefits of this effort was bringing representatives from all the modal agencies together. For the National Transportation Policy, it was done by market segment (e.g., intercity passenger, freight), and all the modes were represented. Modal representatives chaired the committees. It was an effective way of achieving an intermodal focus on the national transportation policy. This spirit carried through, and was represented in, the DOT proposal for the surface transportation reauthorization legislation and was incorporated in ISTEA.

Five aspects of ISTEA are significant for intermodalism and will be discussed here: (a) the first major program restructuring since the 1956 Interstate Highway Act, (b) the new funding flexibility, (c) the changes in planning and decision making, (d) the significantly higher authorization levels and the new opportunities for public-private funding, and (e) the

intermodal thrust of the act. Technical assistance activities of FHWA will also be discussed.

PROGRAM RESTRUCTURING

In terms of program restructuring, the National Highway System (NHS) represents a major shift of focus in national policy from the 300,000 or more miles of primary system under the federal-aid system. About half of that system represented those arterial routes of most significance to international, interstate, interurban, and intraurban commerce and passenger movement. The focus will now be on a leaner and more important national system of arterials.

The Surface Transportation Program (STP) has been discussed at DOT since the early 1970s as an urban and rural block grant system. However, it was never approved by the U.S. House of Representatives, even though the Senate proposed block grants several times. STP has now been approved and has greatly expanded the provisions of the Urban System program. Under the Congestion Mitigation and Air Quality Improvement (CMAQ) Program, because of the special focus of the Clean Air Act Amendments of 1990, emphasis is placed on the planning process and on programming and funding in response to air quality concerns.

FUNDING FLEXIBILITY

Funding flexibility greatly expands the opportunities for intermodal funding under both STP and the CMAQ program, and funds may also be transferred under certain conditions from the NHS. A wide range of eligibility is available for bicycle, pedestrian, high-occupancy vehicle, and transit capital. Projects or facilities eligible for federal transit programs may be funded through STP, including some aspects of commuter rail and intermodal passenger terminals, such as inner city bus facilities. Enhancements may also be funded, including, in some cases, the rehabilitation of old railroad stations, transportation control measures under the CMAQ program, transit operating assistance, congestion pricing, intelligent vehicle-highway systems, and many other types of projects. Some of this flexibility is still being debated; however, there is clearly much wider eligibility and much more money available than was ever possible before.

PLANNING AND DECISION MAKING

Clearly, metropolitan planning organizations (MPOs) have more authority in project selection than before. They had a limited role under the Urban

System program, but it has been greatly increased, particularly in STP and the CMAQ program. The requirement for management systems, including intermodal management systems, to be in place by 1995 helps focus the planning process on the development of performance measures. Strategies from these management systems will be included in transportation improvement programs. There is a much broader requirement in the planning process. Fifteen elements are identified in the MPO planning process, and for the first time, statewide planning is required. Planners are now required to consider land use planning, environmental, energy, intermodal, and freight concerns, among others.

The new planning requirements are significant for financial planning. Statewide and urban plans and programs have to be financially realistic. In the past, many of these plans were wish lists, but now they must be much more focused on the financing of the projects.

AUTHORIZATION AND FUNDING

The fourth area is the higher authorization levels and new funding opportunities under ISTEА. One success of the past several years is gaining more recognition of the importance of the transportation infrastructure to the U.S. economy and productivity. I am amazed at the debate that occurs about whether transportation infrastructure is a key component of economic productivity. Many economic proposals during the next several years will include some component of transportation infrastructure, both as a short-term stimulus and as a long-term investment. FHWA needs studies show that the highway program is significantly underfunded. FHWA's 1991 report to Congress showed that just to maintain the conditions in performance of the existing system, about \$45 billion in capital spending would be required annually at all levels of government. At that time, about \$33 billion was being spent annually—not even enough to maintain current condition and performance, let alone fund improvements.

ISTEA did open up public-private sector financing opportunities beyond the money authorized in the act. Public funds may now be leveraged for obtaining private-sector financial support. This could cause dramatic changes in toll roads on the federal-aid system and become a way of leveraging private resources into the highway system under either private or public ownership.

INTERMODAL THRUST

Finally, the intermodal thrust of the bill provides wider opportunities for planning, financing, and implementing multimodal and intermodal plans,

programs, and projects. As Martinez said, more emphasis on freight planning, which has historically been neglected in the planning process, is necessary to bring intermodal public and private players, such as representatives of ports, airports, private transportation industries, trucking, rail, maritime, intermodal and private shippers, into the planning process. An example of this cooperation is a recent meeting in New Orleans between MPO and trucking association representatives. It was an unprecedented meeting and an effort to bring carriers together with planners. This meeting developed a mutual appreciation of the need to have the private sector represented in MPO and state planning deliberations to help them understand key freight needs. Dramatic changes have occurred in the shipping practices of major industries and among the transportation carriers as a result of deregulation. Industries are focusing more on reduced inventory and lower distribution times, and that puts great burdens on the transportation system for timely deliveries. Congestion obviously causes delay and ultimately results in higher prices for consumers.

TECHNICAL ASSISTANCE

In conclusion, a few of FHWA's technical assistance activities related to intermodal planning are discussed here. An intermodal division has been created in the planning office. One of the important issues now being addressed by this division is the development of intermodal management systems. A number of courses and workshops on intermodalism are planned, including two National Highway Institute courses on intermodal planning and management systems and one on access to intermodal facilities. These pilot courses will be developed in 1993. A major intermodal planning research program is also under development. Additionally, a number of workshops will be held during 1993 on good planning practices and developing case studies of good intermodal planning. Further workshops will follow establishment of the ISTEA management system and planning regulations in 1993.

Clearly, intermodal planning and decision making is in the future of FHWA. FHWA will implement this national policy in cooperation with the other modal administrations and the Office of Intermodalism. ISTEA has firmly set in place an intermodal focus for planning, project development, and program implementation. FHWA officials look forward to the results of this conference, which will help formulate the research program and technical assistance activities at FHWA in conjunction with the other modes.

FEDERAL AVIATION ADMINISTRATION

JOHN RODGERS

It is widely recognized that a trip by air is dependent on effective intermodal cooperation. Generally, most air trips do not start or end with the airplane, but with some other mode of transportation. Consequently, the aviation community is looking at the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) as a step in the right direction because it will improve intermodal links and intermodal cooperation.

Several different dimensions in ISTEA will assist in improving the activity and efficiency of the various modes in a synergistic fashion. Certainly, the focus of the act is on improved intermodal links, that is, improved connections. However, there are other dimensions of ISTEA that should not be overlooked and should be brought into the planning perspective. Improved cooperation between modes is important and is distinguishable from intermodal connectivity. Another aspect of ISTEA, one that fosters research, also presents an important opportunity. With ISTEA encouraging new and innovative transportation technologies, there may be an opportunity for joint development of advanced technology that will result in economic improvements and operating efficiencies for several modes. Four aspects of ISTEA will be discussed here from an aviation perspective. The four areas are airport development, intermodal links and airport access, environmental compatibility and airport capacity, and joint development, use, and financing of new technology.

For each area, background on problems or opportunities that exist will be provided, and the future of ISTEA, which might help solve potential problems, will be discussed. Planners and implementers should think broadly about the opportunities in ISTEA and incorporate them into plans and programs.

AIRPORT DEVELOPMENT

Federal Aviation Administration (FAA) officials believe that there are about 20 major airports in the United States that are congested. Congestion is defined by total hours of delay being experienced by aircraft operating at the airport. Shortly after the turn of the century, the number of congested airports is expected to be as many as 40. Those who have been following the airline industry may wonder why FAA officials are concerned about expanding capacity when a large number of airlines are experiencing financial difficulty. Once the current economic recession, which is perceived to be a short-run phenomenon, passes, there will probably be a

large, untapped demand for air transportation. There are currently only about 450 million enplanements in the United States. Two enplanements are required for a round trip, which means that the average person in the United States takes less than one air trip per year. This is certainly not saturated demand for air travel. FAA officials believe that when the economy improves and there is a resurgence in economic growth, there will again be strong growth in air travel. Hence, FAA officials are concerned about providing adequate future facilities.

How can ISTEA help? ISTEA has many dimensions. One is planning. The act calls for planning both at the local level and at the state level. State transportation planning agencies are directed to consider the connectivity between metropolitan areas within the state and with metropolitan areas in other states. The need for air transportation and for airports should also be considered in that total state planning picture.

Another aspect of ISTEA may be used for airport development. Perhaps the most important contribution of ISTEA is that it authorizes, through the Surface Transportation Program, the construction and reconstruction of highways in order to accommodate other transportation facilities. Because of the total land area required for development of a new airport or expansion of an existing airport, other transportation facilities generally need to be relocated to provide sufficient area for the airport.

INTERMODAL LINKS AND AIRPORT ACCESS

The second area, one more commonly associated with ISTEA, is the opportunity that ISTEA provides for enhanced intermodal links, and, for FAA, this means airport access. I would like to talk just a little bit about the airline industry and the financing of airports. First, airlines are the principal customers and tenants of airports. Airlines are for-profit organizations and as such are generally not interested in fostering use of competing modes for long-distance travel. Hence, airport officials have really not been interested in encouraging links, right on site, with other means of long-distance travel. This is just the way private industry works.

Let us consider another aspect of airport finances. As mentioned previously, almost all air trips are multimodal in nature. Airports, in fact, seek to supplement their income with concession revenues obtained from car rentals, taxicabs, limousines, and parking facilities. Hence, airport officials have not generally been willing to promote access by means of mass transit or other intermodal links from which they cannot make money. Again, this behavior is, from an economic perspective, normal. Consider, for example, restaurant pricing. Restaurants do not survive by the prices charged for entrees. They are interested in selling patrons drinks and

dessert. Movie theaters do not survive by the price of admission. They make money on concession sales. A similar pricing phenomenon is in place for airports, and, as a result, historically only certain types of intermodal links have been promoted by airports and the airline industry.

How can ISTEА help? ISTEА requires planning agencies to provide both a plan and a program to expand the nature of intermodal links at airports. There is another aspect, though, where ISTEА can help. Historically, federal laws have prohibited airports from using airport funding to finance facilities that are not located on airport property. This ban has created a problem in fostering cooperation with respect to highway and other access modes to the airport. Because ISTEА makes airport-access highway projects eligible for funding as a part of the National Highway System, this particular difficulty can be overcome. ISTEА also identifies 51 intermodal transportation projects, 14 of which involve intermodal links at airports. ISTEА also established the Office of Intermodalism at the U.S. Department of Transportation (DOT). One of the functions of this office is to provide planning grants for model state intermodal transportation plans.

ENVIRONMENTAL COMPATIBILITY AND AIRPORT CAPACITY

The third area in which ISTEА can help the national transportation system and aviation relates to the responsibility of transportation facilities as good neighbors. Generally speaking, when a new airport is built, it is built in an environmentally compatible setting. Access infrastructure is developed, which opens up the area to development and, unless there is a strong local zoning program, incompatible land uses soon appear adjacent to the airport property. Local residents then plead for zoning regulations or for regulations that restrict airport operations, and the airport capacity is lost.

How can ISTEА help? State planners are directed specifically to consider the land use aspects of transportation programs and to promote long-run environmentally compatible land use. Planners should view that as a two-sided proposition. Not only should new transportation facilities be environmentally compatible with the areas in which they are built, but planners and state land use agencies should make certain that these areas are subsequently protected by appropriate zoning laws to preserve the transportation capacity investment that has been made there.

NEW TECHNOLOGY

A fourth opportunity provided by ISTEА is the joint development, use, and financing of new technology. One example is the Threat/Collision Avoidance System for aircraft. Many major projects have been undertaken at

FAA to automate the air traffic control system to create “automated highways” in the sky. FAA officials are also interested in promoting satellite navigation systems. LORAN-C has already been implemented and is being used extensively. Many of these technologies may be applicable to other modes or have aspects that should be jointly developed and financed. An entire title of ISTEA addresses research. It calls for a research and development plan to be formulated at the federal level. It calls, for instance, for the development of intelligent vehicle-highway systems. I would argue that there are a lot of synergistic activities that would go into the research for such systems that probably are applicable to other modes. National, state, and local planners should be aware of those opportunities.

ISTEA really does provide a vehicle for synergism, which can facilitate a strong national transportation system. This strong national system will be achieved through a mix of transportation modes that serve markets efficiently and competitively.

FEDERAL TRANSIT ADMINISTRATION

STEVEN A. DIAZ

One of the most important things that we at the Federal Transit Administration (FTA) have been able to do in the last 4 years is to work on the National Transportation Policy and the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), which embodies all the basic values expressed in this policy. Although the respective modal agencies have traditionally worked more or less cooperatively, under ISTEA, the agencies now share a new challenge, the exciting challenge of developing a true partnership to move goods and people; to contribute to the national goals of cleaner air, fuel conservation, and energy independence; to improve U.S. competitiveness in world markets; and to relieve congestion and other inefficiencies in domestic transportation.

The effects of changes in surface transportation policy resulting from ISTEA will be as profound as they are unforeseeable. Gone will be the decision to build this highway or that transit project on the basis of the availability of a particular category of funds. Increasingly, transportation projects will be conceived as expressly suited to local conditions and needs on the basis of the broader permissible use of available resources—the much-touted flexibility.

Historically, the nation’s highways and transit systems have been developed independently. Today, in large part because of the intermodal and planning requirements of ISTEA, coupled with the Clean Air Act require-

ments, a more comprehensive view is now being taken of surface transportation needs. The emphasis is shifting from moving vehicles, be they steel or rubber wheeled, to an evaluation of what strategies are necessary to move people and goods efficiently. For example, FTA and the Federal Highway Administration have joint planning regulations, which were first developed in 1975. These regulations are now being revised to require plans for federally assisted projects in urbanized areas to be consistent with the comprehensive, long-range, regional, multimodal plan. ISTEА also emphasizes local decision making and partnership among federal, state, and local authorities. Communities throughout the country are taking advantage of increased opportunities to listen to and to act on the needs of the traveling public.

FTA is funding a range of intermodal projects from scores of intermodal terminals to intelligent vehicle-highway systems (IVHS) and smart bus projects, including, for example, a project in Orange County, California, known as the Anaheim IVHS operational test. This project is developing a concept plan and a project design for advanced display information systems to be provided to travelers at bus stops, transfer stations, and in-transit vehicles. The information system will be integrated into an existing state-of-the-art traffic management system operated by the city of Anaheim and will provide traveler information on both traffic operations and transit service, in addition to providing the framework for comprehensive traveler decision making. Data input for the system will come from Anaheim's traffic information system and Orange County Transit's automatic vehicle locator. The California Department of Transportation will provide freeway information. This scheme represents a real synthesis of modal interaction.

An era of experimentation and development in transportation strategies and technologies is beginning that will cause transportation professionals to look back in astonishment just 5 or 10 years from now at the fact that they ever accepted a 0.2 percent transportation growth rate. That rate is what the transportation sector has been able to accomplish during the last century and not more.

Transportation professionals will also look back with surprise at the controversy over which transportation mode might win or lose when transportation choices were made and at the outmoded way of thinking that such calculations represented. Intermodalism has shifted transportation policy from an emphasis on seeking federal grants to a focus on actual conditions and efficient movement of people and goods. ISTEА and the tools it provides will allow transportation planners to address congestion, clean air, conservation, and competitiveness, which will guide transportation policy into the next century.

MARITIME ADMINISTRATION

NAN HARLLEE

When asked about the impact of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) on the port industry, I am never sure what to say because, depending on the circumstances, the impact could be very little or extremely large. Robert Martinez of the Office of Intermodalism touched on this point when he said that states and localities now have to consider the movement of freight and access to ports in their transportation planning. However, there is no mandate that ports will actually get any of the ISTEA funds.

During the last 2¹/₂ years, the Maritime Administration (MARAD) has taken the lead in assessing the adequacy of intermodal access to ports. Efficient access is a critical but often overlooked aspect of the U.S. transportation system. Cargo frequently is efficiently moved long distances by a single mode (e.g., on a ship or train), but is then delayed within a few miles of an interchange because of congestion and inefficiencies in the system. Thus, the cost to the transportation industry is raised, efficiency disappears, and, ultimately, the end user pays.

MARAD was joined recently by four other modal agencies in a Transportation Research Board (TRB) study to assess land transportation access to ports. This was the first time, at least that I know of, that a joint study has been undertaken. In addition, the American Association of Port Authorities, the American Association of State Highway and Transportation Officials, the Inland River Ports and Terminals Inc., and the Pacific Northwest Waterway Association were involved. TRB convened a study panel to investigate the severity of inadequate land transportation links to ports. With the support of the working group, land access concerns at 16 ports throughout the nation were examined. These included Seattle and Tacoma, Washington; San Francisco, Oakland, Sacramento, Stockton, Richmond, Los Angeles, and Long Beach, California; Toledo, Ohio; Chicago, Illinois; St. Louis, Missouri; Memphis, Tennessee; New Orleans, Louisiana; Houston, Galveston, Beaumont, Texas City, and Freeport, Texas; Charleston, South Carolina; Norfolk, Virginia; Philadelphia, Pennsylvania; Wilmington, Delaware; New York, New York; and Boston, Massachusetts.

The investigation covered several types of intermodal access problems applicable to intermodal connectivity. The first was whether institutional issues or communication problems or both between the ports and the local and state agencies were impeding the efficient movement of cargo. The second was physical factors, such as overhead clearance limitations for double-stack trains, access to Interstate highways, and inadequate pave-

ment structure. The third issue was regulatory constraints, including government regulations concerning safety, the environment, and union contracts. The fourth problem area for intermodal connectivity centered on conflicting land use priorities.

An interim report focused on general cargo and container ports. The final report of the study committee recaps the interim report and addresses bulk ports as well (TRB 1993). Recommendations are focused on the role of the federal government in providing incentives to state and local governments to ensure that concerns about freight access are adequately considered when state and local transportation plans are formulated.

In addition, a key recommendation is to ensure that the port access routes that are important to international and interstate commerce be included in the designation of the National Highway System (NHS). This is a timely recommendation, given the 1993 deadline for states to submit their designations to the Federal Highway Administration (FHWA). NHS designation is important to ports because NHS roads are eligible for up to 80 percent federal funding.

In addition, MARAD joined the Federal Transit Administration, in cooperation with the Urban Harbors Institute of the University of Massachusetts, to sponsor a two-day roundtable on passenger and cargo access to ports in April 1992. A major recommendation from this roundtable was the need for port officials to work within communities to make community members aware of the strategic and economic importance of ports. Ports by their nature have national and regional influence, but their impacts are primarily on local communities. The ports need to invest in regional and urban planning. Port officials need to work cooperatively with all of the other local entities so that each separate concern is met and a cohesive, comprehensive, regional plan is developed.

Since the enactment of ISTEА, port officials have been trying to determine how it could be used to fund port access projects. There are a number of possible mechanisms, some of which were mentioned by Robert Martinez of the Office of Intermodalism. Besides NHS, the Surface Transportation Program is a new block grant program that offers a great deal of latitude for funding highway, transit, and safety projects. State and local officials really do have flexibility in determining how to use these funds. Funds from the Bridge Replacement and Rehabilitation Program and the Congestion Mitigation and Air Quality Improvement Program may also be used to fund port access projects.

ISTEА clearly stipulates that metropolitan planning organizations (MPOs) must consider a number of factors in developing transportation plans. These factors include relief and prevention of congestion, crossing of international borders, and access to ports and airports. Planners must also

consider preservation of rights-of-way, both those that currently exist and those that are unused, for future transportation use, and they must consider methods to enhance the efficient movement of freight.

More than a year after the enactment of ISTEA, port officials continue to ask whether the policies and provisions of ISTEA make a difference in the granting of federal money. Thus far, the results are mixed. When a port makes an application to an MPO, unless the particular project fits into an existing institutional program, it is difficult for port officials to gain a voice in the process. This is, undoubtedly, an education problem. Transportation professionals must continue to learn about the importance of ports to the U.S. economy and quality of life. Port officials must also be proactive. They must become involved with MPOs and participate in the state planning processes. ISTEA provides the latitude; it does not provide the money per se.

A couple of initiatives are under way at MARAD that should help with this education process. The agency is working with FHWA to conduct a series of workshops. Five have already been held in various parts of the United States; at least three more are being planned; and more are expected. At the request of port officials, MARAD conducts educational seminars for MPO, port, state, and local transportation planning representatives on how ISTEA can work for them. MARAD officials plan to produce an intermodal freight video that will help teach state and local officials and the public about the importance of ports. The agency also plans to publish a brochure describing how ISTEA funds can be made available for port access projects.

ISTEA presents a great opportunity for ports and for the entire freight industry. However, it is not automatic. We all have to work for it.

REFERENCE

ABBREVIATION

TRB Transportation Research Board

TRB. 1993. *Special Report 238: Landside Access to U.S. Ports*. National Research Council, Washington, D.C., 198 pp.

Airport Access: Case Study in Intermodalism

MATTHEW A. COOGAN

Rackemann Environmental Services, Boston, Massachusetts

TO ILLUMINATE THE major themes that have been raised at this conference, I would like to discuss airport access as a case study, a microcosm of intermodal planning issues, and I plan to follow the structure that the conference steering committee established: concept, practice, and vision.

