

## CONFERENCE I KEYNOTE ADDRESS

# Refocusing Transportation Planning for the 21st Century

---

Michael D. Meyer, *Georgia Institute of Technology*

*The world moves into the future as a result of decisions not as a result of plans.*

—Kenneth Boulding

The primary purpose of transportation planning, at its most fundamental level, is to provide information to those responsible for improving the transportation system and ultimately to benefit society as a whole. For the past 40 years, transportation planning has changed in process and substance to reflect the different issues and concerns that have risen to the top of federal, state, and local policy agendas. This evolution has reflected a broadening perspective on what constitutes a transportation system (e.g., modal, multimodal, and intermodal definitions); the types of actions that should be taken to “solve” our problems (e.g., capacity expansion, system management, demand management, and the application of advanced technologies); and an expanding definition of benefit measurement (e.g., quantitative system measures, societal costs, and sustainable development).

The federal government has played an important catalytic role in introducing new perspectives into the decision-making process. State and local policy concerns have also found their way into planning norms. Concern for environmental and social impacts, a desire for more equitable funding distribution among modes of transportation (i.e., substitutability), and the promotion of a more open and involved planning process were state and local policy issues that eventually became codified in federal regulations. The most tumultuous period of such questioning of the transportation planning process is described in a report by Gakenheimer (1). This paper

examines the future context of transportation planning and suggests areas in which today’s transportation planning must change to reflect tomorrow’s exigencies. The basic point of departure for this paper is that the transportation planning process, to be relevant to future decisions, must reflect the changing demographic, technological, environmental, and economic factors that will greatly influence lifestyles and future travel. To examine each of these factors in detail would itself require numerous conferences and lengthy treatises, certainly more attention than can be allowed in this paper. However, as we enter the 21st century, there are several clues that suggest some of the key issues that will be faced by transportation decision makers over the next 20 years, and thus, these issues should be reflected in the planning process. In some cases, these clues are found in historical trends that have consistently shown patterns of likely travel behavior. In other cases, the novelty and rapidity of change preclude any prediction on the basis of observable historical fact, thus leaving us with a best guess of likely changes and resulting consequences.

## EVOLUTION OF TRANSPORTATION PLANNING ISSUES: BRIEF HISTORY

When contemplating the future of transportation planning, it is perhaps instructive to first examine how transportation planning has evolved over the past 40 years. A

detailed history of transportation planning is provided elsewhere in this conference; therefore, it is not repeated here. However, in the context of this paper, an examination of previous professional efforts in refocusing the planning process to reflect the then changing circumstances might provide some interesting parallels and lessons to our current situation.

Periodically over the past 40 years, the transportation planning profession has held national conferences on the status of transportation planning and on future issues that are likely to be faced by those responsible for statewide and metropolitan planning. Some of the more important conferences and their key issues are discussed in Table 1. Although generalizing the evolution of transportation planning can be fraught with peril in missing key trends and characteristics, Table 1 does suggest some interesting changes in focus over the past 40 years (the following format is credited to Steve Lockwood).

- From:* Emphasis on methods and data in support of capital programming.
- To:* Improved information on a wide-ranging set of impacts for a wide variety of capital, operational, pricing, lifestyle, and land use decisions.
  
- From:* Focus on the efficiency of highway networks and corresponding levels of service (speed and travel time).
- To:* Multimodal systems operation and broad performance measurement (accessibility and mobility).
  
- From:* Perspective on how to get from Point A to Point B.
- To:* Broader context of transportation's role in a community and in the global, national, state, and local economic market.
  
- From:* Primary attention to passenger-person movement.
- To:* Commensurate attention to freight movement and productivity improvements.
  
- From:* Vehicle and system technology viewed as a given.
- To:* Innovative technologies used to influence systems operation and travel behavior.
  
- From:* Acceptance of land use patterns as a given and not part of the solutions set.
- To:* Use of growth management tools in connection with corresponding transportation policies as a major strategy.

- From:* Environmental impacts as a project-level mitigation issue.
- To:* Linkage between transportation decisions and a broader systems and sustainability framework of ecological and community health.
  
- From:* User benefits and costs.
- To:* Equitable distribution of benefits and costs within the concept of a community.
  
- From:* Perspective on today's systems operation as a means of calibrating future predictions.
- To:* Use of today's systems operation for real-time control and development of historic files on the basis of monitoring and measurement.
  
- From:* What should the planning or transportation agency do to solve the transportation problem?
- To:* What should all of us do to solve the transportation problem (e.g., partnerships)?

As reflected in Kenneth Boulding's quote, decision making is the most important element of future change. If one accepts the proposition that planning informs such decision making, the characteristics of planning should reflect the requirements of the decision-making process (2). As noted by Friedmann (3), "planning is that professional practice that specifically seeks to connect forms of knowledge with forms of action in the public domain. . . planning becomes less a way of preparing documents, such as analyses and plans, and more a way of bringing planning knowledge and practice to bear directly on that action itself." This type of planning is exactly what transportation planning should have been doing over the past 40 years. One could surmise, however, that in many cases the decision process itself was limited by narrowly defined interests and by categorically limited boundaries of what could be funded with federal dollars. In the future, however, the transportation planning process is likely to be more open to a wide range of issues and constituent demands. These statements suggest that transportation planning for the next century will have to be more flexibly structured and more responsive to a variety of decision-making issues that will occur at many levels of decisions.

A recent example of the examination of the changing context of transportation decision making was provided by a study commissioned by the American Association of State Highway and Transportation Officials (AASHTO) (4). The study identified strategies adopted by state departments of transportation (DOTs) to "cope with the current conditions," that is, the

**TABLE 1** Transportation Planning-Related Conferences, 1957 to Present

<i>Conference</i>	<i>Major Issues</i>
1957—Hartford, Conn.	<ul style="list-style-type: none"> <li>• Designing urban interstates to fit into an urban environment</li> <li>• Importance of comprehensive land use plans and linkage to transportation plans</li> </ul>
1958—Sagamore, N.Y.	<ul style="list-style-type: none"> <li>• Extension of interstates into urban areas</li> <li>• Linking highway investment to economic development</li> <li>• Highway design characteristics</li> <li>• Need for comprehensive focus in planning</li> <li>• Benefit/cost evaluation strategies</li> </ul>
1962—Hershey, Pa.	<ul style="list-style-type: none"> <li>• Conflict between highway, housing, and land use goals</li> <li>• Desire for broader perspective in transportation planning</li> </ul>
1965—Williamsburg, Va. <i>Highways and Urban Development</i>	<ul style="list-style-type: none"> <li>• Cooperative planning among different groups</li> <li>• Community values and goals</li> <li>• Land use plan coordination with transportation planning</li> <li>• Desire for more formalized transportation planning process</li> </ul>
1971—Mt. Pocono, Pa. <i>Organization for Continuing Urban Transportation Planning</i>	<ul style="list-style-type: none"> <li>• Linkage between transportation investment and environment</li> <li>• Community values and their incorporation into transportation planning</li> <li>• Multimodal perspectives</li> <li>• Citizen participation</li> </ul>
1982—Airlie House, Va. <i>Urban Transportation Planning in the 1980s</i>	<ul style="list-style-type: none"> <li>• Need for systematic urban transportation planning</li> <li>• More flexibility in planning process; streamline regulations</li> <li>• Corridor perspectives</li> <li>• More responsibility to state and local officials</li> </ul>
1988—Washington, D.C. <i>A Look Ahead: Year 2020</i>	<ul style="list-style-type: none"> <li>• Linkage between transportation investment and economic productivity</li> <li>• Need to monitor demographic changes and impacts on travel</li> <li>• Environmental impacts</li> <li>• Institutional responsibilities</li> <li>• Urban form and relationship to transportation investment</li> <li>• Role of technology</li> </ul>
1989—Boston, Mass. <i>Statewide Transportation Planning</i>	<ul style="list-style-type: none"> <li>• Relating planning to decision making</li> <li>• Importance of vision</li> <li>• System management</li> <li>• Multimodal perspectives in evaluation</li> <li>• Role of technology</li> </ul>
1990—Irvine, Calif. <i>Transportation, Urban Form, and the Environment</i>	<ul style="list-style-type: none"> <li>• Importance of good data</li> <li>• Dynamics of demographic and social changes</li> <li>• Transportation and air quality</li> <li>• Accessibility and its measurement</li> <li>• Judging the effectiveness of the planning process</li> <li>• Institutional arrangements and financial innovation</li> </ul>

(continued on next page)

TABLE 1 (continued)

<i>Conference</i>	<i>Major Issues</i>
1992—Charlotte, N.C. <i>Moving Urban America</i>	<ul style="list-style-type: none"> <li>• Importance of partnerships to get things done</li> <li>• Serving needs of customers and system users</li> <li>• Mobility as a goal</li> <li>• Social costs of transportation provision and use</li> <li>• Importance of public involvement</li> <li>• Transportation and land use connections</li> <li>• Transportation and air quality</li> <li>• Management systems in context of transportation planning</li> <li>• Measuring quality-of-life indicators</li> </ul>
1992—Irvine, Calif. <i>ISTEA and Intermodal Planning</i>	<ul style="list-style-type: none"> <li>• Focus on effectiveness of intermodal connections</li> <li>• Partnerships</li> <li>• Role of freight movement in transportation planning</li> <li>• Stakeholder participation</li> <li>• Performance orientation in planning</li> <li>• Institutional barriers</li> </ul>
1992—Seattle, Wash. <i>Transportation Planning, Programming, and Finance</i>	<ul style="list-style-type: none"> <li>• Multimodal planning and programming</li> <li>• Transportation and land use</li> <li>• Consideration of freight in planning process</li> <li>• Need for cooperation among many different groups</li> <li>• Importance of demographics in travel characteristics</li> <li>• Performance-oriented planning and evaluation</li> </ul>
1996—Coeur d'Alene, Id. <i>Statewide Transportation Planning</i>	<ul style="list-style-type: none"> <li>• Private-sector role in transportation</li> <li>• System preservation as a goal of planning</li> <li>• Financial constraint</li> <li>• Performance-based planning</li> <li>• Incorporating operations issues into planning</li> <li>• Freight planning</li> <li>• System monitoring</li> <li>• Multistate planning efforts</li> </ul>
1998—Irvine, Calif. <i>Statewide Travel Forecasting</i>	<ul style="list-style-type: none"> <li>• Investment methods to provide support for decisions among modes and between capacity and operational improvements</li> <li>• Methods need to be tied into asset management</li> <li>• Performance measures</li> <li>• Integration of economic activities into forecasting</li> <li>• Need to test modes that do not exist today</li> <li>• Transportation and land use connections</li> </ul>

changing context of decision making. Four general categories of activities, or initiatives, were reported in the study: customer-driven, partner-driven, workforce-driven, and activity-driven. Table 2 shows the different types of state DOT activities that were adopted in response to the "driving forces" for change. It is interesting to note that in the categories of customer-driven and partner-driven initiatives, the adopted characteristics are similar in nature to the trends in the planning

focus that were mentioned earlier. These trends include a broader participation in decision making, more concern for customers, multistate coalitions, and performance measurement. As noted in the AASHTO study, "some of the vectors of change among state DOTs suggest the emergence of new models of organization, process and relationships that reflect the special technical and institutional setting of surface transportation." Some of the features most relevant here (because they

TABLE 2 Overview of State DOT Organization, Management, and Program-Delivery Initiatives (4)