CONCEPT

The concept of an intermodal trip illustrated here is a simple one. The example is from Haverhill, Massachusetts, to Columbus, Indiana.

First, I would like to discuss transporting a piece of freight—a package. A truck picks up the package at Haverhill and takes it to a processing station in Lowell. A larger truck takes it from the processing station to Logan airport in Boston. It is probably put on an overnight plane that takes it to Indianapolis. Early the next morning, a truck takes it from Indianapolis to Columbus.

Now I would like to discuss the same trip for a passenger—my grandmother. My grandmother does not drive, so she cannot rent a car. She would have to take a taxi from Haverhill to Lowell. She could then take an airport shuttle, usually called a limousine, from Lowell to Logan airport, where she could take a flight to Indianapolis. She could take another airport limousine from Indianapolis to downtown Columbus. I have not set this up to demonstrate how bad and hopeless the public transportation network is in the United States; these two trips are actually rather easily accomplished.

What is the difference between these two trips? When I wanted to send a package from Haverhill to Columbus, I was able to pick up the telephone and call a delivery company and say, "Would you take my package from Haverhill to Columbus?" The answer was yes. Four competing companies also could have transported the package.

Now let us examine the trip for the passenger. Something interesting happened in a focus group session I was involved in about 6 years ago. About 10 or 15 travel agents were assembled and asked, "Our boss's grandmother has to go from Haverhill to Columbus, and she does not drive very well. Could you schedule a trip for her?" The answer from the travel agents was, "No, we cannot do that. We are not in that business, but we will be glad to sell you a ticket from Logan airport to Indianapolis airport. That is our job."

What have we just learned from these examples? We learned that the people in the freight business have a fundamentally different way of looking at this trip from those in the passenger business. When I asked the freight people to deliver my package, they understood immediately that there were four links to this trip. They understood this immediately because they must survive in the marketplace and had to figure out a way to sell all four links of the trip. The trip was seamless. When I called the travel agent to schedule a trip for my grandmother, the agent said, "I make a good profit on the ticket from Boston to Indianapolis, but as for that other stuff, that is really not my business and I do not know why you are calling me."

Clearly, those who are trying to understand the strengths and weaknesses of the U.S. passenger network have a great deal to learn from the private-sector leaders of the U.S. freight network.

PRACTICE

I would like to review some newly available data to help us understand the nature of these critically important intermodal links, the links that get passengers to and from the airport. Intermodal links are not the key issue in intermodalism. The key issues are the larger issues discussed by Lillian Liburdi of the Port of Authority of New York and New Jersey.

One of the questions you have a right to ask is, "Why do we care; what is the difference?" There are reasons that we must care. As several speakers at this conference have noted, the Intermodal Surface Transportation Efficiency Act of 1991 and the Clean Air Act Amendments of 1990 require transportation planners to examine the environmental consequences of each segment of a trip.

Figures 1 and 2 show why these little trip segments really are important. These are not hypothetical data. They are empirically derived and include

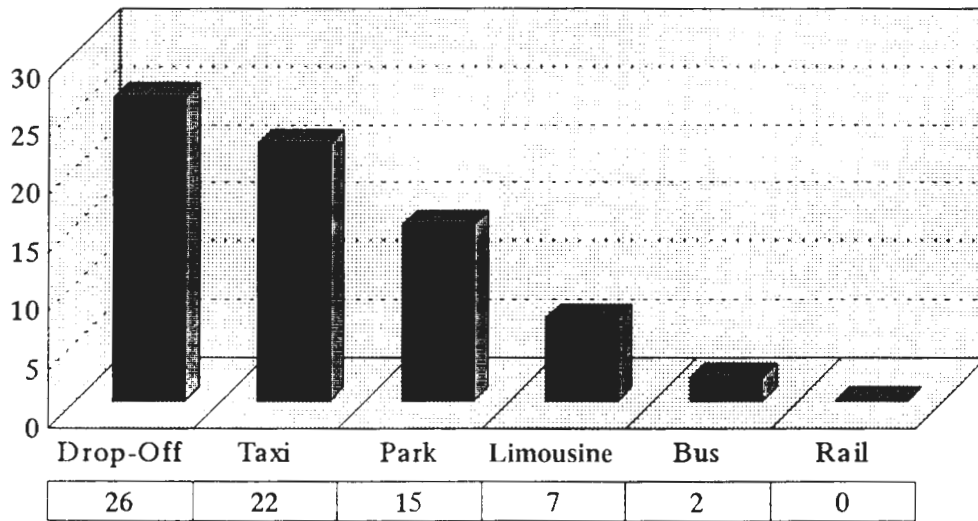


FIGURE 1 VMT for airport ground access per passenger for round trip (automobile modes shown individually) (Rackemann Environmental Services).

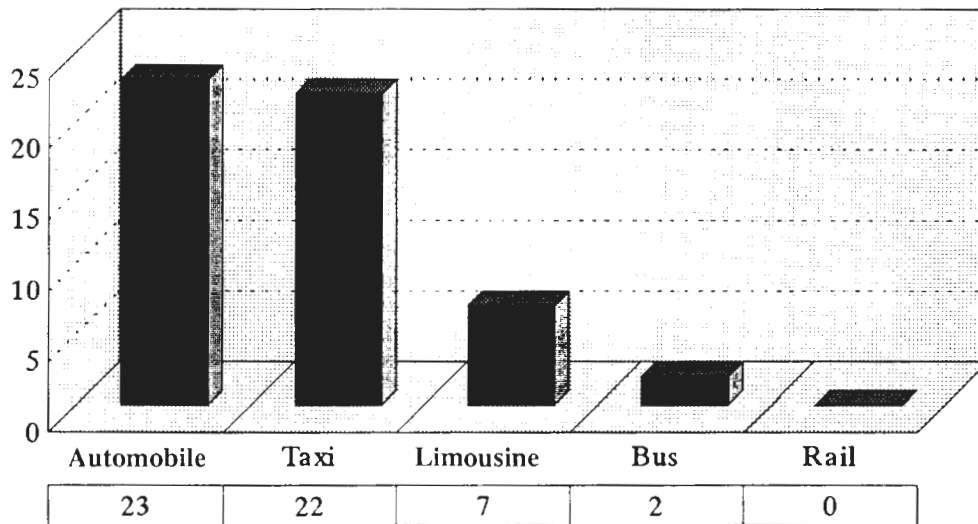


FIGURE 2 VMT for airport ground access per passenger for round trip (automobile modes shown together) (Rackemann Environmental Services).

such key factors as actual bus and automobile occupancy and use rates for taxis. If the average length of a trip to the airport is 10 mi, when I park my car at the airport, my air trip generates 15 vehicle miles of travel (VMT) on the ground in my home community. If a parking freeze is imposed, and I have to take a taxi, what has been accomplished? It may actually be counterproductive because the taxi generates more VMT than does driving to and parking at the airport. Figures 1 and 2 show that the job of

intermodal planners is to find an efficient mode of airport access to encourage drivers who are generating (on average) 23 VMT to take a bus, which would generate only 2 VMT.

Skeptics who have studied the most recent national transportation statistics are probably concerned about this concept because transit ridership is declining. It is not declining, however, in airport access.

There are some success stories, such as Logan airport in Boston. Travel to the airport by automobile fell from 84 percent in 1970 to 54 percent in 1992 (Figure 3). Use of rail transportation has increased, but use of rubber-tired transportation has increased significantly (Figure 4).

This trend at Logan may be compared with those at other major American airports. In 1970, 10 percent of passengers arriving at Logan airport came by limousine, bus, or rail; 20 years later, the figure is 26 percent. In Boston, the trend is up, and it is up sharply. Boston is not an aberration. At LaGuardia airport in New York, 18 percent of passengers arrived by public modes 20 years ago; the figure is now up to 31 percent. At New York John F. Kennedy airport (JFK), use of public modes has increased from 21 percent 2 decades ago to 35 percent today.

The cumulative numbers, which include taxis, show that, in several cases, the majority of passengers do not access an airport by private or rented automobiles. What I am trying to demonstrate is the strength of some of these markets. One example is Los Angeles, which may be described as lotusland. There the trend rose from 15 percent to 24 percent. Another example is Washington National airport. Before Metrorail

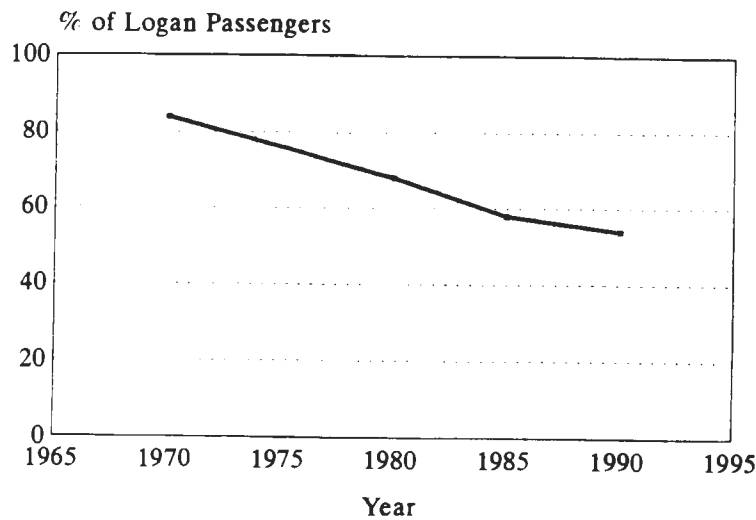


FIGURE 3 Decline in access by automobile to Logan airport (Rackemann Environmental Services).

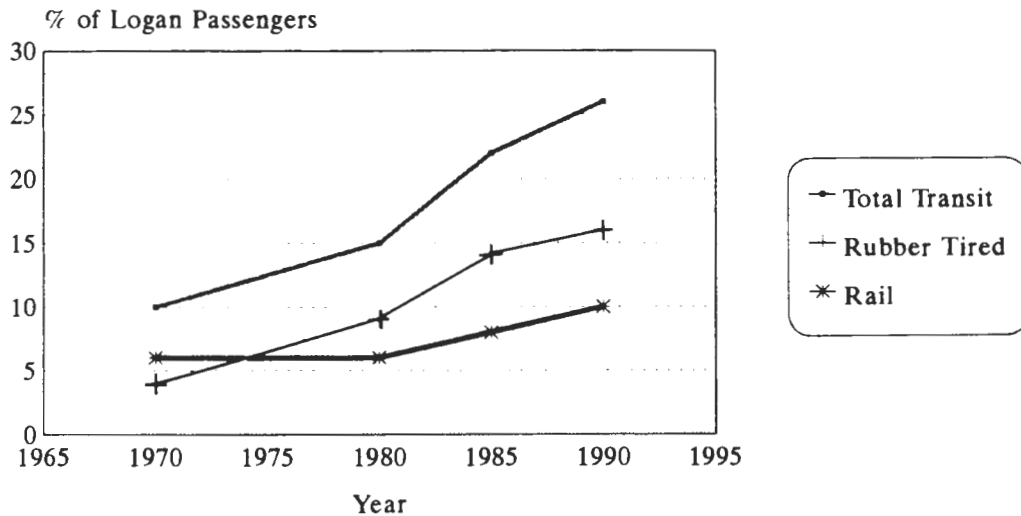


FIGURE 4 Rise in access by public modes to Logan airport (Rackemann Environmental Services).

opened, only 4 percent of passengers arrived at the airport by public modes. After Metrorail opened, the figure rose to 16 percent.

Some may believe that rail is a panacea for transportation troubles. Not necessarily. The 10 percent mode split for rail in Washington, D.C., is similar to the 10 percent mode split for rail in Boston. The figures for Chicago, Atlanta, and Cleveland, however, are all lower, probably less than 5 percent. In the United States, it is unusual for more than 10 percent of air passengers to access airports by rail. On the other hand, about 35 percent of passengers access the relatively isolated airport in Munich, Germany, by rail. Clearly, however, most of the growth in the United States is attributable to rubber-tired solutions.

Some of the trends in the United States are actually quite strong and positive in accomplishing the objectives of transportation planners. Consider, for example, the market niche between JFK and Fairfield County, Connecticut, where more than 50 percent of the air passengers travel by public modes. That is quite a long trip. Buses and shared limousines account for about 27 percent, but another 27 percent travel by private limousines, which are hired in advance for just one person. About half the excellent transit performance is represented by the traditional fixed-route and scheduled service. The other half is represented by the explosive growth in door-to-door, on-demand services that is occurring on the East Coast.

An example from the West Coast is San Francisco. In 1985, 2 percent of passengers arriving at the San Francisco airport came by shuttles and vans.

Just 6 years later, the figure was 14 percent. It is interesting to note that rail accounts for about 10 percent of the market to Washington National airport, but the shuttles, which have no public subsidy, account for 14 percent of the market in San Francisco.

That concludes the discussion about the practice, the way passengers access airports. My central observation is that there is a market out there that is growing despite the way people who travel by public transportation are treated. Access by modes other than the private automobile is sharply up all over the United States, even though airports are simply not designed or managed with the interests of the public transportation user in mind.

VISION

What are examples of better ways to integrate the issue of the multisegment single trip? What are some examples of vision? Fortunately, there are some encouraging examples of vision. The Swiss have perceived airports as a means of getting passengers from one efficient long-distance mode of transportation to another efficient means of transportation for shorter trips. It is not only an issue of facility design or making sure that all the schedules work together, but it is also an issue of understanding how all these pieces fit together in a synergistic way.

The most dramatic example of intermodal thinking in Switzerland is in the handling of baggage. When passengers travel from any town served by the Federal Swiss Railroad or by private railroads, they can check their bags through to their final airline destination.

A couple of observations have to be made here about the individual elements of system design. The designers of the Zurich airport understood that it was an element within an intermodal system and designed it to be centralized and compact. When baggage arrives by train, it arrives exactly at the point at which it is to be processed by the baggage system. Both air terminals tie directly into the railway station in the basement.

If I travel from Los Angeles to Bonn, Germany, Lufthansa takes me the first part of the trip on a jet and the second part of the trip on a train, which it happens to own. Let us examine the design details needed to make that work. No matter where I land at the Frankfurt airport, I pick up my bags at a point immediately adjacent to the basement train station. I can go ahead and walk to the parking garage if I want to, but I have to walk past the railroad station entrance to get there. The design is concentrated: the train does not stop at 10 separate unit terminals; it stops once, at a location immediately adjacent to all the baggage claim areas.

Another example of successful intermodal transfer occurs at London's Gatwick airport. This is probably the only known example in the world of an airport built up from a train station and not vice versa. In the original

Gatwick design, the customs clearance facility is located immediately above the rail tracks. The parking garages and automobile drop-off areas are located about a block away from the rail-oriented terminal. Although recent expansion of the airport has decentralized it a bit, it still ranks as one of the most rail-oriented airports in the world.

On this side of the Atlantic, quite a few exciting things are happening in this dimension as well. In fact, most of the breakthroughs that allow for highly centralized ground support facilities to be applied to large airports have occurred in the United States, not abroad.

Orlando International airport in Florida was one of the first modern American-designed airports at which the airside function is separated from the landside functions. This major facility design improvement allows for all air passengers to claim their baggage in one centralized building. If the local authorities in Orlando now choose to add a magnetically levitated (maglev) rail system to improve ground access, they do not have to have a maglev station at 6, 7, or 10 terminals. The maglev line can go to one building. That station is now designed and is in the main station.

Returning to the theme of intermodal connections, the Orlando airport is designed to support the services that were unavailable in the earlier example of a passenger trip from Haverhill to Columbus. When passengers depart for Orlando from the airport in Wichita, Kansas, for example, they are asked if their destination is Orlando airport or International Drive. If the destination is International Drive, the passengers' baggage is checked through to the new satellite station at International Drive. This is another example of the result when transportation designers understand that they have to take the various links in a trip more seriously.

Another good example can be found in Pittsburgh, Pennsylvania. Some courageous planners rejected the idea of expanding the airport by adding terminal after terminal. Several months ago, what is probably the most important airport in the United States was opened in Pittsburgh. In this exceptional design, all air travelers reclaim their baggage in one well-designed ground transportation building. This design is important because it provides ride-sharing opportunities, increases vehicle occupancy through taxi-sharing strategies, and provides a comfortable environment for passengers to wait for a wide variety of bus services. This can be accomplished in one place; it is difficult to accomplish in 10 different places. If a program sponsored by the Federal Transit Administration to add maglev service to this airport is implemented, Pittsburgh will benefit because planners had the courage to invest in the kind of airport design that allows these intermodal connections to be made.

The first airport at which the landside issue was addressed as an integrated issue of airport design was in Atlanta, where the metro was extended right into the landside facility. However, I would be guilty of

providing an overly optimistic description of the use of advanced airport design in support of ground transportation services if I spoke only of Orlando, Pittsburgh, and Atlanta. Most major American airports are dealing with this issue by retrofitting older designs that are far less supportive of ground transportation needs.

New York's JFK is one example. JFK is the great-grandfather of the American unit terminal concept; it has 10 separate terminals. Officials at the Port Authority of New York and New Jersey, to their credit, understood that getting one bus around that loop during peak congestion hours was causing a delay of more than half an hour, so they have invested much time and effort to deal with this problem of ground access caused by the inherited design of the airport. Five years ago, they came up with the idea of sending all the buses to one central point, where passengers would be transferred by people mover to the existing terminals. It was an interesting idea, but not necessarily optimal. Passengers who travel to the airport by single-occupancy vehicle go right to the airplane. Those who travel by a socially desirable bus have to transfer somewhere in the middle of the airport. Port authority officials are now examining a loop distributor concept to solve this problem.

The final example is Dallas–Fort Worth International airport. There has never been an airport design more difficult to serve by means of ground transportation and more inimical to the integration of air transportation with ground transportation services. The original design provided three separate places in each of the eight terminals for passengers to pick up their baggage. The aim of ground transportation planners is to provide bus service at the baggage claim areas. However, this would require 24 bus stops on one bus loop, an impossible situation from an operations standpoint. The Board of Directors of the Dallas–Fort Worth airport has decided to abandon the master plan of that enormous airport. According to the new master plan, much of the airport will be rebuilt using the landside-airside concept.

What does that mean for us, the students of intermodalism, the ground transportation advocates? It means that this airport can be served with 2 bus stops instead of 24. This was a major decision, and although it was actually made for reasons having to do with successful hubbing, not ground transportation, its implications for intermodal access are positive. The potential for a good interface with possible high-speed rail services increases dramatically.

I do not want to leave you with stories of multimillion-dollar decisions in Zurich and billion-dollar decisions in Dallas–Fort Worth because that is always scary. That means that intermodalism is somebody else's problem, not mine. Instead, I would like to present two smaller examples, which

should provide encouragement on this subject. If I bought a ticket from Boston to Scottsdale, Arizona, on America West a couple of years ago, I could come through the airport lounge and make a truly seamless transfer. Without leaving the airport, at Gate 30, I could wait for America West's connecting service to Scottsdale. I could go through the gate as if I were boarding a plane and board a bus that travels out of the secure tarmac area to a suburban transfer station. I was not asked to go out in the street; I was not asked to wait in the rain to make this transfer. It is a pretty good example of one company doing something on a logical, believable, incremental basis.

I would like to conclude with a story of a friend of mine, whose name is Grace Hughes. Grace and her family are entrepreneurs who own the Marin Airporter bus service. They built, with private funds, a bus terminal to serve people going to San Francisco International airport. Representatives of two airlines approached them with a proposal to sell their tickets at the bus terminal. The response was, "No, you are not welcome in my terminal unless you check people in, take their baggage, and give them a boarding pass right there." The airlines' response was, "We do not do that stuff. Our job starts at the airport. You are in the bus business, not us." The airline representatives were afraid that the baggage would get lost in the hold of the bus. Grace thought about it for a little while, and she came up with a brilliant, "high-tech" scheme. She won. They started to check baggage at Grace's facility.

The scheme she came up with was absolutely brilliant. She took the baggage of the passengers traveling on one airline, put a dog leash around the handles, and pulled the collar tight. Then she took the baggage of the passengers traveling on the other airline, put a dog leash around the handles, and pulled the collar tight. When the bus arrived at the airport, the bus driver unloaded the appropriate bundle of baggage. In several years of operation, they have never lost a single bag.

I put a lot of thought into how to end this presentation. My first thought was the excitement of the decision in Orlando for check-in at International Drive. My second was the scale of the Swiss experience, or perhaps the decision at Dallas-Fort Worth. In the end, I decided to conclude this presentation with the story of Grace Hughes and her dog leashes because she worked on a scale that we all can understand. During the last few years I have been addressing meetings and conferences and arguing that intermodalism is a good thing. While I was doing this, this determined lady solved an intermodal problem with a dog leash. She understood the nature of the problem of linking the trips and set out to find a solution.

Italy's Intermodal Alternative: The Sea Road

GIANNI MIGLIORINO

Viamare S.p.A., Genoa, Italy

In planning this conference, the steering committee was mindful of incorporating international examples of innovative intermodal solutions. The Viamare project is a case study in Italy's experiment to relieve acute highway truck congestion with a cost-efficient, short sea alternative. Ten years of planning and extensive cost-benefit analyses preceded the recent inauguration of the Viamare project. An approach to cross-modal analysis, a focus area of the conference, is examined here.