<i>Customer-Driven Initiatives</i>	<i>Driving Forces</i>	<i>State DOT Activities</i>	<i>Trends/Directions</i>	<i>Characteristics</i>
Priority Setting Process	Resource constraints	Strategic planning	Definition of "corporate" priorities	User/stakeholder survey
	Customer expectations	Definition of mission/objectives	Ties to SWP, STIP	Champion leadership
	Program proliferation		Customer focus	Broadened modal responsibilities
	Governmentwide requirements		Internal buy-in process	Expansion of operations and management functions (ITS) Increase in freight focus
Performance Measurement	Public expectations	Performance monitoring	Measurement of internal performance	Definition of input/output/outcomes
	Legislative accountability	Stakeholder identification	Measurement of outcomes	Customer definition/distinctions
	Resource shortfalls	External accountability	External performance audits	Customer satisfaction surveys
			Incentive programs	Life-cycle orientation
			Peer benchmarking	Legislative reporting
				Cooperative data sharing
<i>Partner-Driven Initiatives</i>	<i>Driving Forces</i>	<i>State DOT Activities</i>	<i>Trends/Directions</i>	<i>Characteristics</i>
Changes in Public-Sector Roles	Regional service scale	Interagency cooperation/coalition	New ISTEA responsibilities	Relationships with non-transportation entities
	Ties to other sectors	Devolution of administrative responsibility	Increasing planning/programming collaboration	New multistate coalitions
	Federal mandates		Transparent service delivery	New interagency agreements
	Customer responsiveness		Allocation of project administration responsibilities	Greater autonomy for MPOs in planning/programming
	Efficiency		Streamlined finance management	Arrangements with local government for project development
Innovative Finance	Budget shortfalls	Leveraging public funds	Consolidation of capital and operating budgets	Extensive use of advanced construction

(continued on next page)



TABLE 2 (continued)

<i>Partner-Driven Initiatives</i>	<i>Driving Forces</i>	<i>State DOT Activities</i>	<i>Trends/ Directions</i>	<i>Characteristics</i>
	Program flexibility	Access capital markets	Increase use of debt financing Public/private financing of private toll roads	Incorporation of toll revenues in budgets SIBs Use of ISTEA Sec 1012 Use of IRS 6320 non-profit corporation
<i>Workforce-Driven Initiatives</i>	<i>Driving Forces</i>	<i>State DOT Activities</i>	<i>Trends/ Directions</i>	<i>Characteristics</i>
Organization Reconfiguration	Budget/staff limitations	Downsizing	Reduction/stabilization in total staffing	Flattening of organization
Staffing	Workforce retention	Decentralization/centralization	Workforce retooling	Structural changes to enhance intermodal focus
	Stovepiping		Distinction between policy and line functions	Cross-functional teams
		Core competency	Increased responsibility to districts	Pay for performance
		Flattening Project focus		Increased operational orientation Focus on public contact activities Project management orientation
<i>Activity-Driven Initiatives</i>	<i>Driving Forces</i>	<i>State DOT Activities</i>	<i>Trends/ Directions</i>	<i>Characteristics</i>
Process Reengineering	Schedule maintenance	Quality management	QA/QC initiatives	Use of ISO 9000
	Partner expectations	Business process reengineering	Partnering	Centralization/standardization of information systems
	Legislative oversight		Internal staff buy-in Reengineering critical information or process-intensive procedures	Cycle-time-reduction focus
Program Delivery Modifications	Private-sector examples	Innovative contracting	Use of incentive-based contracts	Commercialization of services

(continued on next page)

TABLE 2 (continued)

<i>Activity-Driven Initiatives</i>	<i>Driving Forces</i>	<i>State DOT Activities</i>	<i>Trends/Directions</i>	<i>Characteristics</i>
	Customer responsiveness	Outsourcing	Turnkey approaches	Use of open RFPs
	Partners' expectations	Privatization	Contracting out more core/routine functions	Peak load or geographic responses
	Federal mandates		Increase in outsourcing design	Experimentation with managed competition
	Privatization interest		Broader cost and schedule risk-sharing Private project development	Tax-exempt funding Cost/resource-sharing new toll roads
Research and Technology Innovations	Availability of federal support	Product evaluation	Implementation-oriented R&D	Product-evaluation teams
	Private-sector interest	Research partners	ITS programs	Multistate coalitions Public/private partnership SDOT/institutional partnerships

SWP = statewide plan; STIP = State Transportation Improvement Program; ITS = intelligent transportation systems; ISTEA = Intermodal Surface Transportation Efficiency Act of 1991; SIBs = state infrastructure banks; IRS = Internal Revenue Service; ISO = International Standards Organization; RFP = request for proposals.

suggest forms and substance of decision making) include

- Small departments which maintain the responsibility for provision (policy, priorities, funding, quality) with many production functions dispersed via devolution to lower levels of government and outsourced to private entities as determined by benchmarking and managed competition;
- Decentralized departmental units organized based on fluid task-oriented teams and vertical cradle-to-grave project management for closer customer contact and increased efficiency, supported by enterprise information and quality control systems;
- Outcome-oriented investment priorities developed through close user-customer dialogue focusing on interagency delivery of improved passenger and freight service in response to measurable logistics, economic development, and quality-of-life impacts;

- Emphasis on real time operations of upper level systems using the best available ITS technology for reliability, safety, and security in conjunction with a new multi-jurisdictional operating entities—authorities or private corporations;
- Enterprise-style management at all levels (strategic business plans) accomplished by a cross-trained staff maintaining core capabilities under performance incentive-driven employment agreements;
- Streamlined project delivery for reduced schedule/cost risk via competitive turnkey contracting, including public/private partnership franchises;
- Increased utilization of market mechanisms responding to customer willingness to pay (partnerships, tolls, commercialization), together with contemporary financial technology such as infrastructure banking, revolving funds and debt-financing accessing nationally securitized capital markets;
- Incorporation of the best available technology in process activities (information systems), product

development (material and process), and real time operation (intelligent systems); and

- Asset management orientation, including investment trade-off analysis, supported by life-cycle design and true cost evaluation based on improved performance monitoring.