ROAD CONGESTION IS A worldwide problem. It is the consequence of a sort of spontaneous transport model based primarily on the use of road haulage, or trucking.

Road haulage appears to be efficient: it is flexible, it runs straight from door to door, and it is generally considered cost-effective. However, this is not always true because the road haulage industry is often allowed to offset part of its costs in other areas. In Italy, for instance, the haulage industry does not pay for the wear of the road surface; the users of private automobiles pay for it. This cost of offsetting has led to an imbalance in the use of the different transport modes almost everywhere in the world and, from a certain point of view, has slowed the introduction of more convenient intermodal transport systems. The modal imbalance in Italy is shown in Figure 1. Figure 2 shows the changes in this imbalance that occurred between 1970 and 1991. The overall picture in Europe is not much different: road traffic is 76.5 percent; the rail share, 14.4 percent; and inland navigation, 9.1 percent.

This model is no longer sustainable, for both social and economic reasons. Throughout Europe, there is a call for change, induced by growing difficulties from the recessionary economic cycle and at the same time by increasing awareness of environmental issues. The imbalance in the use of different transport modes and the excessive use of road haulage causes the following phenomena:

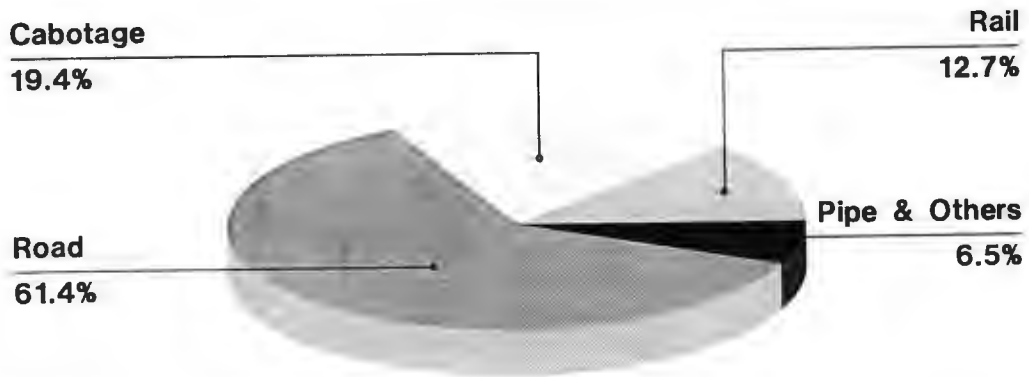


FIGURE 1 Italian domestic cargo traffic by mode (1991) [Conto Nazionale dei Trasporti (C.N.T.)].

- Diseconomies for industry,
- Road congestion and accidents,
- Obstacles to tourism,
- Heavy wear of the road surface,
- Pollution,
- Waste of energy, and
- Waste of land resources.

Figure 3 shows the average number of injured persons per billion traffic units in Italy. Commercial vehicles in Italy are responsible for 7 percent of road traffic, 13 percent of road accidents, and 20 percent of road fatalities.

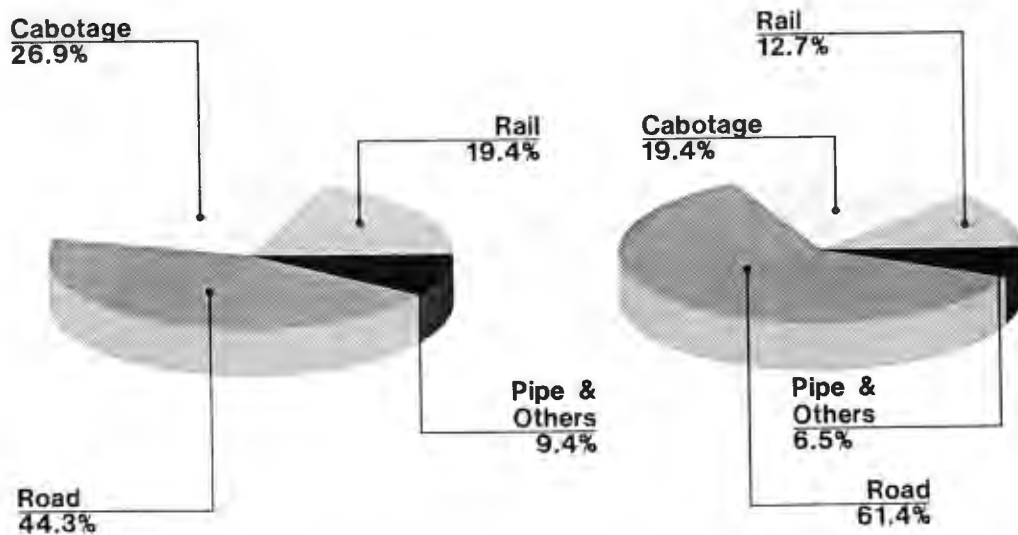


FIGURE 2 Comparison of Italian domestic cargo traffic by mode in 1970 (left) and 1991 (right) (C.N.T.).

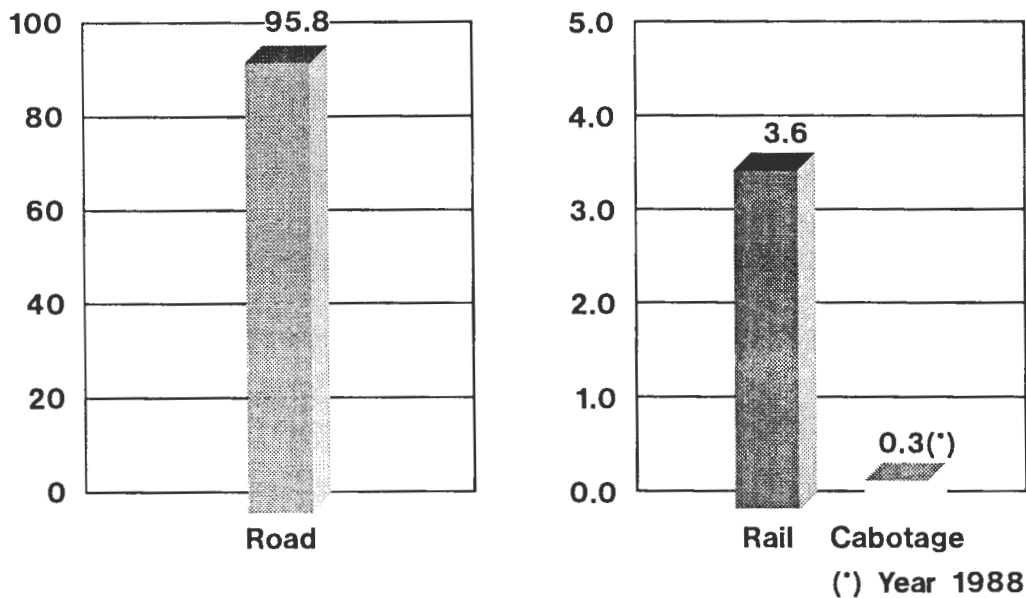


FIGURE 3 Average number of injured persons per billion traffic units in Italian domestic transport (1990) (C.N.T.).

Figure 4 shows the carbon dioxide (CO₂) emissions, which are only part of the total pollution produced by transport. Trucks contribute 22.7 percent of total CO₂ emissions; waterways contribute only 0.7 percent. Figure 5 shows the specific energy consumption of different transport modes. The situation is becoming even worse as cargo traffic flows increase.

The increase in Italian domestic cargo traffic is summarized below:

Mode	Increase, 1970–1991 (%)	
	Total	Annual Average
All	79.8	2.8
Road	149.3	4.5
Rail	18.0	0.8
Cabotage	29.3	1.2
Other	23.6	1.0

The annual average increase is 2.8 percent, whereas the road cargo traffic increase is 4.5 percent. In any case, the figures show a growth bigger than that of the gross national product (GNP). Even though it appears strange, traffic grows at a rate higher than the GNP, and not only in Italy. All these factors have a negative impact on the community in general and represent increased costs for taxpayers. Two questions that arise are, How can change be made? Who will make the change?

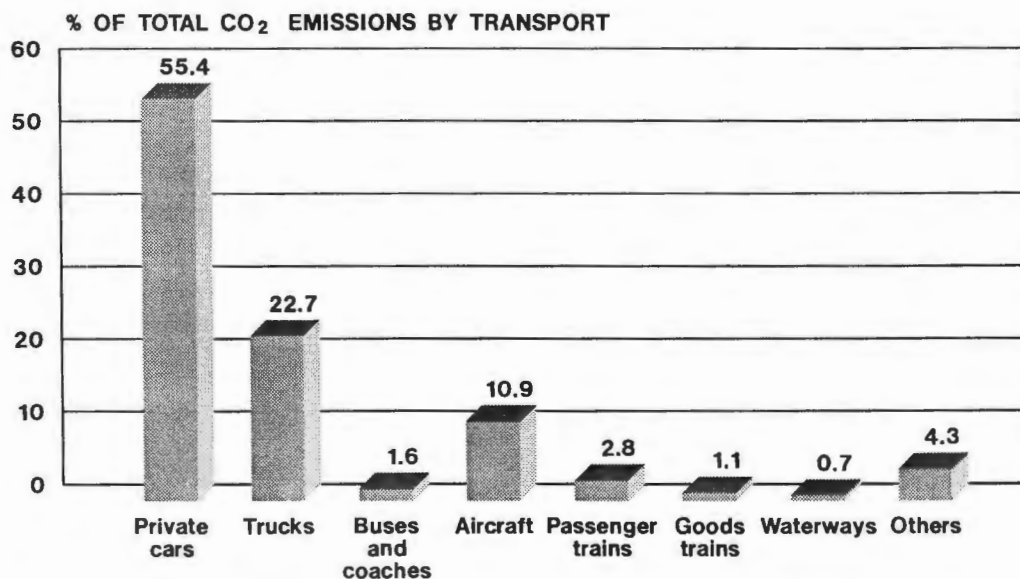
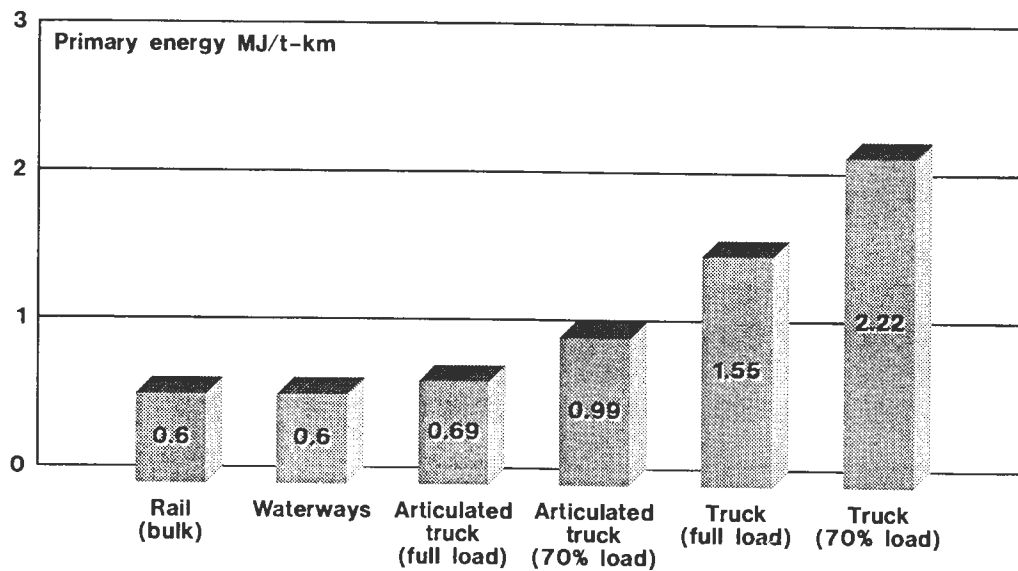


FIGURE 4 CO₂ emissions (Commission of European Community 1992).

There is extensive debate on this subject in Europe. One recent example was a two-day conference at the Dutch Technical University in Delft in November 1992, where maritime policy makers met maritime researchers to discuss how to shift traffic from road to sea, a sea mode called cabotage or sometimes short sea shipping or coastal trade.

During the past few years, national governments and other entities have tried to encourage a change, bringing together all the parties involved. This integration of modes is a difficult policy to implement, yet it makes sense and is consistent with diminishing state funding for transport projects. Such a move was made by the British, the Swedes, and the Dutch. In Italy, this was done in 1986 when the first National Transport Plan was established; the plan was later updated in 1988 and 1990.

I would like to make two points on this subject. First, sea transport was not initially among the topics to be studied. This appears strange for a country such as Italy, which moves more than 260 million tons of goods per year by sea, but other European countries have made the same mistake. Second, the studies for the plan not only showed the imbalance between the transport modes, but also showed that the transport system was a "non-system" (see Table 1). The plan provided the operators with a framework of suggestions for actions to be taken with the consensus of the government, but nothing more. In other words, the answer to the question, "Who will make the change?" is that the task has been left to enterprises. I will try to explain what The Finmare Group did and how it was done. First, let me make a few points.



Articulated truck = 38t x 5 axle truck
 Truck = 20t x 4 axle rigid truck

FIGURE 5 Energy consumption of transport modes (Commission of European Community 1992).

A global approach is required to rebalance the transport system by linking together the different modes. This is particularly true if traffic is to be shifted from road to sea. Transport is a derived activity, and it has an impact not only on the economy but also on the environment and society. Problem solving in the transport field implies wide-range analysis covering all aspects. Such analysis, moreover, has to focus on the strategic aspects—those that may lead to structural changes in the economic and social

TABLE 1 Italian Transport System

	Status	Improvement
Road		
Infrastructure	Suitable (but saturated)	Short-term
Market organization	Weak	Short- /medium-term
Rail		
Infrastructure	Weak	Long-term
Market organization	Weak	Medium-term
Port		
Infrastructure	Suitable	Short- /medium-term
Management	Weak	Short- /medium-term
Fleet		
Renewal	Under way	Short-term

environment. Extensive transformations have taken place in the economic scenario:

- Globalization of the market,
- Internationalization,
- Transfer of technologies,
- Process innovations, and
- Mass introduction of informatics and telematics.

At the same time, logistics has become a critical success factor for enterprises, and this has highlighted the importance of transport (often 40 percent in value).

Today, the following aspects appear to be of paramount importance: the creation of intermodal networks by linking infrastructures and transport means, and the creation of parallel information chains, which have become the major source of added value. The reason for this is evident: information enables transportation professionals to manage the growing levels of complexity of the transport process. It leads, moreover, to a new concept of network, made up of physical elements and of a language—the software—shared among all the participants in the network itself (shippers, consignees, haulers, shipowners, etc.).

Nevertheless, the point of broken or unbroken logistic transport chains has been the topic of much discussion. The objection is that, in comparison with an unbroken chain between shipper and consignee, in a broken chain there will be at least one additional transshipment that will cost time and money. Moreover, one may ask who is responsible for the entire chain or who is going to coordinate it.

The answers to these questions lie mainly in the following three points:

- Efficiency of the physical links;
- Efficiency or cost performance in certain transport modes (rail as well as ship) when compared with road haulage (Figure 6); and
- Introduction of efficient electronic data interchange (EDI) systems, able to keep in contact, in real time, with all of the participants in the transport chain.

Figure 7 shows the physical chain of the combined transport system. This enables passage from the old concept, based on long-distance road haulage, to a new concept based on the combined road and sea transport system, where the long distance is covered by the ship (Figure 8). In other words, the studies showed that it was convenient for the community, in

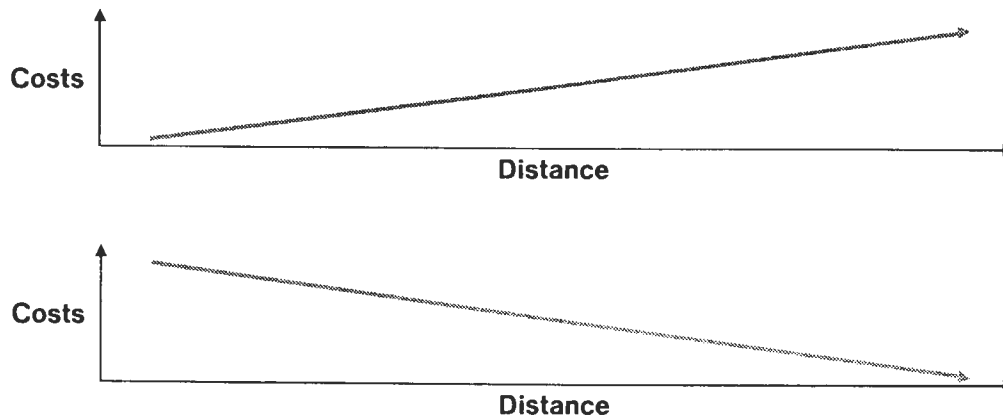


FIGURE 6 Transport costs for road (*top*) and rail and sea (*bottom*).

general, to switch from road to sea transport and that it was probably feasible from an entrepreneurial point of view. This was the starting point for the Finmare cabotage project.

Finmare is the holding company for 11 navigation companies and is the largest shipowner in Italy, operating more than 2 million tonnes. Finmare belongs to the state-owned I.R.I. Group. Important moves are under way in this sector: the government has announced its intention to accomplish a large part of its activities, including shipping, through private contractors.

In any case, recent developments in Italian and European policies, which led to the opening of the Common Market, permit only initiatives that can reasonably compete on the market without subsidies. Finmare officials tried to determine if the strategic issues and the social demand requiring cheaper transport costs, less road congestion, less pollution, and the like could be transformed into a business opportunity.

Being peninsular and mountainous, Italy has serious traffic problems, but at the same time, it has the opportunity to take advantage of two major seaways, the Tyrrhenian and the Adriatic (Figure 9). Finmare officials realized that part of the infrastructure was already in place and immediately available.

A feasibility study was conducted to determine the following:

- Amount of cargo suitable for transferring from road to sea,
- Main features for a successful service,
- Technology to be used,
- Investment necessary,
- Operating costs,

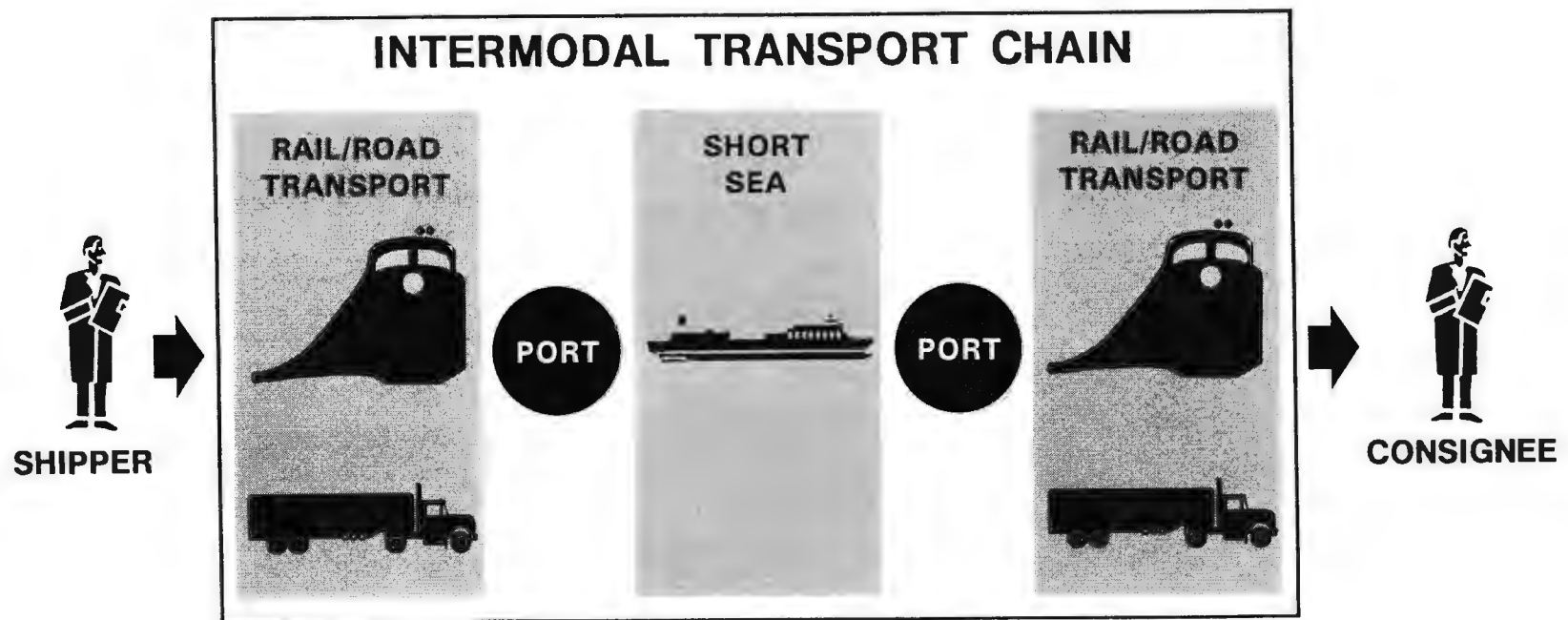


FIGURE 7 Physical chain of the combined transport system.

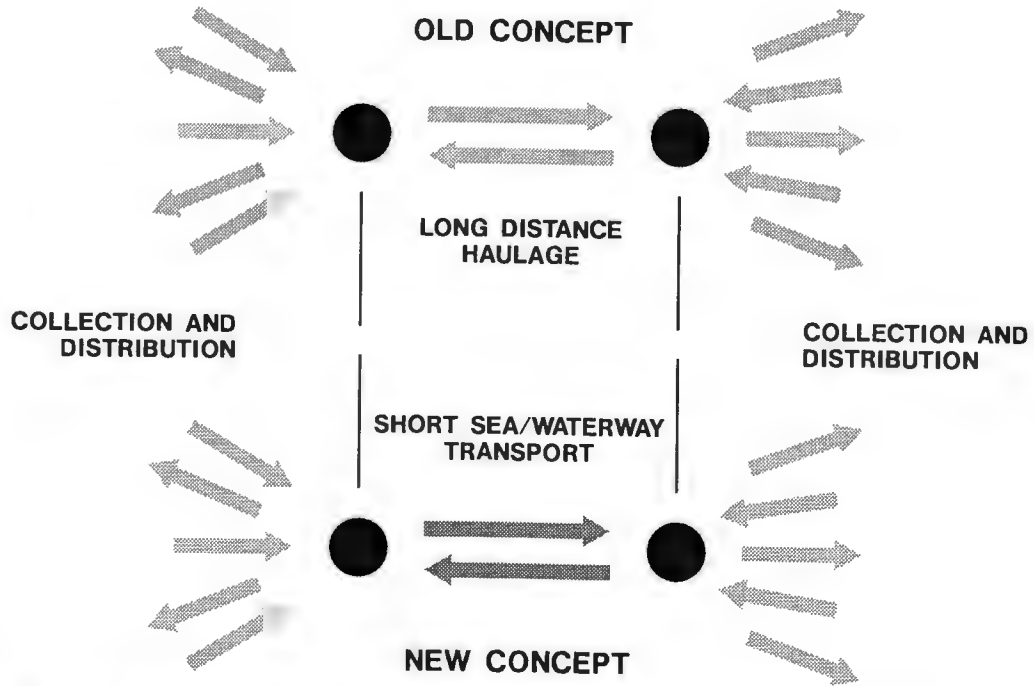


FIGURE 8 Nodes linked by different networks (A.T. Kearney/Finmare).



FIGURE 9 Cabotage among Italian ports.

- Possible return on the investment,
- Impact on existing traditional cabotage services, and
- Impact on road haulage.

The following is a discussion of the results:

- The study revealed that 4.6 million linear meters run between the north of Italy and Sicily each year. The linear meter is the unit of measurement for roll-on, roll-off (ro-ro) vessel traffic. Conventionally, 12.5 meters is equal to 25 tons of cargo; 1.3 million tons are already transported by sea, whereas the remaining cargo continues to be transported by road.

- The study also revealed that to induce the change, Finmare should act on the frequency of sailings and on the capacity offered. Both of these factors are part of the quality of the transport service and affect the number of ships to be deployed.

- Starting from the amount of investment required, Finmare found that it was possible to sell the service at a competitive rate. Road haulers operating within a range of 200 km (Figure 10) from the sea terminals can save up to 25 percent of the transport costs by using sea transport instead of road transport alone. This figure does not even take into account the savings from the reduced wear and tear on the vehicles. According to other studies conducted in Europe, haulers use sea transport only if the total advantage is at least 35 percent.

As far as the last two issues are concerned, the study proved that the total seaborne traffic in the area would improve. It also confirmed other studies, according to which the impact on the number of trucks and trailers deployed would be only marginal. This is important because Italian haulers were afraid that the introduction of cabotage would reduce their market share.

By the end of 1990, the decision had been made to set up a new company called Viamare to operate service in the Tyrrhenian Sea with five ro-ro ships, with each ship offering 1,780 linear meters. Viamare was also conceived as part of a major cabotage project in the Adriatic Sea. Other Mediterranean destinations have also been considered.

Various options for ships were examined, from purchasing secondhand vessels in order to start immediately to building nonconventional new vessels. After an in-depth study, the main features for a conventional, though advanced, ro-ro vessel were established; the vessel was developed in cooperation with the Dutch van der Giessen-de Noord and the Italian Fincantieri.

An important choice was made about the type of cargo to be carried. After in-depth consideration, the idea of loading double-stacked con-

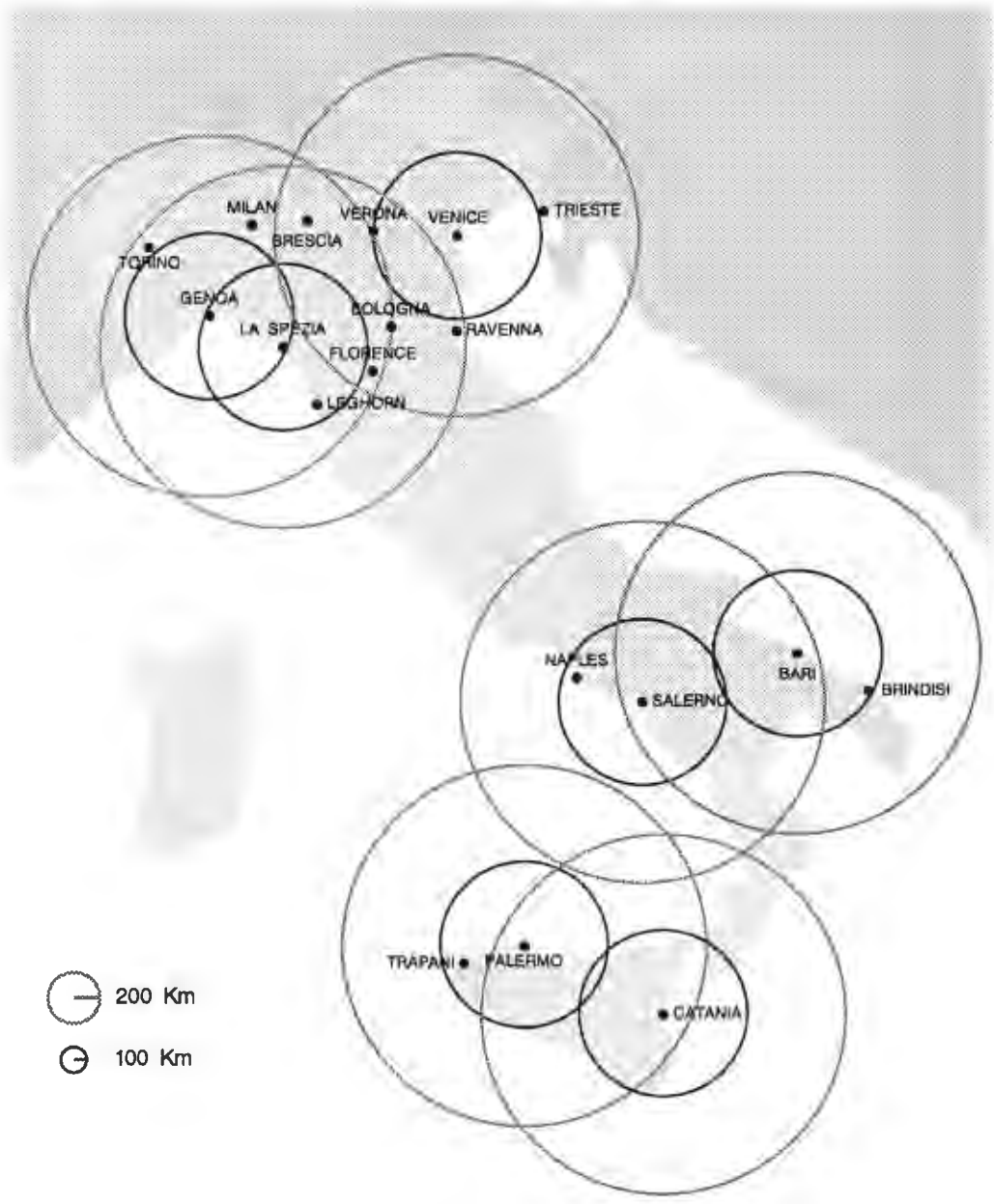


FIGURE 10 Potential market for Viamare.

tainers, which would have required a much-too-long operating cycle, was abandoned. More ships would have been required in order to guarantee sufficient service. As a consequence, it was decided to accept basically standard trucks and trailers as cargo. Swap bodies and International Standards Organization (ISO) containers loaded on flatbeds may also be carried.

The time factor was essential. The following were needed: greater speed for transit times to be competitive with those of road haulage, increased

safety, and efficient port operations (easy drive on and drive off, extra-wide access ramps and lanes, comfortable driver accommodations, facilities for refrigerated cargoes, etc.). Viamare officials have tried to produce the best combination of marine qualities and commercial qualities, the best for which a land transport operator could wish. Let me add that the ship itself, even though rich in innovation, is a product at the maturity stage. On the other hand, the service offered is at an early stage of the curve that is normally used to describe the life cycle of a product. Of course, this stage involves high investments and low returns (Figure 11).

I would like to briefly describe how the physical and information chains mentioned previously have been activated. The maritime terminals chosen were Voltri, a new extension to the port of Genoa, and in Sicily, Termini Imerese, about 34 km from Palermo. It takes 24 hr (including maneuvering time) to travel the 425 nautical miles between the two ports. The reasons for the choices were the availability of sufficient space for parking trailers and the direct link with the motorway. The latter was important not only in order to create the chain but also to avoid the large amount of traffic through the towns.

Switching cargo from road to sea, in general, can create congestion in port areas. A type of bypass is necessary. Therefore, in the future, a rail link will be established between the port and the main line.

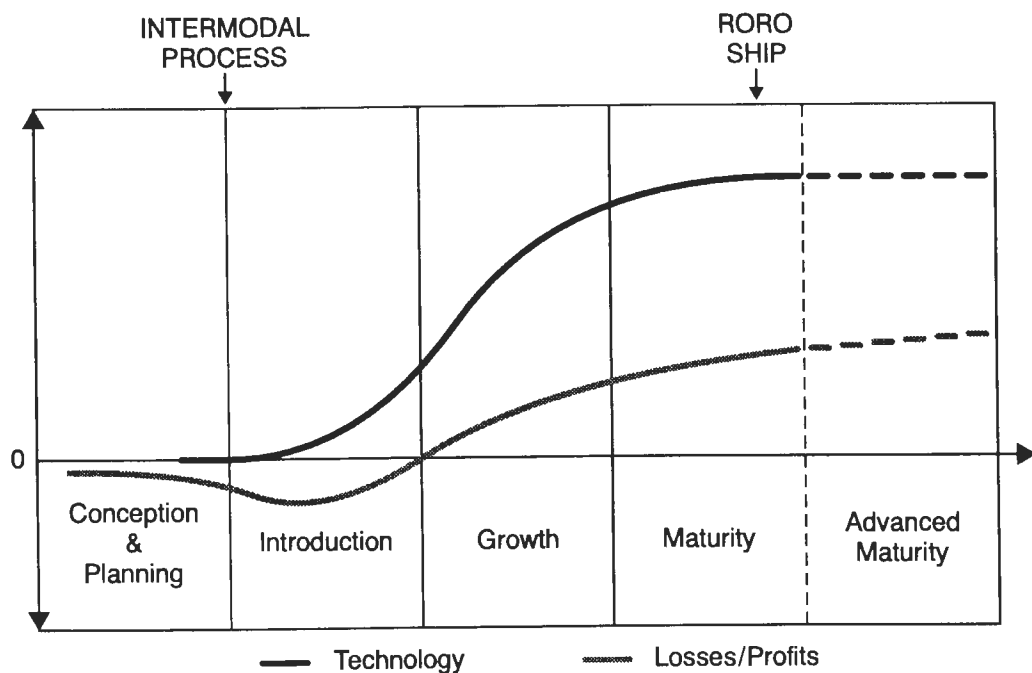


FIGURE 11 Life cycle of transport product or service.

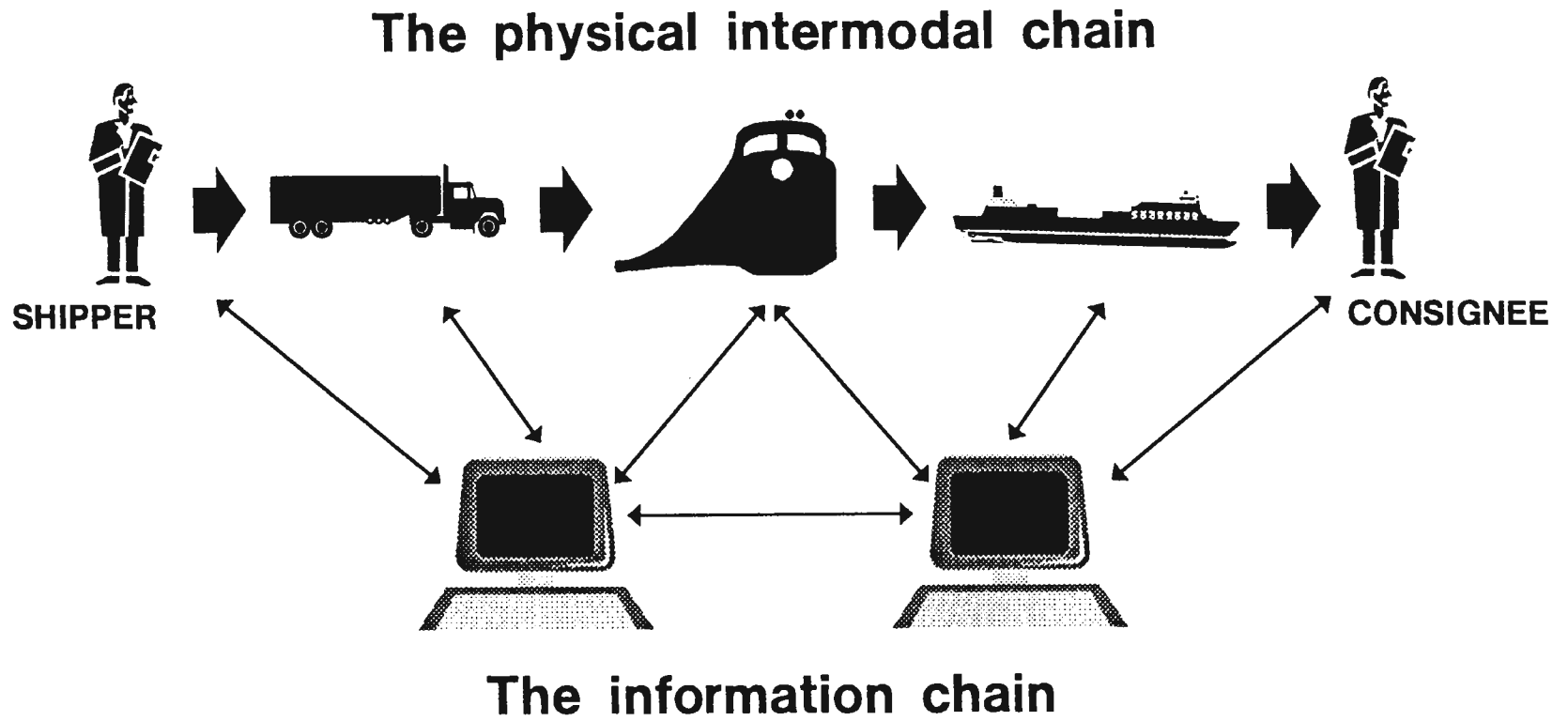


FIGURE 12 The Viamare concept.

The terminals are equipped with gates operated by Viamare personnel, and the gates represent the nodes for both the physical and the information chains. Trucks and trailers entering the gates are electronically measured and weighed, and bills of lading are issued. Once a truck has entered the system, information is available in real time to the company, the other terminal, and, once they are linked, the shipper and the consignee. Participants can also obtain information such as the estimated time of arrival and departure of the ships, approximate position of the ships, time when the truck has left the other terminal, and so forth. This technology is currently available, but its introduction into the system is important for commercial and safety reasons. First, agricultural products and fish from Sicily, for instance, can set quantity and price in the North Italian or European markets. Second, protection against thefts and hijacking in Italy is a major concern. Thus, it is comforting for the shipper, the consignee, and the hauler to know that the truck has entered the terminal and that it will be safe as far as the destination port.

The Viamare concept is shown in Figure 12. The question is, "Does it work?" I would like to say, "Yes!" but I prefer to say, "Yes, it probably does." The third ship came into service in December 1992. The promised performance is good (considering that it was organized in only 18 months). The service began in July 1992, and it is too early to make any statements based on the economic returns. In any case, the people involved are committed, and the first 6 months of operation (July 1992–December 1992) showed steady cargo growth. Haulers, shippers, and consignees all appear to be satisfied. Viamare officials hope to be able to say within a year or two that we have abandoned the losing scenario of excessive fragmentation of road haulage, infrastructural limits, excessive use of long-distance road haulage, weak market organization, too many middlemen, and empty return trips in favor of the winning scenario of fewer and stronger operators, intermodalism (use of road, rail, and sea modes), use of road haulage mainly for distances up to 200 km and for final distribution, and EDI (as added value and compensation for broken chains).

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The Road to Intermodalism

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SINCE ITS HEYDAY IN the 1960s to the early 1970s, transportation planning in the United States has endured a long period of uncertainty, marked by professional questioning and political inattention. Transportation planning began to lack centrality for a familiar variety of reasons. Chief among them were repeated energy crises, financial difficulties, social and environmental concerns, and a general lack of faith in highway solutions to transport problems. Long-run, comprehensive planning suffered in particular as the focus in transportation came to be on the short run—projects, strategic spans, sketch plans, policies, and political solutions—instead of on 20-year plans replete with statistics, models, alternative and recommended solutions, and supportive financial elements.¹

In this last decade of the century, however, new directives for planning and planners can be found in the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). ISTEA gives major new impetus for long-range, comprehensive planning by requiring states and localities to engage in transportation planning. These plans are key to project funding because transportation improvement programs and air quality control measures must be coordinated with the planning process to achieve the act's several purposes. Moreover, required metropolitan planning organization (MPO) plans and state plans must also be coordinated, giving effective mutual veto power in decisions on federal surface transportation funds to states and urban areas if agreement cannot be reached.

Just to list the purposes embodied in ISTEA is to see how much is expected of transportation planning today and how great the promise is for comprehensive planning in the years to come. The goal of the act is to

support an intermodal transportation system that is efficient and in which attention is paid to energy considerations, the environment, and strengthened economic competition on a global scale. How are planners to revise their activities and attentions to carry out this mandate? What new directions are required? Must institutions, planning practices or methods, educational activities, and public and professional attitudes be changed to support these new requirements?

Although it appears that transportation planners have major new tasks ahead along an uncertain new path, it should be remembered that not all that is being demanded of planners in the 1990s would seem particularly unusual to planners of past decades. To see what change might be required, it is useful to view the major eras and events in transportation planning during the last 30 years.

ERAS IN TRANSPORTATION PLANNING

The 1962 Highway Act

Let us turn to a period in transport planning that still heavily influences today's planning philosophy and responsibilities—the decade of a major local-state planning effort in the United States initiated by the Federal-Aid Highway Act of 1962. The act used the lever of highway funding to establish a continuing, comprehensive urban transportation planning process carried out cooperatively by states and local governments. Before federal-aid highway projects in urbanized areas with populations of 50,000 or more could be approved, the planning process was to be under way (Weiner 1983, 35, 37–39). Although important and pioneering planning work had occurred earlier in some states and in major urban areas, particularly under the studies established by Section 701 of the Housing Act of 1954, as amended, the broad geographic spread of planning that began under the 1962 highway act was of key importance because it supported a view of planning among decision makers and professionals as necessary and legitimate. The highway act brought large numbers of state highway engineers into the urban planning process and set up new interactions between engineers and local planners. The development of the 3C (continuing, comprehensive, cooperative) planning process, accompanied by the set-aside of 1.5 percent of highway funds for planning and research, became a major stimulus for the establishment or expansion of planning agencies and for the promotion of training in transportation planning. Planning became a respectable career path in transportation for local and state agency professionals. By the time established for compliance under

the act (July 1, 1965), every urbanized area in the country had an urban transport planning process under way. (Weiner 1983, 42).

When the directions given to planners under the 1962 act are compared with those established nearly 30 years later by ISTEA, it becomes evident that almost all the matters now considered important were incorporated early on in the guidelines of the 1962 act, such as economic factors affecting development, land use, multimodal consideration (highways and transit), finance, and social factors (including the physical environment). Perhaps only energy and intermodal activity were given little attention.²

Planning for Transit and the Environment in the Early 1970s

How well a multitude of required factors was incorporated in metropolitan plans is subject to dispute. Certainly the early transportation plans resulting from metropolitan studies were largely highway plans, in major part because the Urban Mass Transportation Act of 1964 initially led to little federal funding. If implementation of transit alternatives was financially impossible and highway funds were readily available, it was impractical to propose bus or rail projects. An extensive lag occurred before cities and states became the chief financial supporters of transit that they are today in the United States. Perhaps the most important aspect of the Urban Mass Transportation Act was to move transit strongly into the public sector, as a public responsibility, with cities and transit authorities buying out bankrupt and undercapitalized transit operators. The result was eventually to establish a need for public planning to help determine the allocation of local, state, and federal funds between transit facilities and highways, roads, and streets.