What does the future hold for transportation planning and how should the process be refocused? The following section provides an overview of those issues that are likely to concern transportation decision makers over the next several decades.

## TRANSPORTATION PLANNING AND THE FUTURE

Transportation planning over the next 20 years will be very similar in substance to what occurs today. It is likely that analysis tools and data-collection methods will improve by taking advantage of tremendous advancements in computing power and sensor technology. Information systems will provide more ability to synthesize large amounts of data and perhaps will create new avenues for public participation in the planning process. The great unknowns, however, are the level of technological change, the demands of economic and market forces, and the degree of environmental consciousness that will characterize this future. For example, the transportation profession has been urged for years to better consider the needs of freight movement in transportation planning. How ironic it would be if technological change (e.g., the application of nanotechnologies to the manufacturing process) and economic forces (e.g., globalization and distribution of the manufacturing process) would effectively make this newfound attention immaterial.

There are 10 areas in which future transportation planning will likely face challenges (i.e., demands from decision makers for information and solutions). Therefore, these areas are topics for this conference on Refocusing Transportation Planning for the 21st Century.

### Demographic Change

In presenting the "distinguished lecture" at the 1999 Annual Meeting of the Transportation Research Board, Alan Pisarski argued that transportation professionals missed several key trends in the 1970s and 1980s that had profound impact on travel. These trends included substantial growth in jobs, increases in truck travel, the significant growth in vehicle-miles traveled, and changes in economic production processes. He also predicted that the trends to watch during the next decade will be the increasing immigration, higher household incomes

(which lead to increased vehicle ownership), and the aging of the population. As noted elsewhere, these trends are likely to have profound impacts on transportation planning (5). Mobility for the elderly, especially given the fact that this group, now more than ever, will be driving into their later years, creates a special challenge for transportation planners. This issue could have significant implications on how travel information is disseminated and on the importance of nonwork trips as they relate to daily travel. In urban areas, decision makers could be pressured into providing more transportation services to the elderly population.

Immigration presents special challenges to transportation planners. Immigrants tend to locate in metropolitan areas (by 90 percent) and in central cities within metropolitan areas over suburbs (55 to 45 percent). For example, the cities with the largest increases in zero-vehicle households between 1980 and 1990 were Miami, San Diego, and Phoenix. These cities also experienced large increases in Spanish-speaking immigrants (6). As immigrants become assimilated into society, it is likely that they will represent a new wave of automobile drivers. In the short term, transportation options that provide access to jobs will become a major issue.

### Economic Production and Market Forces

The fundamental relationship between economic activity and transportation demand has been the cornerstone of transportation demand analysis for decades. And yet, my perception of our profession is that we are often caught unaware of the profound changes in the technology of production and in the movement of resources and products that so significantly affects the transportation system. Free trade agreements, globalization of the production process, diversification of employment sites, innovations in goods movements that increase productivity but shift flows (e.g., containerization), and larger capacity and faster goods movements all have important effects on metropolitan transportation systems. Transportation planning clearly needs to do a better job of incorporating freight movement into the process; however, my concern is that many planners view this simply as better understanding truck flows on the region's highway network. The scale of analysis goes way beyond such a simple perspective.

### Highways, Plus...

One of the key trends that is illustrated in Table 1 is the desire for a transportation planning process that considers all modes of transportation in an unbiased and systematic way. Multimodal transportation planning has been discussed and pursued for many years, but only recently have



we begun to see examples of how such planning can occur (7,8). Increasingly, many public officials and transportation experts are calling for a more balanced transportation policy and planning process, one that recognizes the inherent subsidies prevalent in automobile use and that considers the full societal cost of alternative transportation options. Intermodal planning, a concept that gained interest after the passage of ISTEA, added to this discussion the focus on modal connections and their importance in the overall effectiveness of the transportation system, especially for freight movement (9).

With a growing sense that building more highways will not likely solve highway congestion, many metropolitan areas are looking at a range of possible solutions. These include enhancing highway operations (see following section), plus implementing demand management strategies, land use controls, pricing techniques, and marketing efforts to encourage use of nonsingle occupant vehicles. An excellent example of such an approach is the US-301 corridor study in Maryland that examined

- Transportation management associations in major employment centers,
- Employee vanpool programs,
- Home-based ride-sharing programs,
- Local paratransit programs with community centers,
- Improved park-and-ride amenities,
- New park-and-ride lots,
- Additional area telework centers,
- Additional bike and pedestrian facilities,
- Transit-oriented development amenities,
- Travel-demand management in the development-approval process,
- Congestion pricing,
- Reduced transit fares,
- Parking pricing for public facilities, and
- Parking cash-out programs.

Such actions will likely be commonplace in corridor and regional studies throughout the United States.

The implication for transportation planning of adopting a "highway, plus, . ." perspective is that the data collection, analysis tools, evaluation methods, prioritization schemes, and funding mechanisms need to be in place to answer two simple questions: How much will each action cost? and What will be their impacts?

## Operations Perspective

Beginning with the Transportation System Management (TSM) initiative, which was implemented in the mid-1970s, the U.S. transportation community has slowly placed greater emphasis in the planning process on more efficient operations of the existing transportation

system. Incorporating such concerns into the planning process reflects the convergence of several policy thrusts that originated in different policy environments. The targets of the transportation system and traffic management through time have in rough sequence been (a) increasing traffic efficiency and capacity, (b) providing alternatives for large-scale infrastructure investment, (c) reducing the consumption fuel when serious fuel-supply disruptions occur, (d) improving air quality through more effective use of road space, and more recently (e) mutually reinforcing a resurgent concern for land policy and urban densification.

Given that the focus of traffic operations managers tends to be short term, hardware-oriented, and technically grounded in engineering, operations strategies have not often found a place in the planning process. However, with the introduction of ITS technologies into the array of transportation strategies, operations personnel become a critical component of successful implementation strategies. One critique of the TSM initiative in 1975 was the incompatibility of incorporating an operations perspective into a planning process that was focused on large-scale capital investments programmed over a 20-year time horizon. Twenty-five years later, we need to do it right (this time).

## Role of Technology

Each great leap in transportation progress occurred because of technological innovation. This innovation happened in transportation because of the desire to travel more quickly and to arrive safely, while the transportation system carried more passengers and cargo. Whether these outcomes occurred for land, water, or air transportation, the unmistakable role of technological advancement was present. The literature on transportation history is vast as demonstrated by Lay (10), Harrison (11), and Woodman (12) in their useful discussions on the role of technological advances and resulting consequences.

One of the unmistakable trends in urban transportation today is the increasing application of advanced technologies to vehicle and systems operation. In addition, low-emission vehicles are being designed that could greatly reduce pollutant emissions, and telecommunications technologies are evolving so rapidly that technological obsolescence is now measured in months instead of decades. In the broad perspective of transportation history, telecommunication technologies represent the first time that physical presence (and thus transportation) is rendered immaterial (telegraphs or telephones do not represent the full functionality that is necessary to fully substitute for physical presence). In a long-planning time frame, therefore, the consequences

of such travel substitution become a critical factor in assessing future demand, but admittedly one that is very difficult to gauge.

In the shorter time frame, transportation planning needs to anticipate the application of ever more advanced technologies in system operations. These technologies include infrastructure and systems design that is compatible with the ITS national architecture, as well as identifying operational improvements, including ITS strategies. Over the longer term, the use of information systems in all aspects of society will continue to shape dramatically personal and business decisions that directly relate to transportation.

### Sense of Community

A book published by the Drucker Foundation in 1998 examined the future of society and concluded that one of the key guiding concepts of our future will be the search for a "sense of community." The amazing feature of this book was that its major contributors were most well known for their treatises on effective management techniques and corporate strategy. Yet, each contributor concluded that "seeking a community" was likely to be an important characteristic of our future. As stated by Peter Drucker (13), "the task today, therefore, is to create urban communities—something that never existed before. Instead of the traditional communities of history, urban communities need to be free and voluntary. But they also need to offer the individual in the city an opportunity to achieve, to contribute, to matter." Steven Covey (14), in the same volume, argued that the ideal community has four major elements: (a) principle-centered goodness; (b) vision and direction; (c) purpose, mission, and unity; and (d) economic equality.

In transportation, we have heard about quality-of-life and environmental justice, but I do not believe we have placed them in a larger context of community responsibility and values. As the disparity between central city and metropolitan median incomes continues to widen, decision makers will be faced with increasing pressures to provide economic opportunity for all of society (15). Transportation will have an important role to play in providing access to such opportunities.

### Laying the Groundwork for Pricing

Economists for years have argued that road use is underpriced (especially when considering externalities) and that the solution is to implement road or congestion pricing. There is little argument that pricing will in fact have the biggest impact on congestion [Small, Winston, and Evans (16) discuss one of the latest proposals on the

subject in their report]. However, as noted in a recent article, the threshold level of congestion "cost" has not yet been reached, to any great extent, by automobile users in U.S. urban areas such that significant shifts in travel mode or times of travel have occurred (17). A review of several policy initiatives that were aimed at clearly defined groups and in which the costs of compliance were considered too intrusive (e.g., mandatory employer-trip-reduction programs in the 1990 Clean Air Act Amendments, Regulation XV in Southern California, congestion-pricing demonstrations, and an extensive congestion-pricing study in Minneapolis-St. Paul), led me to conclude that the public, and thus political decision makers, is not yet ready for a large-scale application of road pricing.

The transportation planning process can serve as a very important catalyst in the collective-learning curve toward eventual implementation of pricing schemes. By being selective in targeting potential markets for demonstrations or experiments, transportation agencies can lay the groundwork for a changing public perception. Note that this suggestion implies a role for transportation planning that goes beyond the development of the plan and program and goes to the heart of the pressures that are likely to be faced by decision makers. Without supportive constituencies, it is not likely that any dramatic changes in road pricing would be adopted by elected officials.

### Putting Teeth into Growth Management

Planners have stated for many years that congestion reduction and mobility strategies must include land use actions, especially applied at a regional level (18). In some parts of the country, such regional or growth management strategies have been adopted in an effort to better link investment decisions on infrastructure with desired development patterns (the most recent and highly visible case is Maryland's Smart Growth Initiative). The incorporation of different land use patterns into transportation analysis has been fairly common for over a decade (19–22). However, many of these efforts were simply used as scenarios for determining "what if" contexts for transportation demand. The primary role for transportation plans in actually achieving these futures was the encouragement for new patterns of development through the provision of transportation infrastructure. Although policy statements often included encouragement to local governments to make land use decisions within such a regional context, very seldom were there any incentives or sanctions to do so.

A 1994 study conducted by the American Planning Association identified a number of principles for successful integrated regional transportation and land use

planning (23). The principles that are relevant here include

- Subregional planning in the absence of regional planning is not likely to be successful; neither is regional planning in the absence of an empowered regional government.
- Regional government may be a necessary condition for successful regional planning, but it is not a sufficient one.
- Possibilities for future urban form are few.
- Measurement in a multiobjective world is always faulty; regional planning led by technicians will be interesting to technicians only.
- Focus on direction, not destination; the only way for most people to evaluate a long-run vision is to focus on the short-run policies that are the first steps toward it.
- Work with the market to change behavior; change prices.
- Evaluations of regional policy focus on efficiency; interest groups and the public care about equity—what will this mean for me?
- Integrated regional planning needs champions.
- If you really want to affect the long run, take a long-run attitude toward change.