It also took some years of experience with highway and transit planning before concerns about declining environmental quality were legislatively codified in the 1969 National Environmental Policy Act, the Environmental Quality Improvement Act of 1970, and the 1970 Clean Air Act Amendments. Planners and engineers were forced to expand their focus and intensify their planning efforts to account for new federal regulations (and to meet new state requirements that were frequently set in addition to federal law).

Early State Transportation Plans

One feature of the late 1960s and early 1970s was a series of state transportation plans (STPs) undertaken by the new state departments of transportation (DOTs) that were established following the creation of the U.S. DOT in 1966.³ (Regional transportation plans were not produced to

any major extent at the time or, for that matter, have been since.)⁴ Often the state legislation that set up the DOT called for a comprehensive plan as one of the new agency's first activities. The focus of these plans was primarily on highways and organizational change, but attention was paid to goods movement by rail, water, and even pipeline in some instances, as well as by truck. The lack of comprehensive data, however, and of good methodologies for making multimodal trade-offs meant that the early STPs were largely either broad policy plans or unintegrated summaries of already existing system plans (TRB 1974).

Planning Shock: Energy and Financial Shortfalls

Although comprehensive planning enjoyed a brief period of attention at the state and federal levels in the first half of the 1970s, the 1973 oil embargo, with its resultant flurry of activity at every level of government, forced the concentration of planning attention on short-run program and management responses to the virtual exclusion of earlier, longer-range planning efforts (DOT 1975 and 1976). As highway revenues declined, and the costs of highway investment and maintenance inflated, it became clear that long-run system plans had no prospect of implementation.

Energy Crisis Continuation

By the time of the second energy shock in 1979, the directions of the shift in planning focus were clear. As writers at the time pointed out, "The distance between long-range plan components and the political reality of today does not encourage strong local support for LRP [long-range planning]" (Schulz et al. 1979). Although the first Surface Transportation Assistance Act in 1978 advanced multimodal efforts through combining highway and transit finance, placing them on a somewhat more equal footing, it stressed the short run by emphasizing energy conservation as a planning goal and requiring the evaluation of transportation systems management strategies (Weiner 1983, 128). Intermodal movement, as in combining the automobile or bicycle or walking with bus or rail for a commute, could be considered only a minor aspect of urban transport and was not stressed in the 1978 act. State planners, too, pulled away from forecasting the long-run to deal instead with the emergencies of the day (Hyman 1983).

Extension of Planning to Railroads

As highway and transit planning shifted to short-run considerations in the 1970s, a new field for transportation planners emerged. Following the bankruptcy of the Penn-Central Railroad and the extended Eastern and

Midwest rail crisis, came the Regional Rail Reorganization Act of 1973 (3R Act), which established the Rail Services Planning Office and funding for state rail plans and programs (Parker and Gilbert 1977). Rail bankruptcy and abandonment were the immediate issues, but the potential role of railroads in a society faced with an energy shortage was central to many rail plans.

The Railroad Revitalization and Regulatory Reform Act (4R Act) followed in 1976, and before the end of the decade, not only was the federally controlled Consolidated Rail Corporation in operation, but a number of states and localities were funding and operating shortline or regional railroads, although the decline in federal funding greatly affected such state and local efforts (Boaten 1983). Several states, such as California and Michigan, became interested in rail passenger services, as well as rail freight, and supplemented operations of the National Railroad Passenger Corporation (Amtrak) with state-financed "403b" trains. The 1970s ended with planners paying more and more attention to nontraditional planning, which included a variety of modes.⁵ The focus, however, remained on short-run policy planning. State rail plans (emphasizing actions to prevent rail-line abandonment) became available to add to highway and airport plans, but the overall STPs of the time, although multimodal (that is, including analyses and recommendations for several modes), were not analytically cross-cutting or intermodal, in the sense of focusing on personal trips and goods movement using more than a single mode. The nature of STPs by the end of the 1970s is described in work by Fleet et al. (1979), Wilson and Cannon (1979), and the Transportation Research Board (TRB) (1980). For a description of intermodalism and the history of intermodal development in the United States, see work by Mahoney (1985).

Shift of Responsibility to the States and Cities: The 1980s

Perhaps the most important changes in U.S. transportation since the establishment of the Interstate highway system occurred in rapid succession starting with the Airline Deregulation Act of 1978,⁶ followed by surface deregulation with the Motor Carrier Act and the Staggers Rail Act in 1980 and intercity bus and household goods mover deregulation in 1982. Instead of the strong national edifice of regulation across the board, consisting of entry, exit, rate, and financial control of private transport (to achieve coordination and support modal "inherent advantage"), as envisioned by the Transportation Act of 1940, the United States opted for generally free-market intra- and intermodal competition, retaining only residual regulation, which was further relaxed year after year.⁷

Although a highlight of the 1980s was the dismantling of the federal regulatory structure (and the reduction of some state economic regulation as well), deregulation was accompanied by a general shift in emphasis in the United States away from federal funding and control. Despite nominal increases in federal support, such as the Surface Transportation Assistance Act of 1982, which established an additional \$.05/gal user fee on gasoline (\$.01 being earmarked for transit), public support for transportation infrastructure and services increasingly became a state and local government responsibility.⁸ Central federal direction in transportation reduced its reliance on the two key control mechanisms used by governments—regulation and finance.⁹ This meant that planning for transportation, faced with evident federal disinterest and a dearth of either tools or money to pursue national transportation goals, increasingly became attuned to local and state concerns.¹⁰

Characteristics of Today's U.S. Transportation System

In the 1990s, local and state direction of transportation efforts continues to be the ordinary and primary state of affairs, as supported in the U.S. DOT's national strategic plan, *Moving America* (DOT 1990), and as emphasized by the ISTEA planning requirements. There is also intensified interest in the decline of the nation's infrastructure and in international markets (*Business Week* 1992). In addition, the new federal administration is committed to added transportation expenditures. Private finance of transportation is often explored.¹¹ The interrelationships of transport and development are frequently cited and explored. All the same, the U.S. infrastructure and the transport services it supports should be recognized as having quite different characteristics than in past decades. Many of these characteristics are discussed in work by TRB (1988, 329–366). These characteristics are suggested in the following impressionistic sketch.

With deregulation, the availability of energy at historically low real prices, and the mature growth of the federal-aid highway system, the trucking industry has captured a greater share of the nation's freight bill. [See work by Smith (1991, 40) for freight bill share estimates over time.] Just-in-time services, tight inventory control practices, and smaller shipments appear well fitted to the practices of the truckload carrier industry. Although there are more trucking firms and more truck-tractor combinations on the highways than ever, the railroad industry has become profitable and, with technological, managerial, and marketing advances, is no longer the desperate, failing industry that it was in the 1970s. Double-stack container shipments appear to have achieved some of the promise long expected by the industry. In the other freight modes, even in a

recessionary period, maritime excess capacity seems on the verge of control; capacity shortages may not be far away. Oil and gas pipelines are experiencing the relief of higher traffic levels. Great Lakes traffic fell further in 1992 as part of that mode's continuing long-term decline, but the inland waterways appear to be maintaining their role in bulk carriage. Instead of road-rail and other forms of intermodal competition, however, today's freight markets are marked by specialization, intermodal exchange, and joint use of facilities to an extent never before evident.

Although there have been more failing airlines than bankrupt railroads in the last few years, unless structural decreases in business travel occur (with telefaxes and telecommunication playing more of a role), recent air carrier mergers and internationalization indicate a stronger future for the airlines once the current economic recession abates. Amtrak has come close to operating profitably in recent years, but the intercity bus industry barely survives, chiefly on the strength of charter revenues. High-speed ground transport, despite renewed interest and research, is still some decades away from widespread application in the United States. Urban transit is now maintaining steady ridership, and new rail starts continue to supply improved services and technology in major markets. Commuter bus and other specialized services show strength. Automobile ownership and use, however, continue to rise, as might be expected with the increased number of women in the work force, and carpooling is declining, or at best holding steady, in urban areas. Widespread urban and suburban congestion are intense public concerns.

What is also different about transportation in the 1990s is the statistical dominance of freight carriage by passenger transport; the nation's freight bill, nearly as great as passenger expenditures in 1960, by 1990 equaled only a bit more than half the amount spent on passenger transportation (Smith 1991, 6, 38).

This shift to far more money spent on passenger transport than on freight transport should be expected for the service-oriented U.S. economy, with ever-growing industrial productivity but with stagnation in many other economic segments. Differences in transportation in the 1990s will ensure that pressure will continue for enhanced productivity in all freight transport segments. Intermodal freight will be the focus for the push for improvement, and competition between freight and passenger transport for such scarce resources as corridor capacity and public funds will be keen.

Intermodal transport is perceived by some to be so central to the times that writers on freight transport can state that if the decade of the 1980s can be characterized as one of dramatic change for the transportation industry, the 1990s may well be the Decade of Intermodalism (Yeager

1991). Rarely can one pick up a trade magazine in any transport field without finding an article or a special issue on intermodalism.

In summary, for U.S. transportation in the near future, it can be expected that change at a more rapid pace than has usually been the case will be the hallmark. New technologies will be incorporated as they become practicable; the computer, global positioning, and geographic information systems are only now making a difference in transportation management. New knowledge is being gained rapidly, and such concepts as virtual reality, chaos theory, and even plate tectonics will eventually apply to transportation. However, urban congestion will remain under any conceivable scenario of expenditure for new facilities and will spread to trafficked lanes everywhere. [For suggestions on congestion management, see work by Downs (1992)].

The U.S. transport infrastructure is extensive and completed; it has not expanded geographically to any meaningful extent in the past several decades, and under current pricing standards, it is coming close to capacity in many areas. If low-cost freight transport is to enable U.S. producers to reach international markets, this congestion must be managed, and freight must be given priority over passenger carriage. If the U.S. quality of life is not to decline with falling mobility indices, greater environmental damage, and falling worker productivity caused by longer commutes, passenger transport must be given priority over freight in resource allocation. Because much capacity expansion is unlikely and either competitive outcome is unthinkable, the challenge to transportation planners and administrators is clear.

PLANNING FOR TRANSPORTATION IN THE 1990S

ISTEA is the first U.S. transportation act to highlight intermodalism. The apparent centrality of intermodalism to planning for transportation in the 1990s requires an attempt to produce a standard definition of the term. The challenge was accepted by Michael D. Meyer of the Georgia Institute of Technology (Meyer 1993). Meyer first defined multimodal planning, the type of planning that occurs in every urban area where annual transportation improvement programs, including both highway and transit elements, are developed. He then defined intermodal planning as a process of (a) identifying the key interactions between one or more modes of transportation where affecting the performance or use of one mode of transportation will affect another; (b) defining strategies for improving the effectiveness of these modal interactions; and (c) evaluating the effectiveness of these strategies from the perspective of enhancing the

overall performance of the system affected by the intermodal connections (Meyer 1993).¹²

Meyer presents examples of how multimodal planning could apply, for example, in interstate transportation studies comparing high-speed rail with air and in highway projects for interstate corridors (Meyer 1993). Few good examples of multimodal planning exist, but public-sector examples of intermodal planning, by Meyer's definition, appear to be completely lacking.

Meyer's definition of intermodal planning captures the ideas, first, of modal interaction to produce transportation services and, second, of how the interactions might be evaluated and improved. Transport planners should focus on such improvements and compare the results of projects or policies that address intermodal movement at the same time that they evaluate projects or policies affecting only a single mode. However, I prefer to emphasize the output of intermodal transportation instead of the interactions.

To me, intermodal planning means devising ways of improving the transportation product or output that results from using more than one mode of transportation in freight or passenger carriage. Appropriate service at the right price is what transportation users want; how that service is provided (by one carrier or many, by one mode or many), is simply immaterial. If the result is better from using one mode instead of two, the user will vote with his or her business dollar and use the superior transport provider.

By my definition, planning intermodally is a process of tracing the trip or shipment to understand how it is made and then determining improvements that can be undertaken. Of course, a linehaul trip or shipment does not stand by itself, and the origin and destination must be analyzed as well, as must the reasons for the movement, the alternatives to transport, and the resulting externalities. However, it should be emphasized that planning for intermodal movements is no different in concept than any other sort of transportation planning. If the trip is complicated by alternatives and impacts, the planning analysis is complex; if the trip or shipment raises few public concerns, planners should not interfere. In short, it is probably best not to emphasize the definition of "intermodal," but to focus instead on solving the multitude of problems faced by transportation users and providers.

Transportation planners today certainly do face more intense problems than ever before, and new technologies have to be included in the solutions. Congestion is a reality, and global warming, the topic of the 1992 Earth Summit in Rio de Janeiro, Brazil, is becoming more threatening as it is better understood. Sustainability, commingling social goals, and balanc-

ing needs and the resources to support those needs is the challenge. Meanwhile, planning for transportation continues to be focused at the local and state government levels, although it receives great attention from the private sector.¹³ Federal direction through ISTEA is clearly a policy stimulus to action, but the bulk of future planning will be conducted by MPOs and state DOTs.

In previous work, Meyer stated that the challenge of transportation planning is to devise a new 3C process for the 21st century: a process that combines creativity, credibility, and communication. Planners must be creative in a credible way and communicate effectively with decision makers (Meyer 1989). Does such a new process characterize today's state and local planning?

An informal survey of state DOT planning offices by the author in fall 1992 revealed that a majority of planning programs are not yet beginning to produce the STPs required under the statewide planning section of ISTEA.¹⁴ There also appears to be little evidence, from a review by the author of recent modal system plans and multimodal documents produced by the states, of any new 3C approaches. The author read 12 state plans produced in 1992 and concluded that uncommon efforts would probably be required for the states to revise those plans to fulfill even the minimum requirements of Section 135, Statewide Planning; Part (c), State Planning Process, of ISTEA. The requirements that cause particular difficulty appear to be in determining the "overall social, economic, energy, and environmental effects of transportation decisions" [Section 135, Part (11)] and finding "the effect of transportation decisions on land use and land development" [Section 135, Part (15)]. A review of the interim STP guidelines is provided elsewhere (*Transportation Planning* 1992). Moreover, these state plans fail to follow Meyer's directive to communicate easily and appropriately with a general audience.

Clearly, it is unfair to search already published plans for examples of best practice under a new federal planning act. It is better, although difficult, to investigate proposals for new state planning efforts expected to begin under ISTEA.

WISCONSIN DOT APPROACH TO PLANNING UNDER ISTEA

One example of the direction that planners might take is given by recent proposals for action by the Wisconsin DOT. The following information was gathered in interviews with Wisconsin DOT staff in July and October 1992 and by a review of unpublished internal documents. The author's views are not necessarily those of the Wisconsin DOT.

It should be noted that Wisconsin established one of the earlier state DOTs in the United States and produced an all-mode interim STP in 1975. That plan was followed by a State Transportation Policy Plan in 1980, and both of these plans were supported by and interacted with various modal system plans. Although those efforts were pioneering, Hyman (1983) suggests that neither was fully carried out or implemented. In 1985, Wisconsin produced its *Transportation Policy Agenda* (a strategic plan), and a number of plans or planning studies have been finished since 1985 (such as an airport plan, an intercity bus study, a freight users' survey, a rail policy plan, and Amtrak and high-speed rail studies). In short, transportation planning in Wisconsin parallels that of the more progressive state DOTs in the 1970s and 1980s in the practice of developing STPs and establishes a good basis for ISTEA planning. It should also be observed that the Wisconsin DOT has long supported and interacted with its state's regional planning commissions and urban planning groups.

In response to ISTEA, transportation planners in Wisconsin propose to develop and maintain state-of-the-art multimodal planning processes to produce effective modal and integrated multimodal transportation system plans to serve intercity, urban, and rural mobility and development needs in an efficient and environmentally responsible manner (internal memorandum, Wisconsin DOT, 1992). The expected result is a multimodal state transportation plan that includes a system-level environmental evaluation process. Planning processes are to be developed for the following six functional areas, each with modal elements:

- Intercity public transport (intercity bus, rail, air passenger, and ferry);
- Urban public transport (urban transit, including commuter bus and rail);
- Urban bicycle and pedestrian transport;
- Intercity and urban demand management;
- Private personal transport (automobile and private aircraft) (internal memorandum, Wisconsin DOT, 1992); and
- Intercity freight (rail, truck, air, and water).

In addition, prototype multimodal corridor analyses will be conducted. Following this work, a comprehensive state plan will be created.

The Wisconsin planning process is ambitious, encompassing virtually every form of transportation, with the possible exception of taxicabs and pipelines. It promises the ability to analyze modal trade-offs (although the trade-off mechanism is subject to experimentation—different methods are to be explored). It addresses the ISTEA state planning process points.

Wisconsin could well be taking up Meyer's new 3C challenge, with a creative approach, if the methodology and results can be communicated to the public and administrators.

On the other hand, this process is being undertaken by a state with a full (although perhaps not completely untarnished) history of transportation planning performance.¹⁵ The financial and human resources applied to the proposed process will undoubtedly be enormous. Success is chancy. How many other states can initiate a similar process, or replicate Wisconsin's effort once it is under way?

FUTURE PLANNING DIRECTIONS

ISTEA brings true challenges to transportation planning and planners. Returning to the questions posed at the beginning of this paper, what new directions are required? First, as has been shown, much of the institutional structure needed for planning at the local and state levels is in place. It can be expected that planning will continue to be channeled through these MPO and state DOT institutions, instead of being strongly directed at the national level, as is the case in many other countries. The institutional change necessary for effective planning is to bring the private sector fully into the local and state process, and that will require a great deal of openness and much learning by all parties. A vision of public-private cooperation must emerge, with all parties pressing to achieve shared social goals. The emphasis needs to be on communication—a component of the new 3C planning process proposed by Meyer (1989). Shippers and transport users, freight and passenger carriers, and planners must interact successfully in the envisioned planning process, or planning for transportation will make no progress beyond the piecemeal efforts of the 1970s and 1980s.

The second major change required in planning is to strive to attain another component of Meyer's new 3C planning process. Planners cannot be creditable, no matter how well they communicate, if they do not have mastery of, and apply in their practice, appropriate techniques to analyze proposed change. As Meyer also suggests, "Having the technical tools to analyze and evaluate the trade-offs among multimodal alternatives is very important, and yet is seriously lacking" (Meyer 1993). The ability to investigate ways of improving intermodal operations and the impacts of intermodalism on production and distribution is even less developed. How difficult will it be for states and MPOs to attain and master these needed tools?

Resources today are too scarce to make mistakes in ignorance, yet the history of transportation planning, as every planner and observer can

describe from experience, is full of investment and service mistakes. The U.S. General Accounting Office (GAO) recently commented on the history of making highway-transit trade-offs, concluding that local and state agencies have made little progress in planning across modes, in "seriously examining the trade-offs and interactions between competing and complementary transportation modes" (GAO 1992b, 8). This lack of progress may, as GAO officials suspect, be due to a lack of techniques, measures, and methods for use in analysis (GAO 1992b). The reason could be less-than-adequate interaction between practicing planners and those who develop the methods and techniques in the universities and research organizations. No reason, though, is important enough to keep planners and the transport industry from an immediate overhaul of the ways that transportation changes are investigated.

The focus for transportation planning under ISTEA should be similar to the tenants of good planning practice of the past, with three qualifying distinctions. First, tomorrow's good planning will be more broadly based and involve the private sector more completely than transport planning ever did before. It is imperative that all the players make the effort to learn about each other as quickly as possible. Second, planning will be creditable only if planners capably use the best analysis techniques available. Political arguments and arrangements cannot be accorded primacy if the United States is to compete in world markets. Third, the difference in the 1990s is the urgent need to make U.S. transportation the best, most integrated system possible to help cope with increased personal mobility and freight-market demands.

For more than 2 decades we have been aware that transportation must reduce externalities of environmental and social damage, cut energy use, and support social goals. Some progress has been made, but not much. The focus for the 1990s need not be greatly different from that of the past; it is simply that the time has come for a truly serious effort in the United States to establish superior transportation planning. ISTEA presents a long-needed opportunity to envision how transportation can best work to the interest of all. The challenge is to make the most of this act's impetus to create a clearer look at transportation's potential for every state and city in the country.