We are beginning to see in several instances a movement toward incentives and sanctions that reflect several of these characteristics for integrated land use and transportation planning. It seems likely that in instances in which decision makers are adopting more stringent criteria for developing decisions, they will want transportation policies that are conducive to their overall goal. Transportation agencies will have to be part of the “team.” This objective might require a very different role for the transportation planning process.

### Transportation Planning Within a Sustainability Framework

A safe and healthy environment has been one of the mainstays of public opinion over the past several decades. This concern will continue and expand in the 21st century under the general umbrella of “sustainable development” or “sustainable transportation.” Sustainability means many things to many people. To some, sustainability pertains to the compatibility between a specific action and natural ecological principles (24). To others, and especially in the context of community development, physical, biological, and social “connectedness” requires a broader perspective on how we should design our communities. This broader context suggests certain principles (25–29):

- Coordinating decisions that relate to land use, transportation, environment, and social services;
- Reducing the exposure of natural hazards on people and property;
- Limiting exposure to air and water pollution and the consumption of nonrenewable resources;
- Developing land efficiently with higher densities and contiguous to existing development;
- Promoting a sense of place by protecting views and encouraging compatible urban design;
- Providing cultural life and vibrant public spaces that encourage the interaction of people from different social and economic groups; and
- Providing access and mobility for all socioeconomic groups.

Other researchers have focused on the characteristics of a sustainable transportation system and the implication for the transportation planning process (30,31). Perhaps the most forceful perspective on what sustainable transportation means to transportation planning is articulated by Cervero (32), who argues that planning for accessibility in all forms becomes the ultimate goal, rather than planning for the automobile (see Table 3).

It is likely that the concept of sustainability, especially that portion that relates to human impacts on natural ecosystems, will become stronger in the future. From a decision-making perspective (and thus with import to planning), this is likely to mean new demands on the planning process to place proposed actions in a much broader environmental evaluation context. For example, I could envision the future transportation planning process beginning with an environmental “scan” of the region that identifies sensitive environmental (broadly defined) areas and likely consequences of further infrastructure development. Some of the key issues in such an approach will be secondary and cumulative impacts.

In many ways, the business sector appears way ahead of the public sector in thinking through how sustainability can be incorporated into decision making. Business principles and environmental audits have been devised to influence the decision-making process. For example, the following checklist was proposed for those individuals considering investment opportunities (33):

1. “*Environmentally screen all investments*—All investments should be accompanied by an explanation of their environmental impact.
2. “*Reconsider costs*—Anticipated benefits of conventional proposals may disregard the environmental costs of the planned activity.
3. “*Reconsider benefits*—Have all environmental paybacks been presented? Proposals may underplay benefits of waste reduction and avoidance of anticipated cost increases.



TABLE 3 Transportation Mitigation Approaches Under Different Planning Paradigms (32)

<i>Automobility Planning</i>	<i>Accessibility Planning</i>
<b>Road Construction Expansion</b> <ul style="list-style-type: none"> <li>—Motorways/freeways</li> <li>—Beltways</li> <li>—Interchanges/rotaries</li> <li>—Hierarchical networks</li> <li>—Arterial expansion</li> </ul>	<b>Land Use Management/Initiatives</b> <ul style="list-style-type: none"> <li>—Compact development</li> <li>—Mixed uses</li> <li>—Pedestrian-oriented design</li> <li>—Transit villages</li> <li>—Traditional neighborhoods</li> <li>—New urbanism</li> </ul>
<b>Intelligent Transportation Systems/Smart Highways/Smart Cars</b> <ul style="list-style-type: none"> <li>—On-board navigational systems</li> <li>—Vehicle-positioning systems</li> <li>—Real-time informational systems</li> </ul>	<b>Telecommunication Advances</b> <ul style="list-style-type: none"> <li>—Telecommuting/teleworking</li> <li>—Telecommunities</li> <li>—Teleshopping</li> </ul>
<b>Transportation System Management</b> <ul style="list-style-type: none"> <li>—One-way streets</li> <li>—Rechannelizing intersections</li> <li>—Removing curbside parking</li> <li>—Ramp metering</li> </ul>	<b>Transportation Demand Management</b> <ul style="list-style-type: none"> <li>—Ridesharing</li> <li>—Preferential parking for HOVs</li> <li>—Car-parking management and pricing</li> <li>—Guaranteed ride-home programs</li> </ul>
<b>Large-Scale Public and Private</b> <ul style="list-style-type: none"> <li>—Heavy rail transit/commuter rail</li> <li>—Regional busways</li> <li>—Private tollways</li> </ul>	<b>Community-Scale Public and Non-Motorized Transport</b> <ul style="list-style-type: none"> <li>—Light rail transit/trams</li> <li>—Community-based paratransit/jitneys</li> <li>—Bicycle and pedestrian paths</li> </ul>

4. *“Reconsider the criteria applied—Have environmental objectives been explicitly considered in evaluation?”*

5. *“Reconsider the possible options considered—Does the action provide a solution in isolation, or would there be a more environmentally superior alternative?”*

6. *“Consider the opportunity costs—Has there been a serious analysis of the costs of not accepting the proposed solution? What is the cost of opportunities foregone if resources are utilized in implementing the current proposal?”*

7. *“Reconsider the time horizon—Realistic paybacks of environmental benefits might not occur for a long time.”*

8. *“Reconsider the discount rate—Discounting often does not take into account full costs of remediation or the long time frame of environmental benefits.”*

9. *“Consider the valuation of externalities—If true costs of environmental resources (such as water, air, waste disposal to land or water) were used, how would decision be changed?”*

10. *“Consider decisions in light of sustainability—Looking at decisions from a longer term, broader, sustainable perspective could change the evaluation results and overall assessment of viability.”*

We are already noticing in some metropolitan areas the beginnings of public interest in such criteria for transportation investment. I suspect that such criteria will be commonplace in the coming decades.

### Decision-Making and Planning Accountability

An important trend in recent years in almost every government program has been public interest in accountability. What has actually happened or changed given public investment? In transportation, there is increased interest in audits, program assessments, and performance-based planning (34). As congestion becomes worse, the collective frustration of the public and political system can lead to dramatic finger-pointing. In Atlanta, for example, the business community led a regional examination of what to do about transportation problems in light of the perceived inability of public agencies to deal with the often opposing political forces for real change. The group recommended that the Atlanta region and the new governor take the following steps:



- Set and communicate short- and long-term performance objectives for Atlanta's regional transportation system;
- Adopt aspirations-based strategic planning and land use compliance incentives;
- Create a regional transit authority to plan and coordinate all transit in the region;
- Secure adequate and flexible funding for transportation needs;
- Build public awareness about transportation issues and alternatives to single-occupancy vehicle travel;
- Mobilize the business community to support recommendations and change commuter behavior; and
- Empower one regionally focused agency with integrated responsibility for planning, resource allocation and authority, and monitoring of implementation for all forms of transportation in the Atlanta region.

The latter recommendation was in response to a widely held belief that the current regional planning agency was unable to move forward a transportation plan that would really achieve congestion reduction and air quality goals. Atlanta's new governor is moving rapidly to create a regional agency similar to the one that was recommended.

We are in a period in which more accountability is being demanded of governmental programs. In a planning context, this demand means identifying ways of linking system-performance outcomes to targeted investments to show accomplishments. As noted in the Atlanta case, this could also mean institutional change

that is designed to overcome perceived barriers to program implementation.

## CONCLUSION

Figure 1 illustrates, in a very simple way, the evolution of transportation planning over the past 40 years. As shown, the different "periods" of planning simply added new perspectives and decision-making requirements onto the core-planning process. To a large extent, the basic mission of the transportation planning process has remained the same over this period-how to provide mobility in as safe and cost-effective manner as possible. This core mission has been stretched and augmented to reflect changing issues of concern to policy makers and to respond to a much-expanded context within which success is now measured. Given the role of planning as support for decision making, this is exactly as it should be.

Although I have focused on the types of issues that will likely face decision makers in the 21st century, I cannot leave a discussion of planning without saying a few words about "process." The transportation planning process has evolved over many decades, guided by regulations and law, to encompass many tasks and activities that purport to meet decision-making needs. In general, this process has been opened to new perspectives and new participants. However, the analysis framework that has evolved to support state and regional planning has tended to offer little support in answering

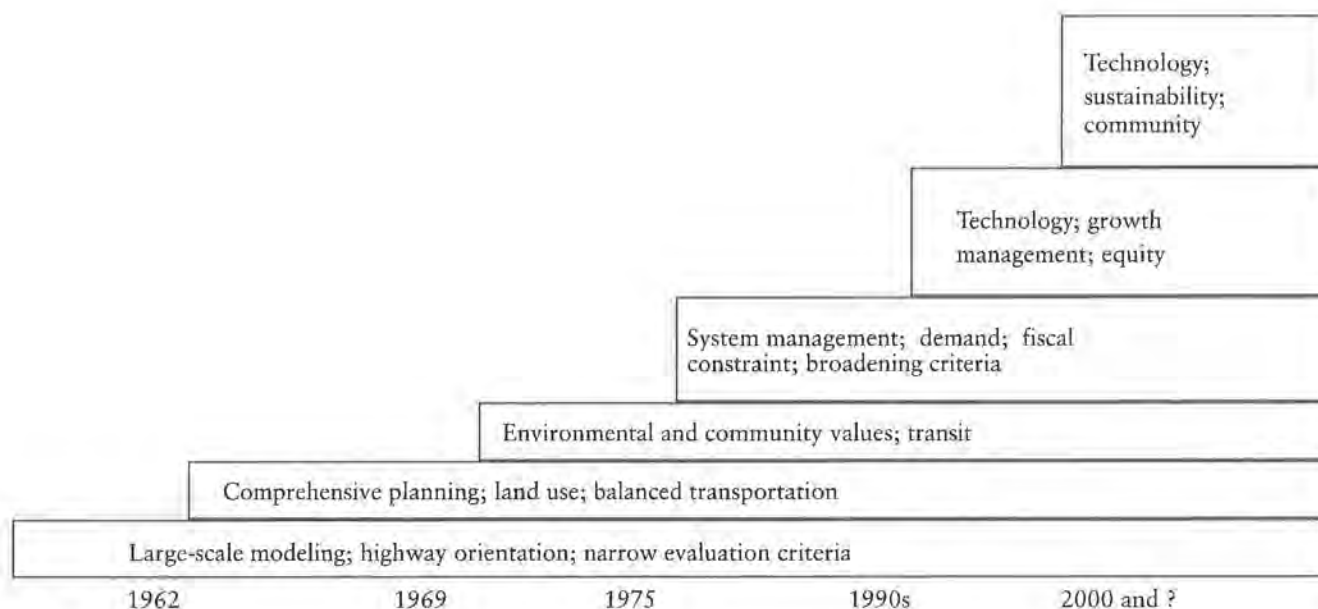


FIGURE 1 Key issues in the evolution of transportation planning.

the types of questions that are being asked by these new groups. A responsive 21st-century transportation planning process will have to be much more attuned to the customer, who ranges from the individual traveler to elected decision makers, about information that is being produced. This might require increased use of market research techniques, and most certainly, will require innovative opportunities for participation.