NOTES

1. See, as an example of the changed focus, the guidance and impetus given to strategic planning in work by Tyndall et al. (1990). Strategic planning is also promoted for the individual modes (TRB 1992).
2. For perspective on views at the time of the 1962 act, the author reviewed one of the leading transport texts of the period, first published in 1963 (Pegrum 1963). Pegrum

discussed the act (p. 576) and referred to fuel as an input factor to the production function (p. 5). Intermodalism, as best as can be determined, was not cited, but "service co-ordination" was, as "the complementary use of the same or different modes in providing for what is essentially a single movement by firms of the same mode or by firms of a different mode. For example, a freight shipment from Chicago to San Francisco may travel over the lines of more than one railroad company. The collection and delivery of the freight may be made by truck. The shipment, however, may be made as a single movement as far as the shipper is concerned" (Pegrum 1963, 119). What is prescient about Pegrum's statement, and worth remembering, is the position of the shipper. The shipper is not concerned about intermodal coordination, but simply about reasonable delivery of the shipment with a price and quality of service that are appropriate. Such expectations for "seamless transportation" have a long history.

3. Only Hawaii and California had DOTs before 1966. The New Jersey DOT was established in 1966 just before the U.S. DOT. See work by Bennett and DeWitt (1972), Highway Users Federation (1970), and RuBino (1971). For a description of New York's early STP work, see *Highway Research Record* 264 (HRB 1969). An early framework for STPs is given in another HRB report (1972).
4. In the early 1970s, Gakenheimer et al. (1971, 309) wrote, "Regional transportation planning offers, unfortunately, only a lean body of experience to evaluate when considering steps toward its further development." Further, "We find little basis here . . . for encouragement toward the creation of much more widespread regionalization for transportation planning. . . ." It might also be noted that regional councils, which might be the focal points for regional planning within states, lost "significant amounts of planning capacity during the 1980s" (McDowell 1992).
5. It should be noted that airport planning had long been an important activity for local and state planners and a type of planning that continued to bear a long-run focus. However, reviews of state and local airport plans revealed that these plans were rarely integrated with planning for the surface modes. Evidence of waterway, waterport, and pipeline planning was found only in scattered state and local plans (or federal documents, in the case of the waterways and maritime transport).
6. Congressional deregulation of passenger services was proceeded, however, by selective agency deregulation by the Civil Aeronautics Board and by congressional air cargo deregulation in 1977.
7. The exception was maritime transportation. The Shipping Act of 1984 (which revised the 1916 act) supports rate agreements and other collective activity, but it allows for individual carrier actions. Congressional review of the act in 1992 resulted in no new legislation.
8. Although a major federal focus during the 1980s was privatization, little private-sector funding of highways or transit facilities was evident by the early 1990s. Also note the large decline in intergovernmental revenues for transportation since the 1960s (GAO 1992a, 41).
9. However, part of the challenge for state and local transport planners has been a continuing move to attain national goals using transportation as a mechanism. Examples include such important national legislation as the Americans with Disabilities Act and the Clean Air Act amendments (both passed in 1990).
10. See work by Engelton (1986) for a view of nonfederal transport planning in the mid-1980s that focuses on "processes and techniques that are common in preparing plans at the policy, system, corridor, and project levels." Local transport planning in the early 1980s is covered in a TRB special report (TRB 1982). The STP in the early 1980s is described by Creighton (1982) and its progress by the mid-1980s is described in work by TRB (1985).

11. This is one of the key themes of *Moving America* (DOT 1990). However, a recent commentator on private finance suggests, “. . . the domain for public-private partnerships is a niche market” (FHWA 1991, 23).
12. Another recent definition of intermodal transport is “the movement of goods and/or people by two or more modes of transportation between specific origins and destinations” (Revis and Tarnoff 1987, 1). Revis and Tarnoff state that their most important conclusion from reviewing intermodal transportation is “the lack of intermodal coordination. Unlike other public infrastructure, the problem is not unmet investment needs or unbuilt facilities or capacity. It is the lack of a central focus point. . . .” (Revis and Tarnoff 1987, ii).
13. As one example of private attention, trucking industry representatives met with representatives of 84 MPOs during MPO Visit Week in fall 1992 to bring the industry into the ISTEA planning process (Strak 1992, *Transport Topics* 1992, Schulz 1992). The intermodal-planner involvement has intensified on several fronts (Burke 1992). Involvement by the National Association of Regional Councils is cited by the *Commercial Carrier Journal* (1992). *Moving America* (DOT 1990), produced just two years earlier, barely mentions planning, except in the context of DOT’s strategic planning.
14. The 1995 implementation deadlines are quite near for extensive STP efforts of the nature mandated. However, it should not be implied that states are unconcerned or uninterested in ISTEA implementation. To the contrary, a great deal of interest is apparent. For example, the Minnesota DOT (Mn DOT) sponsored a Northstar Workshop in May and published its proceedings in summer 1992 (Schneider and Stires 1992). By November, Mn DOT had published two issues of a newsletter on the implementation of ISTEA. Minnesota, however, began its STP efforts before the enactment of ISTEA (Gildemeister and Tanzer 1991). Some of the interest is no doubt spurred by state interest groups; for example, see the extensive coverage of ISTEA by the Transport Development Association of Wisconsin (1992).
15. One stimulus for the new planning efforts in Wisconsin was a suit brought against the DOT seeking to improve planning through establishing “a fully developed open, continuous, cooperative, and comprehensive intermodal planning process . . . that will include a ‘long range transportation plan’ [as required under ISTEA]” [*State of Wisconsin Public Intervenor, Wisconsin’s Environmental Decade, Inc., Sierra Club—John Muir Chapter, and Citizens for a Better Environment, Inc., v. Wisconsin Department of Transportation* (Case 91-CV-1869, Dane County Circuit Court, Branch 13, 1992)].

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ABBREVIATIONS

DOT	U.S. Department of Transportation
FHWA	Federal Highway Administration
GAO	General Accounting Office
HRB	Highway Research Board
TRB	Transportation Research Board

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Regional Context of Intermodal Decisions

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“IT IS THE POLICY of the United States to develop a National Intermodal Transportation System that is economically efficient and environmentally sound, provides the foundation for the Nation to compete in the global economy, and will move people and goods in an energy efficient manner.”

This opening paragraph in the declaration of policy of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) announces congressional interest in serving a world market. In addition, the act authorizes model intermodal transportation plans and requires states to develop six management systems, including one for intermodal transportation facilities and systems.

Increased productivity in the context of “social benefits” and “other aspects of the quality of life in the United States” are also addressed in the declaration of policy:

“The National Intermodal Transportation System shall give special emphasis to the contributions of the transportation sectors to increase productivity growth. Social benefits must be considered with particular attention to the external benefits of reduced air pollution, reduced traffic congestion, and other aspects of the quality of life in the United States.”

These two paragraphs help to frame the dilemma faced by transportation planners as they consider an intermodal system that serves a world market. The quality-of-life and environmental factors will be debated and settled primarily in a regional context.

A metropolitan transportation planning process created by the Federal-Aid Highway Act of 1965, and amended several times since by transportation and environmental laws, has created a regional framework for making

transportation decisions in the context of other community values. A state, national, or world context for making such trade-offs, however, does not appear to exist.

What can be learned from the metropolitan planning experience to help advance intermodal planning and systems analysis? A comparison of the characteristics of metropolitan transportation systems with those of intermodal systems reveals interesting distinctions (which are presented in Table 1).

COMPARISON OF METROPOLITAN AND INTERMODAL SYSTEMS

Markets

Three distinctions can be made in comparing the markets of the metropolitan and intermodal systems. First, the commuter market demands the attention of metropolitan transportation system planners, whereas freight dominates the intermodal system. Second, the metropolitan transportation system serves a regional market, whereas the intermodal system serves a world market. Third, a complex web of political and private managers affects decisions in metropolitan transportation systems. Freight customers, on the other hand, are the magnet for intermodal system decisions.

TABLE 1 Conceptual Contrasts Between Intermodal and Metropolitan Transportation Systems

Definition	Intermodal	Metropolitan
Markets		
Focus	Freight	Commuters
Scope	Global	Regional
Customers	Shippers/receivers	Voters
Service	Customer defined	Political process defined
Systems		
Orientation	Linear	Diffused
Definition	Multimodal	Multimodal
Integration	By contract	By plan
Management		
National interest	Economic	Multiple
Objective	Profit	Community values
Decisions	Private companies	Government
Ownership	Private companies	Government
Finance		
Capital sources	Banks, stocks, retained earnings	Taxes
Operating sources	Operating revenues	Individuals and taxes

Systems

Despite many years of attention, the metropolitan transportation system is poorly defined. It is more a collection of system fragments, with many owners, than an integrated whole. In the San Francisco Bay Area, for example, the system is the property of 100 cities, 9 counties, about 24 transit operators, several sea and air ports, the state, and hundreds of private operators. By comparison, the intermodal system appears to be more clearly defined. Major freight operators are linked by contracts, which makes the system work efficiently for the customer, despite the many transfers and transactions required along the way.

The metropolitan transportation system is diffused and stretches in every direction in a complex web to serve the multiple requirements of a region. The intermodal system is more linear. The nodes of the intermodal system are often major destinations in the metropolitan system. It is here that the intermodal system sometimes does not function properly because it depends on efficient operation of the metropolitan system for delivery of goods.

Management

Interest in the intermodal system in the United States is predominately economic. This objective is basic to the nation's support for a functional metropolitan transportation system as well, but the development and use of the metropolitan transportation system is conditioned by several other social objectives, including clean air, service for the disabled, and low fares for the elderly. A loosely defined political process, centered on metropolitan planning organizations (MPOs), is charged, by ISTEА and the Clean Air Act Amendments of 1990, with reconciling these many objectives.

Other fundamental differences can be identified between how the metropolitan transportation system and intermodal system are managed. Government exerts most control over the metropolitan transportation system, whereas private corporations have more power over intermodal system decisions. These corporations exercise considerably more independent judgment now that government economic deregulation has occurred.

States and municipalities own the metropolitan transportation system plant. Airports and seaports, with strong influence from their corporate clients, own the intermodal system nodes. Private companies own railroads and pipelines. Most metropolitan transportation system rolling stock (automobiles) is owned by individuals. All intermodal system rolling stock and aircraft are owned by private corporations.

Given these differences, the intermodal system can be expected to be improved by emerging technology more quickly than the metropolitan system. Government officials tend to move slowly and cautiously when contemplating technological change. Private corporations are more likely to accept some risk if there appears to be a prospect of gaining competitive advantage from technological adaptation.

Finance

The metropolitan transportation system capital plant is financed by taxes, whereas the intermodal system capital plant is financed by retained earnings, stock issues, and money borrowed from banks and other private corporations.

Metropolitan transportation system operating costs are borne by individuals driving automobiles, owners of truck companies, transit users, and taxpayers, whereas intermodal system operating costs are paid for through freight charges and passenger fares.

The overall fiscal conditions of federal, state, and local governments and the political forces determining tax policies influence the ability to finance metropolitan transportation improvements. The financial health of individual firms or sectors, the prevailing conditions in capital markets, and investor confidence are the factors that condition the prospects of financing intermodal system improvements.

Summary

This comparison of how markets, system definition, management, and finance of the metropolitan transportation system differ from the intermodal system dramatizes the obvious. Both systems provide transportation services, but they have little in common (Table 1).

The most telling differences occur because the metropolitan transportation system is dominated by government, whereas the intermodal system is much more responsive to corporate decision making. The metropolitan transportation system is basically a public good managed and financed by government under the premise that it fulfills a fundamental societal need. Political considerations are the driving force, and subsidies are available to fill financial gaps necessary to deliver them. The intermodal system, on the other hand, is a private or economic good managed and financed according to competition for scarce resources (the market for moving freight). Marginal costs are the driving force, and corporate choices are largely determined by these costs.

Although the differences between the two systems need to be illustrated, the physical and operational overlap between them is more critical from

a joint perspective. This overlap is influenced by two separate decision frameworks (government and corporate), yet there is a nexus between them (Figure 1). This nexus does not have to be explained to freight operators. They know all too well that the weak link in their delivery chain is in the metropolitan system. It is in urban America, not the middle of Nevada or most any other state, where trucks dwell at length in congestion.

INTERMODAL PLANNING

The “I” (intermodal) and the “E” (efficiency) of ISTEА and its intermodal planning provisions require federal, state, and regional governments to

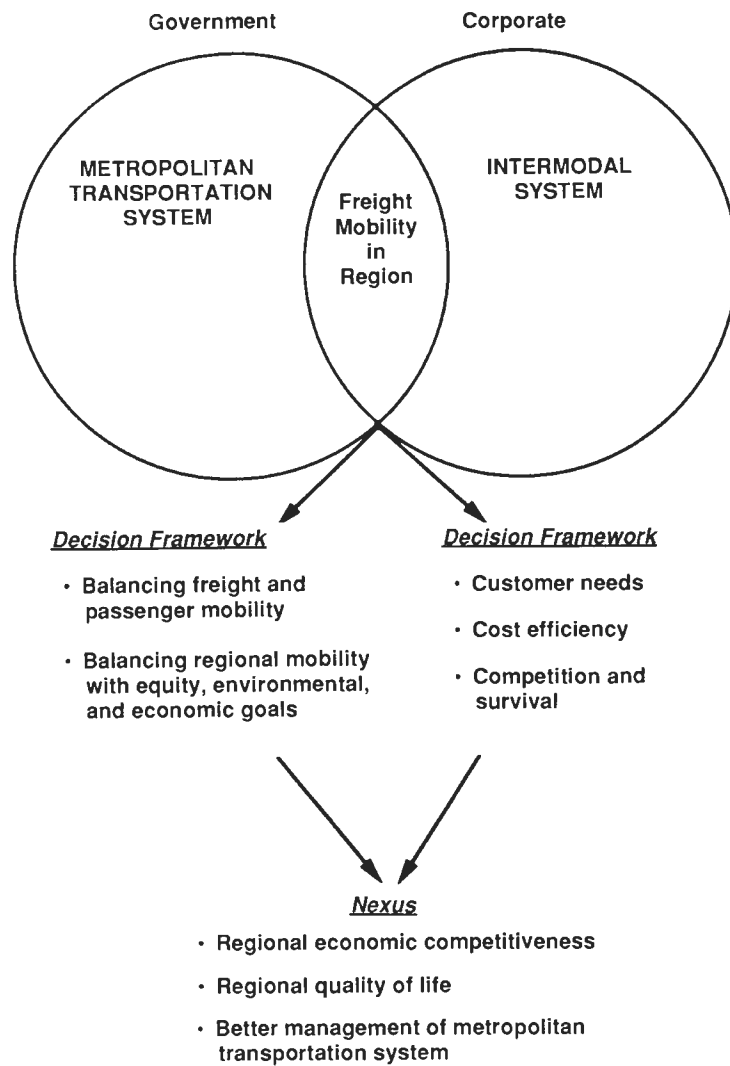


FIGURE 1 Overlap between intermodal and metropolitan transportation systems.

examine the intermodal system more intensely. Whereas government regulatory agencies possessed detailed information concerning critical facets of the operations of regulated carriers before deregulation, the planning divisions of the Federal Highway Administration, Federal Transit Administration, states, and regional agencies today are not so well informed.

Is this a strategic shift in governmental policy—to move from carrier regulation to carrier partnership through the planning process? If so, given the fundamental intermodal system and metropolitan transportation system differences, considerable cross-training will be needed. This cross-training will take many forms. This intermodal planning conference represents a good start: the new partners have convened to identify the critical interaction of intermodal and metropolitan transportation system decisions.

Intermodal management systems, required of all 50 states, provide additional opportunities. This and several other new ISTEA initiatives bring a new level of intensity to state transportation planning.

MPOs are at the center of transportation decisions in metropolitan areas. In the San Francisco Bay Area, a newly formed government partnership of 36 agencies spans the federal, state, regional, and local spectrum. The partnership includes planning and regulatory agencies, and it is multimodal. It is complemented by a Blue Ribbon Advisory Council, which provides for participation by the research, university, business, and environmental communities, as well as citizen activists. The business interests include freight operators who were previously not involved in the process.

If access to the process is provided, then what are the most critical points of access? Members of the corporate community will not participate unless it is clear that metropolitan decisions are relevant to their own decisions. There are many metropolitan decision points. Regional transportation plans and congestion management systems (CMSs) have taken on new importance.

METROPOLITAN PLANNING

It is the direct interaction of ISTEA and the Clean Air Act that makes the regional transportation plan so important now. MPOs are required to demonstrate by an analysis referred to as conformity that transportation and air quality plans are mutually reinforcing. Further, the new regional transportation plan must include only projects that can be financed by reasonably expected revenues. It has been transformed from its previous visionary, but tentative, status to a 20-year budget document. Budgets help to keep decision processes realistic. Whether the intermodal system nodes are advanced or served by metropolitan transportation system investments

over the next 20 years will be signaled first in the next round of regional transportation plan adoptions.

This emphasis on budgets helps to dramatize why the six management systems called for in ISTEA are so important. It has been apparent for many years that the combined transportation budgets are insufficient to pay for expansion to adequately confront congestion in the growing metropolitan areas of the United States. Other limits have become obvious as well, tangibly demonstrated in the form of massive sound walls, for example.

CMSs provide a new way of thinking about how to cope with the current situation. Conceptually, CMSs should be used to identify congestion choke points, determine which ones put the most stress on the system, and compare the potential benefits of capital investment corrections and operational solutions. The metropolitan transportation system is fragmented because it has so many owners, and few incentives exist for them to integrate their services for the benefit of the user. CMSs are tools that can be used to forge some common thinking and action by these many owners. Their use may begin to remedy the institutional defect that undermines ultimate implementation of new technologies advanced by research and development of intelligent vehicle-highway systems (IVHS).

Near-term operational improvements, intermediate selection of the most critical capital investments, and longer term adaptation of IVHS technology to smooth traffic in urban and suburban America all stand to benefit from treating CMSs as the catalysts for rethinking the attack on congestion.

It is ironic that it is recognition of insufficient budgets that involves more players and interests in the transportation planning process because these same players demand further improvements. Perhaps in the long run, this problematic situation, an apparent catch-22, can produce two positive outcomes—a better managed system and a broader base of support for additional transportation resources.

Finally, there are the environmental factors—the clean air standards that must be met and the environmental review process that must be followed. State and federal laws and files full of case law make this a complex and time-consuming part of the transportation delivery system. Never before has the old adage, “If you don’t have time to do it right, when will you have time to do it over?” been so true.

CONCLUSION

Under the categorical funding constraints of the past, the range of project alternatives was often quite limited. As funding flexibility emerges, the

consideration of alternatives in the system and corridor improvement plans will become more relevant. Thus, just as freight carriers were presented an entirely new challenge in moving from a regulated to a freer market, so are planning agencies presented with new challenges in making the choices now available with more flexible funding programs.

Will world class intermodal suppliers benefit from association with their new metropolitan planning partners? Time will tell. At the very least, the cross-training that has started so suddenly and energetically, as a result of the "I" and the "E" of ISTEA, should produce better informed metropolitan transportation system and intermodal system managers. Better information should contribute to improved operation of both systems and stronger support for the resources required to improve mobility and compete in a world market.

Intermodal Partnerships Under ISTEA

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THE INTERMODAL SURFACE Transportation Efficiency Act of 1991 (ISTEA) establishes a new vision for surface transportation in the United States. This vision includes more attention to the intermodal aspects of transportation, including highways and transit, air, water, and rail systems. Additionally, it provides for creation of a new transit planning and research program, including a broad-based cooperative research program; the establishment of several new councils and commissions to further investigate methods for improvement in the areas of surface transportation; increased funding for research and development; and education and training (TRB 1992).

Given the increasing complexity of the intermodal transportation system and the diversity of the partners involved, there is a critical need to build effective working relationships between the providers and the users (customers) of transportation systems. A successful partnership will find ways to improve the efficiency of existing systems and provide input from a broader base for future planning.

Internal partnerships (relationships between transportation-related organizations) and external partnerships (relationships between the organizations and the customer) will be addressed here. The following will be identified:

- Common reasons for a partnership,
- Partnership characteristics,
- Shared commitments,

- Intermodal partners, and
- Possible impediments and resolutions.

COMMON REASONS FOR A PARTNERSHIP

The following are common reasons for establishing partnerships:

- Technological:
 - Rapid technological changes exceed capability,
 - Immediate access to new technology, and
 - Use of excess capacity;
- Managerial:
 - Leveraging of local expertise,
 - Tailoring to local needs,
 - Difficulty of maintaining competitive advantage alone, and
 - Cooperation to maximize synergies;
- Economic and Regulatory:
 - Critical to manage total pipeline,
 - Economies of scale,
 - Use of excess capacity, and
 - Compliance with local laws requiring cooperation; and
- Strategic:
 - Access to otherwise closed markets,
 - Exploitation of partners' unique capabilities,
 - Defense against competitors, and
 - Strategic advantage in an area where one could not be successful alone.

PARTNERSHIP CHARACTERISTICS

Partnership, as defined in the dictionary, is (a) an association of persons who share risk and profits in a business or other joint venture, or (b) someone associated with another in a common undertaking.

The term "partnership" is used to describe a working relationship that reflects a long-term commitment, a sense of mutual cooperation, shared risk and benefits, and other qualities consistent with concepts and theories of participatory decision making (Wilson 1989).

The partnership concept rests on the notion that performance can be significantly improved through joint, mutually dependent action. It has been argued, however, that the "natural" motivation of independent organizations is self-serving and that a necessary condition for moving away

from this focus on self-interest is a belief that the relationship will be long-term (Axelrod 1984).

Other researchers note a distinction between a “transactional-style” relationship and a “partnership-style” relationship. The traditional, transactional-style relationship is one in which rules are well specified and failure to deliver on commitments by either party may be resolved through litigation. In contrast, the requirements of a partnership-style relationship include risk sharing, the need to view the relationship as a series of exchanges without a definite endpoint, and the need to establish a range of mechanisms to monitor and execute the operations of the partnership (Gardner and Cooper 1988, 15–31).

Two dimensions of partnership-style relationships are partnership in context and partnership in action. Partnership in context is defined as the degree to which the partners believe that the partnership will be sustained over time. This dimension includes the key factors that establish the participants’ belief in the longevity, stability, and interdependence of the relationship. Partnership in action is defined as the ability of the partners to influence policies and decisions that affect the operational performance of the partnership. This dimension involves the key factors that create the day-to-day working relationship (Henderson 1990).

Partnership In Context

The first major determinant of a partnership in context is the need for mutual benefits, benefits that would not be achieved through independent action. Effective partnerships require explicit articulation and agreement on the benefits accrued by each member of the partnership. One possible benefit would be the improved use of available capital or funding. A second benefit would be process improvement and the ability of the partnerships to pool expertise and knowledge of products and processes in a way that fosters innovation and, ultimately, enables the partners to develop these innovations into products or services. Current systems can be made more efficient while partners plan more adequately for the future. A third type of benefit is risk sharing. The partnership enables each organization to pool risk (e.g., expansion and new development), resulting in an increased willingness to take risk. A fourth benefit is the ability to create a positive working environment. This benefit, although clearly intangible, reduces the level of conflict between the partners and improves productivity and innovation.

The second major determinant of a partnership in context is commitment. Commitment among the members of the partnership is a major

contributor to the belief that the relationship will be sustained (see also section on shared commitments).

The third major determinant of a partnership in context is predisposition, an existing attitude in favor of the partnership. Two indicators of predisposition are (a) trust and (b) existing attitudes and assumptions.

The ability to sustain the partnership ultimately translates into a sense of trust among members of the partnership. The concept of trust is built on (a) the existence of an explicit track record with members of the partnership and (b) personal relationships. Building trust requires partners to allow their failures to surface and to highlight the commitments achieved. Trust is built by creating open communication between members of the partnership. Emphasis is on the need to develop personal relationships at all levels of the organization; people in the partnership organizations must have the ability to bypass the organization and go directly to someone who will listen and act.

The second indicator of predisposition is the existing attitudes and assumptions of the partnership members. For example, decision makers at Sea-Land Service, Inc., a company recognized as an innovator of containerization and intermodal transportation, for many years believed that working alone with dedicated assets (ships, containers, chassis, terminals, etc.) was the way to maintain a competitive advantage in the marketplace.

As containerization matured, those competitive advantages eroded as competitors acquired or developed similar assets and infrastructures and implemented competitive marketing strategies. Soon to follow were the pressure on earnings and the need to produce reasonable rates of return (ROIC) for shareholders.

During the last decade, the operating philosophy at Sea-Land evolved from one of being driven by the market, the competition, and cost to one of an obsession for the customer. This new philosophy required a radical change in corporate culture and the implementation of a total quality management process.

Evolving along with this new philosophy was a strategy to maximize earnings and achieve acceptable ROIC levels for shareholders. Concepts such as strategic partnerships with competitors (which for years were unthinkable) emerged, and, moreover, were developed and implemented.

Following are three examples of partnerships that were developed. First, in 1988, Sea-Land developed a partnership with Trans Freight Lines, Nedlloyd, and, eventually, Spanish Lines to share vessel space and terminal facilities in the trans-Atlantic trade route, which was then regarded as a mature market with excess capacity. Later, the partnership rationalized containers and chassis worldwide. Second, in 1991, Sea-Land entered into a partnership in the trans-Pacific trade routes and inter-Asia with Maersk

Lines of Denmark. This partnership was focused on customer benefits, including improved vessel schedules, enhanced frequency, superior transit times, and rationalization of terminals. Third, in 1992, Sea-Land announced the out-sourcing of certain information technology systems functions, including data center and network operations, through a partnership with CSX Technology (a sister company). The partnership enables the companies to leverage their mutual capabilities, use existing hardware more efficiently, enhance the key process significantly, and reduce operating costs. The rationalization of computer and human resources will improve access to new technologies and provide additional capacity to support growth.

Partnerships In Action

One of the critical factors for effective execution of a partnership in action is the extent of knowledge shared between members of the partnership. An in-depth understanding of key roles is vital to an effective working partnership. Also of importance is the shared knowledge of the environment, the culture, and the work process.

The second factor, and a natural extension of shared knowledge, is shared values—the key principles, visions, or both that are common to the partners. Clear goals and a set of values can be found in almost all companies or organizations in the private sector. Examples of both are a passion for the customer [emphasizing customer service instead of being driven by internal factors or market share (volume)] and a focus on quality (meeting customer requirements and striving for constant improvement). If an organization is not customer-focused, it may be forced to serve only small, specialized segments of the market.

The third factor for a partnership in action is mutual dependency on distinctive competencies and resources. It is difficult to develop a partnership if one partner has an advantage in all areas of a critical part of the business. This may include market knowledge, management skills, experience, and product attributes as types of resources to which that partner could lay sole, or near total, claim.

A relationship combining the synergy of unique strengths will have the highest degree of success. Do not enter into a partnership to correct a weakness, but to accentuate the unique strengths of the partners. In most cases, partners do not have the ability or the desire to acquire the unique strengths of the other partners.

A partnership between the private and public sector can be successful, provided it is driven by the customer (end user). The customer, in either case, demands improved quality and additional value-added services,

which provide a common link between the intermodal players identified in ISTEA. The perceived synergy can be developed, implemented, and managed through a mutually agreed on total quality management system. The key to this partnership should be the need to influence key decisions and policies and the belief that the partnership will be long-term.

The fourth factor for a partnership in action is organizational links. There are three types of links: physical process integration, information integration, and social networks.

Physical process integration is the intertwining of the actions and activities of the organizations. This could refer to the joint use of a partner's facilities or employees to establish and manage the quality process across organizational lines. Information integration is essential to the success of any partnership. This link brings together the critical skills, the experience, and the assets necessary to manage data across the various organizations. Finally, social networks, or personal relationships, are a major mechanism for creating organizational links. These relationships must be developed at all levels of the organization, and the relationships must be reflected in the actual business processes that are critical to the partnership (Henderson 1990).

Actions To Build and Sustain Partnerships

Education

Specific actions must be taken to educate the members of the partnership, including the provision of skills transfer and training, general education that spans the partnership, and social and cultural training.

In ISTEA, the newly required planning responsibility for the metropolitan planning organizations (MPOs) and states, combined with the emphasis on efficiency, will necessitate the gathering of intermodal data and information available in the private sector. The private sector, being accustomed to operating within budget limitations and in a global competitive environment, can provide valuable intermodal data, information, and examples of current best practices to the public sector.

Joint Planning

The second major set is joint planning, which involves more than the exchange of planning-related information. It is an ongoing, iterative process that reflects both strategic thinking and the translation of that strategy into action plans. This process is a multilevel commitment and involves the key members of an organization who will be working together. This process is ongoing and iterative, includes negotiating mutual benefits and setting common goals, and provides education.

Measurement and Control

A third major action centers on identifying and creating appropriate measures to monitor activities and evaluate performance. The monitoring and evaluation process is jointly designed and implemented, uses effective bench-marking (focus on best practices), and provides operational and performance data.

The organizations, through the design of a joint control system, provide a mechanism for enabling process integration. The first step is to design a compatible incentive system to reflect joint commitment. Second is the need to establish bench marks during the initial stages of partnership development. Bench marks are a key element in many strategies for implementing quality control and continuous improvement processes. It has been noted that the trust in a partnership is directly related to the success of the partnership.

Effective Use of Teams

The fourth major area is the effective use of cross-functional teams. Cross-functional teams provide three significant contributions to effective partnerships: coordination of diverse knowledge, creation of social networks, and creation of stability.

ISTEA's requirement for MPOs, states, and other government agencies to work together in the development of intermodal plans and management systems appears to be a natural fit for this type of partnership. First, the ability to effectively intertwine and create links between the partnership organizations requires multiple disciplines and extensive knowledge of the organizational processes. Cross-functional teams provide a means to access and coordinate this diverse knowledge. The second major contribution of cross-functional teams is social networks. These networks must span both functional areas and the hierarchy in the organizations. They provide the ability to network quickly. The third major contribution of cross-functional teams is stability. Stability is critical for partners to achieve the goals of the partnership; through this stability, or continuity, partners must be able to build and sustain personal working relationships while developing an organizational memory.

Multilevel Human Resource Strategy

Partnerships must be established at many levels of the partner organizations. To ensure full assimilation of partnerships, they must be integrated horizontally and vertically within the organizations. Careful selection and assignment of key personnel are vital to successful working partnerships.

Strategic partnerships are fairly easy to form and sustain at the senior management level of organizations. However, establishing effective partnerships among mid-level players across organizations or across functions presents a challenge. This challenge is caused primarily by the level, or lack, of communication and clear understanding down through the organization of the shared values and commitment made by the senior management. Roger Smith, a former chief executive officer of General Motors said, "I wish I'd done a better job of communicating with GM people. Then they would have known why I was tearing the place up. . . . There we were, charging up the hill right on schedule and I looked behind me and saw that many people were still at the bottom trying to decide whether to come along."

Technology

Finally, a key action is the use of information and communication technology necessary for building and sustaining partnerships. Use of this technology is an asset to partnerships and provides a mechanism for interorganizational exchange. The cost of coordination for partnerships is high. Information technology holds the potential to reduce costs significantly. It is also viewed as a key element in supporting joint planning processes and increasing the effectiveness and efficiency of teamwork (Henderson 1990).

SHARED COMMITMENTS

Adopting the concept of strategic alliances and partnerships requires a high level of commitment from senior management because the transition may involve difficult decisions.

The first shared commitment should be in the partners' leadership and culture. ". . . leaders create cultures, but cultures, in turn, create their next generation of leaders. The unique and essential function of leadership is the manipulation of culture . . . to ensure the health and survival of the group" (Schein 1985).

Second, common goal structures can sustain a partnership when expected benefits are not realized. Further, shared goals provide a common ground for negotiating solutions in cases in which divergent goals cause conflict. Placing the user (stakeholder) at the center of a true systems philosophy (Camph 1992) should be the basis of the goal structure.

Third, and closely related to shared goals, are incentive systems that reinforce the goal structure of the partnership and require focus on quality instead of volume as a measure of effectiveness.

The fourth concept is the establishment of contracts. Although contracts play an important role in a partnership, they provide only a general sense of the partnership responsibilities. Contracts are often ineffective as an enforcement mechanism. However, negotiating a contract helps to clarify expected benefits and identify shared goals (Henderson 1990).

The fifth concept is that of personal commitments. Implementing and maintaining a successful quality program or partnership depends greatly on the willingness and ability of each and every person within the organization (especially senior managers) to “walk the talk.” This phrase simply means that one’s behavior should consistently exemplify what one espouses.

INTERMODAL PARTNERS

ISTEA refers to the “intermodal aspect of transportation” as including highways, transit, air, water, and rail systems (Galis 1992). Based on that broad-based definition, the intermodal partners would include, but are not limited to the following:

- Federal Highway Administration;
- Federal Railroad Administration;
- Maritime Administration;
- Federal Transit Administration;
- Federal Aviation Administration;
- State departments of transportation and other state transportation agencies;
- U.S. Department of Defense Transportation Command;
- MPOs:
 - Transit agencies,
 - Cities,
 - Counties,
 - Seaports, and
 - Airports;
- Service providers;
- Subsystem operators; and
- Representatives of stakeholders:
 - Shippers,
 - Receivers,
 - Freight and passenger carriers,
 - Private and public employers, and
 - The environmental community.

POSSIBLE IMPEDIMENTS AND RESOLUTIONS

Impediments

With the diverse representation of the potential intermodal players, impediments are certain to be numerous among the groups (e.g., public/private, private/private, and state/local/federal). Some of the most common, broad-based impediments may be the following:

- Failure to anticipate the magnitude of the institutional barriers, including access to proprietary information (Camp 1992);
- Regulatory restrictions;
- Lack of capital or funding;
- Lack of commitment (implementation and the concept of “walk the talk”);
- Allowing expectations to exceed reality;
- Geographical scope; and
- Time.

Resolutions

It would be difficult to anticipate every type of impediment that might arise among the potential players. However, if the participants can agree to a set of shared values (openness, candor, mutual respect, trust, risk taking, etc.) and a process with which to conduct themselves, progress toward the objectives set forth in ISTEA can be accomplished. Partnership relationships are not always appropriate. The critical thing is to understand the characteristics of a current relationship and have the capacity to change it.

Conclusions derived from premature assumptions, without the benefit of a total quality management process (including education and cross-training), may ignore the real requirements of the customer and, as a consequence, fail to identify the real impediments. The partners must insist that the process be allowed to work, and some form of problem-solving technique must be used to address each impediment. For example, the following is the problem-solving process used at Sea-Land Service:

1. Problem definition: gap between standards and actual performance;
2. Possible causes: possible reasons for the gap;
3. Most likely causes: root causes of the problem;
4. Possible solutions: how to eliminate the root causes;
5. Evaluation: how to know if the solution worked; and
6. Follow-up: how to maintain the level of improvement.

CONCLUSION

The do's and do not's of strategic partnerships have been outlined here. The author related what has worked successfully in the private sector to his knowledge and understanding of ISTE A and the processes of respective governmental agencies. By contrast, it is likely that the public sector has had limited orientation and understands little of what works in the private sector. ISTE A provides both the funding and a vehicle for the best and most modern transportation system in the world. It is hoped that this conference becomes a linchpin for that success.

ACKNOWLEDGMENT

The concepts presented here were based largely on the research and writings of others.

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Developing Partnerships

JACK D. HELTON

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The presentation by Jack D. Helton on intermodal partnerships prompted a number of conference participants to ask how the guidelines he presented should be followed and how the private partnerships he discussed were developed. These questions are answered in this paper, which was not presented at the conference.

IN THE PAPER ON intermodal partnerships, the following were examined: common reasons for a partnership, partnership characteristics, shared commitments, intermodal partners, and possible impediments and resolutions.

A sixth topic, and the subject of this paper, is the process of developing partnerships. Sea-Land Service has been successful in cultivating intermodal partnerships for several years. These partnerships have made a marked contribution to corporate market position, productivity, efficiency, and earnings. Developing partnerships involves the following: culture (predisposition), vision, strategy, and commitment. The examples provided here are from the experience of Sea-Land Service because they are the most familiar to the author.

CULTURE

Definitions and publications about culture are both varied and many. Here, "culture" means that the behavior of the members of an organization can and should be measured against the beliefs they espouse.

For successful partnerships to be developed, certain characteristics or values must exist within an organization:

- Competitiveness;
- Profit and loss concept;
- Focus on meeting requirements of customers;

- Passion for quality; and
- Desire to perform better and become more efficient.

These characteristics are some of the pre-existing qualities found among those who drive partnerships.

Although Sea-Land Service has always been competitive, shareholder interests act as a counterweight to ensure that this competitive market position is not accomplished at any cost. Every associate at the company is well-versed in concepts of profit and loss and which economic levers provide the sought-after return on invested capital. Equally applicable on a much larger scale is the need to be competitive with other countries, not just with everyday competitors.

Sea-Land Service measures almost everything it does against requirements polled from its customers. Moreover, business decisions and investments are tailored to meet customers' requirements as well. People or organizations who drive partnerships must not only have a passion for quality, but they must also be devoted to providing a quality product or service to their customers. Those not sharing this belief will likely stay with "the pack," and if fortunate, suffer under the status quo.

Finally, the desire to improve or increase efficiency, even in good times, is an essential ingredient of culture in developing partnerships. Members or organizational units must routinely look for alternative ways to accomplish requirements toward one or more objectives.

VISION

Vision is fundamental to developing a partnership. Potential partners must be able to see beyond the present and envision the future. The organizational culture must encourage risk taking and embrace the concept that no idea is a bad idea.

In every partnership, regardless of scope, Sea-Land has invariably proceeded with a vision of the end objective and a quest for alternative options to fulfill that vision. These two concepts are fundamental to partnership development. Vision includes identifying the requirements of customers and measuring against the following common reasons for a partnership: technical, managerial, economic and regulatory, and strategic.

A final consideration is to identify all potential partners and carefully assess their respective shared risks and benefits. Potential partners may not reciprocate the desire or need for partnering. A partnership should not be created for the wrong reasons, for example, to correct a weakness.

STRATEGY

The following elements are necessary for developing a strategy for attracting potential partners: (a) determining the need for partnership, (b) identifying the potential or eligible partners, and (c) establishing the goals of the partnership.

COMMITMENT

The start-up period of a partnership can consume a lot of time, depending on how many potential partners are involved. Moreover, it requires a lot of time and a tremendous amount of commitment from the leaders of the organization to move successfully through this period. Commitment usually takes the form of patience (i.e., staying power), but may also be manifest as the requirement of considerable financial resources for presentations, travel, and related expenses. Commitment cannot be taken lightly.

The start-up period usually begins with a series of meetings and presentations to determine the potential results of various strategies or actions. A tremendous amount of education of the proposed partners is required to develop the essential shared values (vision).

From 6 to 24 months, with the norm being about 18 months, is usually required to obtain consensus among the partners and formalize the partnership.

Perspectives on the Conference

AT THE CONCLUSION of this conference, three participants were asked to reflect on the presentations and discussions of the three-day conference. Each individual represents a group that is critical to the success of intermodal planning and the partnership that must be developed to make it work.

STATE DEPARTMENTS OF TRANSPORTATION

GLORIA JEFF

Michigan Department of Transportation

As the last in a series of Transportation Research Board conferences addressing the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and its impact comes to a close, transportation planners are at the beginning of a journey to discover an unknown quantity—the role of transportation in the 21st century. At the first conference, Moving Urban America, held in May 1992 in Charlotte, North Carolina, urban areas and possible implications of ISTEA for these areas were examined (TRB 1993a). At the Conference on Transportation Planning, Programming, and Finance, held in July 1992 in Seattle, Washington, participants examined multimodal planning and programming and how to address the challenges of ISTEA for transportation planning (TRB 1993b). The focus at this conference on intermodal planning was the intermodal system. Participants at this conference included not just the planners and the public

owners and operators of transport systems but also private owners and operators of transport systems, private providers of transport services, and those who are affected by the performance of the transportation system. Many participants at this conference represent minority communities that are affected by the quality of the transport system and whether it contributes to residents' quality of life and provides opportunities for community participation.

At this conference, participants had an opportunity to discuss the transportation system as a whole. Planners have traditionally dealt with it in pieces, but now they must address the entire intermodal system. Such a system includes more than just the connection points; it also includes system-level choices that provide opportunities for partnerships and cooperation to improve the overall performance of the transport system. This performance must be considered in today's world as a response to market forces, but also as a means of implementing long-term public policy in the future.

This conference also provided an opportunity for participants to better understand intermodal management systems. Ever since the passage of ISTEA, I have wondered what an intermodal management system is. What is it that we are supposed to do? What is the system? How does it work? This conference has given state departments of transportation an excellent point of departure for developing intermodal management systems, the vision of what an intermodal management system might be, what directions we need to take to explore what the best practice is today, and what the best practice should be tomorrow.

Transportation professionals have begun to wrestle with the difficult question of cross-modal evaluation, not trade-offs, but how we make modes work together and integrate them effectively. We have found that the fundamental thing we need to do is educate ourselves, both in the public and private sectors, as well as those who are involved in the decision-making process and those who are affected by it. We need to recognize that education is not achieved by having transportation professionals talk to one another using traditional jargon, but requires the provision of fundamental information on the importance of intermodal transportation to our communities, states, and the country. Sending a package from Indianapolis to a small town and transporting passengers from one city to another are concepts that the public can understand, as opposed to the number of links, the connections, and the seamless transport system over which this travel must occur.

The definitions of partnerships and the work that goes into developing a strong foundation for effective partnerships are important because new partners must be involved in transportation planning and decision making.

We have never before discussed what it takes to create an effective partnership. This conference has provided definitions with which we can work. A declaration by Congress that we will have new partners is not sufficient to create them. Instead, in this new environment of intermodal planning, we need to form relationships that lead to partnerships that are mutually agreed on, involve risk sharing, and benefit all the partners in the process.

We have begun the journey and have no clear path before us. This conference, however, has provided the tools we will need as we move toward that undiscovered future.

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METROPOLITAN PLANNING ORGANIZATIONS

LAWRENCE D. DAHMS

Metropolitan Transportation Commission, Oakland, California

This conference has been a learning experience. One of the most important benefits of a conference such as this is the formal and informal discussion that occurs among the participants.

During the first panel session in which I participated, we were attempting to define “intermodal” and “multimodal,” and one of the panelists asked, “Doesn’t ‘multimodal’ mean ‘partnership?’” That question has stayed with me throughout the conference, and I think the answer is yes. “Multimodal,” “intermodal,” and the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) mean “partnership.” Partnership becomes the important word that describes the essence of this conference. Any word may be overused and made trite, but I think that if partnerships are not elevated to a new level of effectiveness, ISTEA will be unfulfilled.

Partnership probably means a change in the corporate culture in the broadest sense of the word. I believe that the presentation on intermodal partnerships by Jack Helton of Sea-Land Service was the most important

of the conference because of his excellent discussion of what makes a partnership work. Especially in the area of commitment, his thoughts are most significant. Particularly noteworthy was the phrase, "walk the talk." It is a new phrase to me, something akin to "business not as usual." To Helton, it is more of a commitment to change.

Helton also talked a great deal about trust and what it means. One of the most important aspects of trust is open communication. He made the point that partnerships are a lot easier to develop at the top level of an organization, but the real challenge is communicating the common goal and common understanding of the purpose down through the organization. According to Helton, working partners must have the ability to bypass the organization and go directly to someone who will listen and act. How true. Isn't this something we run into every day?

I recently spoke with a state department of transportation (DOT) official from an eastern state. She told me that they were attempting to use the San Francisco model of intermodal planning in her state. One problem for the state is that the people participating in the planning process were senior DOT officials. They were so concerned about the need to demonstrate a successful planning process that they had to know the outcome before they would become involved in the process. They did not trust the process to serve them, so they were unwilling to accept it as objective. They were concerned about preserving their political advocacy.

The partnership and corporate culture must transcend the whole organization. A dynamic partnership must be able to reach into the organization at the appropriate place in order to accomplish something.

I take away from this conference two action agendas. The Metropolitan Transportation Commission is known as having one of the better partnerships between the private and public sectors in the United States. We have talked a lot about our process at this conference. However, the list of what makes an effective partnership that was established at this conference makes me want to reexamine the partnership and whether it contains the essential ingredients. If not, areas that need to be shored up must be identified because the partnership has to work. This conference has provided a lot of insight on what might be done to form effective partnerships.

The second action agenda is one that I hope I share with some other conference participants. The question was raised yesterday, and I would like to raise it again today, whether an ad hoc nucleus of participants at this conference could operate on a national level to define the nexus of potential partners' common interests. This group could help the relationships that are tentatively forming here to develop into productive partnerships. I hope that some people here would be interested in exploring this idea.

THE PRIVATE SECTOR

M. JOHN VICKERMAN

Vickerman · Zachary · Miller

My view as a representative of the private industry is that of a consultant. However, I believe that there are some important common agreements that characterize the private industry among participants at this conference. I would like to share some of the positives and some of the apprehension. Many of the private-sector representatives here are happy to participate in the planning process and are not only happy but also enthusiastic and energetic in wanting to participate proactively.

I had the opportunity at this conference to talk with some private-sector representatives. Almost all of them told me that it is the desire of representatives of private industry to contribute, communicate, and assist in what they perceive to be "business not as usual." It is their desire to participate and to add value in an arena where there is a new vision. I believe that it is opportunity, vision, and potential that are drawing private industry to the process, to fully participate and to contribute.

However, I do want to share with you a sense of concern. Private industry is in an ever-changing world that is changing so fast that it is becoming virtually impossible to keep abreast of all the technological systems, logistics, and policy issues that relate to being a viable participant.

A good example of this rapid change occurred less than 7 years ago. Up to that time, double-stack trains had not been in use. In 1985, the first double-stack train traveled from the West Coast to Chicago, and less than 5 years later, more than 114 train sets departed weekly. Today, more than 190 train sets depart weekly. Not only must those in private industry foresee and anticipate these kinds of changes and deal with them on a daily basis, but they must also understand the strategic investment implications of these decisions that could last 40 or 50 years. That is a scary venture to participate in.

The promise of the Intermodal Surface Transportation Efficiency Act of 1991 and the promise of participation in transportation planning is the ability to help foresee, mold, and create a future that is more rational and that helps create a sense of structure in what I believe private industry representatives would say is an absolutely chaotic, and in many instances extremely volatile, environment. Those in private industry believe that what is known today will be different tomorrow. It will change, and change dramatically.

It is the hope of those in private industry that this conference is not simply a regulatory response to a piece of legislation. If it is just rhetoric or

if it is just words that are not taken to heart and energized by means of a system of partnerships, I believe that the private sector will become disenchanting with the system. The objective of the partnership is to keep these partners participating constructively in creating the future. Many believe that what is beginning today is not rhetoric, not just a regulatory response, but a systematic way of looking at improving the system. If this is true, then I believe there will be more participation from private industry, with a greater and greater capability to solve the major concerns facing the nation.

I want to conclude with support of the partnership. I believe that many private organizations today find themselves in a shrinking marketplace and that the marketplace becomes more global every day and more focused on the ability to deal in a worldwide system. Transportation planners must recognize competitiveness on a global scale and how each connection point relates to this concern. In large part, having this as an axiom will allow the United States, the private sector as well as the public sector, to flourish and maintain its quality of life and culture.

The private sector representatives enthusiastically believe it is part of their mandate to participate, with the caveat that solutions will be developed that will help the entire transportation system. I hope that there is a sense of urgency, a sense of continued participation, and a sense of examining near-term as well as long-term issues so that this conference does not become simply a response to a piece of legislation.

Steering Committee Biographical Information

C. Michael Walton, *Chairman*, is the Paul D. and Betty Robertson Meek Centennial Professor and Chairman of the Department of Civil Engineering at the University of Texas, Austin. He received his B.S. in civil engineering from the Virginia Military Institute and his M.C.E. and Ph.D. in civil engineering–transportation from North Carolina State University. He has held a variety of positions, including the Bess Harris Jones Centennial Professor of Natural Resource Policy Studies at the University of Texas, Senior Partner of WHM Transportation Engineering Consultants, Inc., Transportation Planning Engineer at the North Carolina State Highway Commission, Transportation Economist in the Office of the Secretary of the U.S. Department of Transportation, and Policy Consultant for the Heavy Vehicle Electronic License Plate Program. He serves on and is Past Chairman (1991) of the Transportation Research Board (TRB) Executive Committee, and he serves on the Technical Committee on Commercial Vehicle Operations of the Intelligent Vehicle-Highway Society of America (IVHS America). Dr. Walton is also involved in the Institute of Transportation Engineers (ITE), the Operations Research Society of America, the Urban Land Institute, the Society of American Military Engineers, the Council of University Transportation Centers, and the National Society of Professional Engineers. He was awarded the James Laurie Prize in 1992, the Harland Bartholomew Award in 1987, and the Frank M. Masters Transportation Engineering Award in 1987. In 1993 he was elected to the National Academy of Engineering.

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Albert C. Eisenberg is Senior Director for Federal Legislative Affairs for the American Institute of Architects in Washington, D.C. He received his B.A. in history from the University of Richmond and his M.A. in education from the Hampton Institute. He previously served as Legislative Assistant to U.S. Senator Harrison A. Williams, Jr., and as Staff Director for the U.S. Senate Subcommittee on Housing and Urban Affairs. Other activities include service on the County Board of Arlington, Virginia; the Virginia Housing Development Authority; the Washington Metropolitan Council of Governments, including chairmanship of its Metropolitan Development Policy and Public Safety Policy committees; the Northern Virginia Housing Coalition; the Northern Virginia Transportation Commission; and the Council of Governments Partnership for Regional Excellence.

Thomas L. Hardeman is a United Parcel Service (UPS) corporate Vice President. He is responsible for managing the firm's state government affairs throughout the United States and for its congressional contact activity. Mr. Hardeman has had more than 30 years of experience at UPS and has managed all phases of the company's operations. He served as District Manager in a number of states before joining the public affairs office in 1984. He is Chairman of the Advisory Board of the Commercial Vehicle Safety Alliance, an association of federal, state, and private-sector organizations devoted to safety. He serves on the board of the Professional Truck Driver Institute of America, an organization dedicated to improved highway safety through effective driver training and operator certification, and on the boards of a number of associations related to the transportation industry and public policy activities. In addition, Mr. Hardeman is Chairman of the Board of Sonscape, an organization committed to the mental, spiritual, and physical recreation of ministers of all faiths.

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Lester A. Hoel is the Hamilton Professor of Civil Engineering at the University of Virginia in Charlottesville. He served as Chairman of the department from 1974 through 1989. He earned a bachelor's degree in civil engineering from the City College of New York, a master's degree in civil engineering from the Brooklyn Polytechnic Institute, and a doctorate in engineering from the University of California, Berkeley. He previously taught at Carnegie-Mellon and San Diego State universities and was Principal Engineer at Wilbur Smith and Associates. He also was a Fulbright Research Scholar and Visiting Professor at the Norwegian Technical University Institute of Road and Railway Engineering. Dr. Hoel has written more than 100 publications in the field of highway and urban transportation systems. He is coeditor of the book *Public Transportation* and coauthor of the textbook *Traffic and Highway Engineering*. He is a Past Chairman of the TRB Executive Committee and is the recipient of the American Society of Civil Engineers (ASCE) Huber Research Prize, the Highway Users Federation Stanley Gustafson Leadership Award, the Frank Masters Transportation Engineering Award, and the TRB Pyke Johnson and W.N. Carey, Jr., awards. He was elected to the National Academy of Engineering in 1989. Dr. Hoel is a Fellow of the Urban Land Institute and of ASCE, and he has served as President of the Council of University Transportation Centers.

Michael P. Huerta, former Executive Director of the Port of San Francisco, was recently appointed Associate Deputy Secretary and Director of Intermodalism of the U.S. Department of Transportation. He received his B.A. in political science from the University of California and his M.P.A. in international relations and policy analysis from the Woodrow Wilson School of Public and International Affairs at Princeton University. In 1980 he joined Coopers & Lybrand and served first as a consultant for International Trade Services and then as Project Advisor for the Project Development Assistant Program—West Indies. From 1986 to 1989, he served as Commissioner of the City of New York's Department of Ports, International Trade and Commerce.

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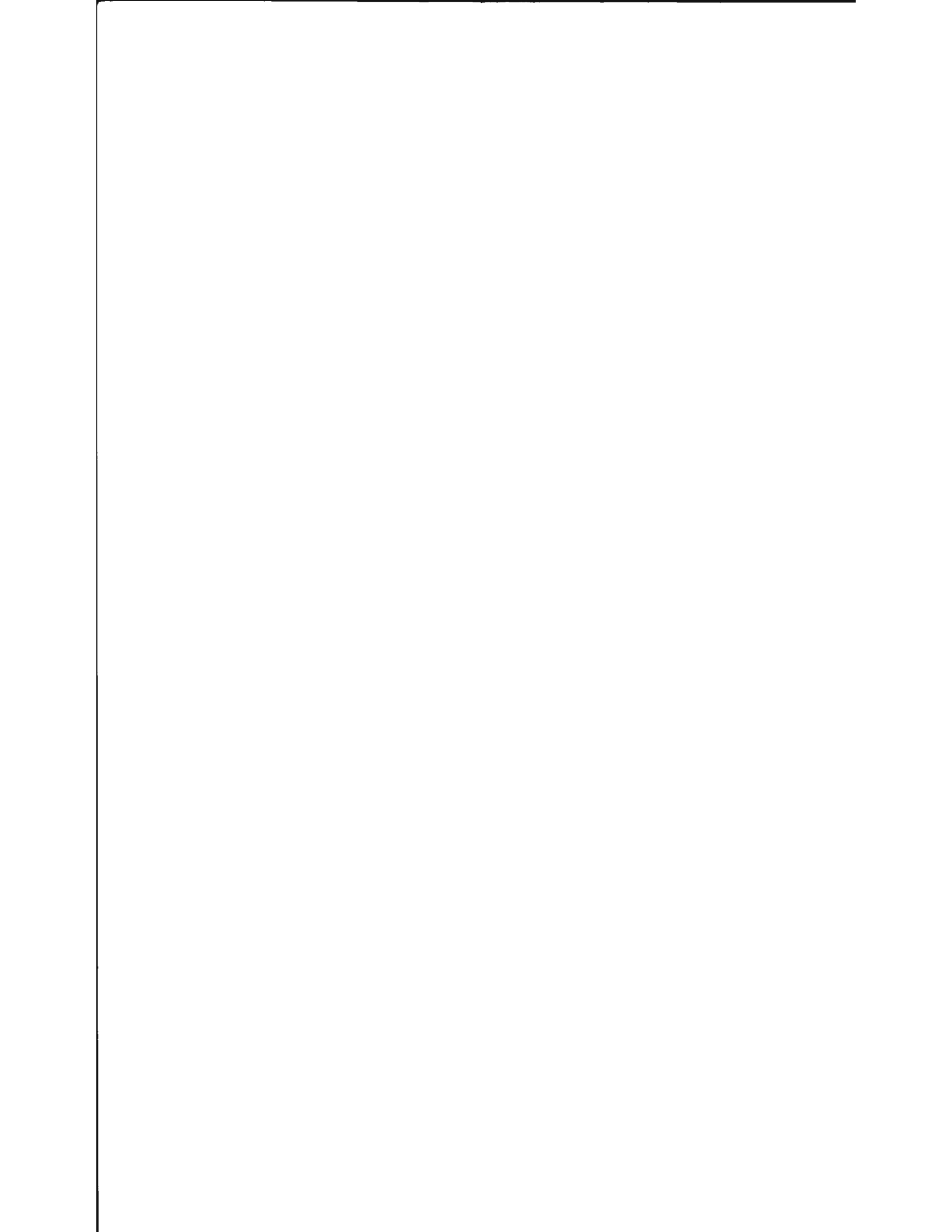
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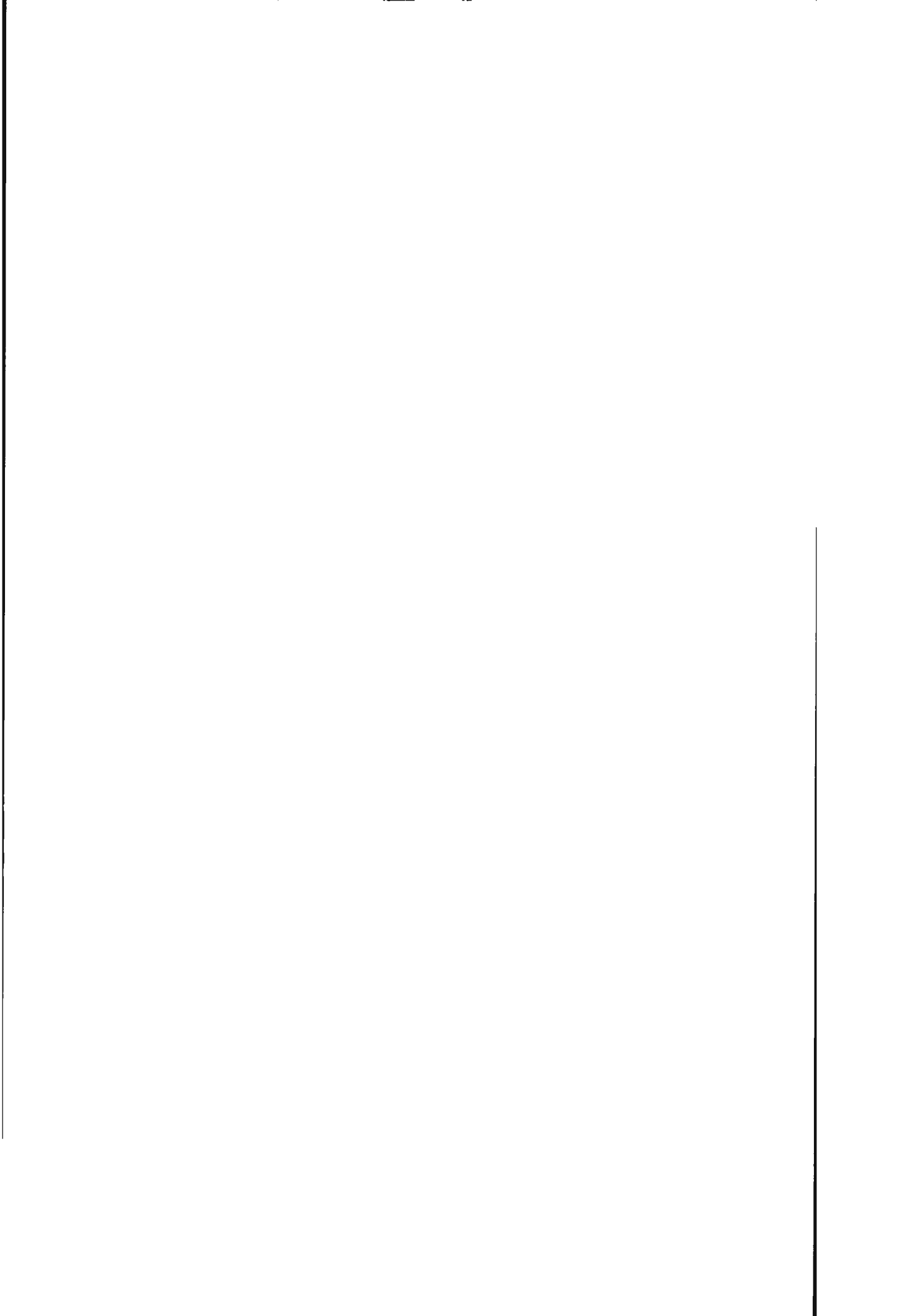
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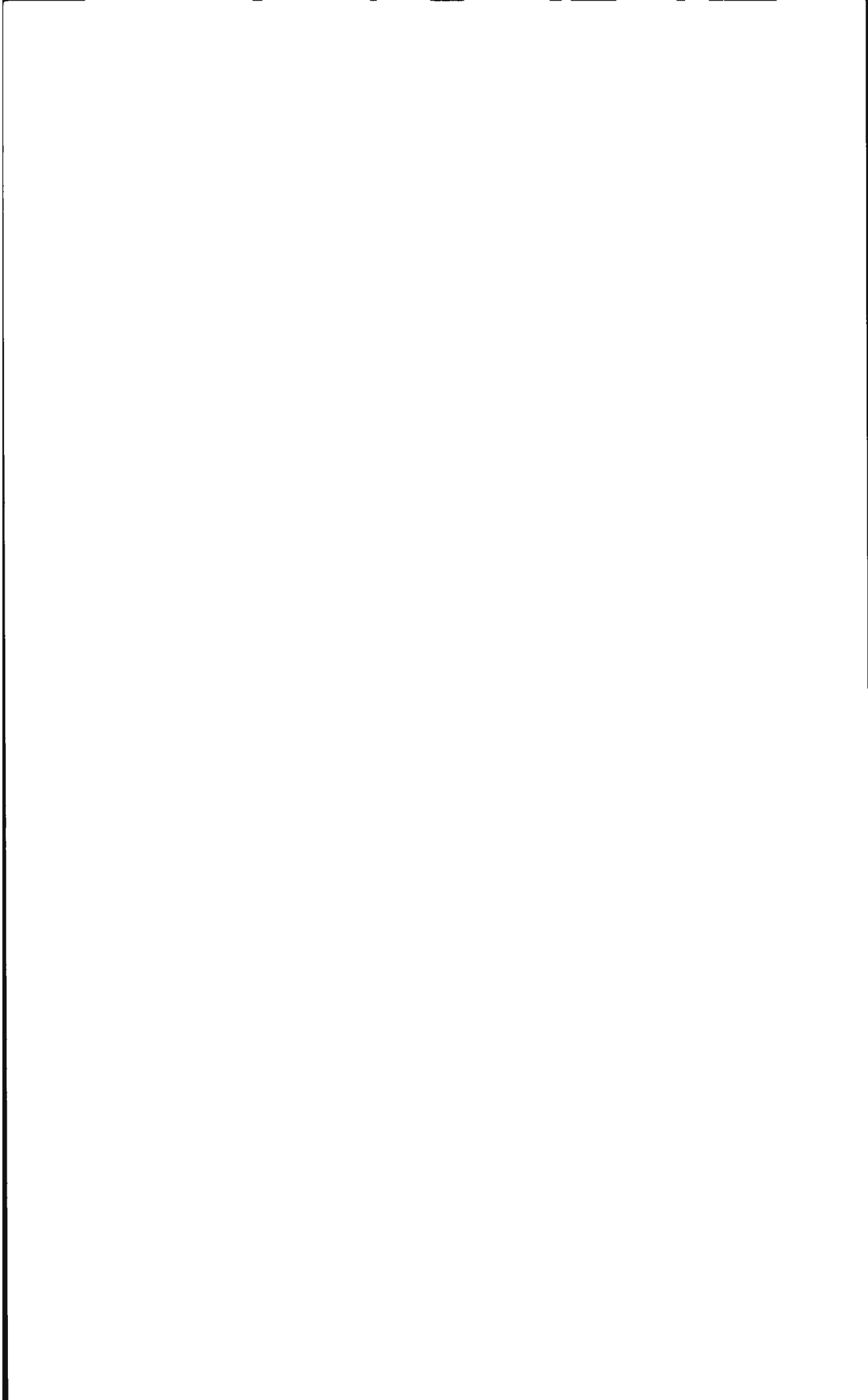
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