As noted earlier, the linkage between transportation and the environment and community will likely become much stronger than it is today. A strong linkage will lead to even more debate on the appropriate role for transportation in achieving community visions, and on how to measure transportation-investment outcomes with a very broad framework. Land use and community development will be an important issue in this debate.

Many different societal concerns and desires will likely influence the period of planning that we are now entering. However, the next era of transportation planning could very well be viewed by future historians as being defined by the convergence of two dominant trends—ever-increasing technological sophistication of society (and especially in the use of the transportation system) and ever-increasing societal concern for sustainable community development. If approached carefully, and planned for, these two trends can be mutually reinforcing. If not approached carefully, they can raise the prospect of technological advances fostering lifestyle patterns that are not in keeping with broader values of societal and ecosystem health. Many of the other issues can, in fact, fit into each of these categories (e.g., an operations focus in systems planning can lead to a discussion of technology).

The success of transportation planning in this next period could very well be measured by the degree to which these two issues are handled. Will technology (defined in its broadest sense to include fuels, materials, telecommunications, and system-vehicle control) be able to reinforce the desire for community development that is more livable and sustainable? Or, will technology be applied in ways that encourage travel behavior and development patterns that run counter to sustainability principles? This could very well be the next great challenge for transportation planners in the 21st century.

## REFERENCES

1. Gakenheimer, R. *Transportation Planning as a Response to Controversy*. MIT Press, Cambridge, Mass., 1972.
2. Meyer, M., and E. Miller. *Urban Transportation Planning: A Decision-Oriented Approach*. McGraw-Hill, New York, 1984.
3. Friedmann, J. Toward a Non-Euclidean Mode of Planning. *Journal of the American Planning Association*, Vol. 59, No. 4, 1993.
4. *The Changing State DOT*. American Association of State Highway and Transportation Officials, Washington, D.C., Oct. 1998.
5. Meyer, M. D. *Toolbox on Congestion Reduction and Mobility Enhancement*. Institute of Transportation Engineers, Washington, D.C., 1998.
6. Pisarski, A. *Commuting in America II*. Eno Transportation Foundation, 1996.
7. Meyer, M. D. Transportation Research Circular 406: The Future of Transportation Planning: Jumpstarting the Push Toward Multimodalism. In *Conference Proceedings: Transportation Planning, Programming, and Finance*, Transportation Research Board, National Research Council, Washington, D.C., April 1993.
8. Rutherford, S. Multimodal Evaluation in Passenger Transportation. *National Cooperative Highway Research Program Synthesis 201*, Transportation Research Board, National Research Council, Washington, D.C., 1994.
9. Meyer, M. Conference Findings. In *Special Report 240: ISTEA and Intermodal Planning: Concept, Practice, Vision*, Transportation Research Board, National Research Council, Washington, D.C., 1993.
10. Lay, M. G. *Ways of the World: A History of the World's Roads and of the Vehicles That Used Them*. Rutgers University Press, 1992.
11. Harrison, J. P. *Mastering the Sky*. Sarpedon, New York, 1996.
12. Woodman, R. *The History of the Ship*. Conway Maritime Press, 1997.
13. Drucker, P. Introduction: Civilizing the City. In *The Community of the Future* (Hesselbein et al., eds.), Jossey-Bass Publishers, San Francisco, Calif., 1998.
14. Covey, S. The Ideal Community. In *The Community of the Future* (Hesselbein et al., eds.), Jossey-Bass Publishers, San Francisco, Calif., 1998.
15. Research Atlanta. *A Population Profile of the City of Atlanta: Trends, Causes, and Options*. School of Policy Studies, Georgia State University, Atlanta, Ga., 1997.
16. Small, K., C. Winston, and C. Evans. *Road Work: A New Highway Pricing and Investment Policy*. The Brookings Institution, Washington, D.C., 1989.
17. Meyer, M. D. Demand Management as an Element of Transportation Policy: Using Carrots and Sticks to Influence Travel Behavior. *Transportation Research*, in press.
18. Ewing, R. *Transportation & Land Use Innovations*. Planners Press, Chicago, Ill., 1997.
19. Baltimore Regional Council of Governments. *Impacts of Land Use Alternatives on Transportation Demand*, Baltimore, Md., 1992.

20. North Central Texas Council of Governments. *Urban Form/Transportation System Options for the Future: Dallas/Ft. Worth Case Study*, Arlington, Tex., 1990.
21. Portland Metro. *Concepts for Growth, Region 2040, Decisions for Tomorrow*, Portland, Ore., 1994.
22. Puget Sound Council of Governments. *Summary and Comparison Between Alternatives, Vision 2020*, Seattle, Wash., 1990.
23. Moore, T., and P. Thorsnes. *The Transportation/Land Use Connection*, American Planning Association, Planners Press, Chicago, Ill., 1994.
24. Sjöstedt, L. Sustainable Mobility: The Challenge of Engineering Transportation for Society. *Proc., 10th Convocation of the Council of Academics of Engineering and Technological Sciences*, Swiss Academy of Engineering Sciences, Zurich, Switzerland, 1993.
25. Global Cities Project. Building Sustainable Communities: An Environmental Guide for Local Government. In *Land Use: Stewardship and the Planning Process*, Center for the Study of Law and Politics, San Francisco, Calif., 1991.
26. Lowe, M. *Shaping Cities: The Environmental and Human Decisions*. Paper 105, Worldwatch Institute, Washington, D.C., 1991.
27. Beatley, T., and D. Brower. Sustainability Comes to Main Street. *Planning*, May 1993.
28. National Commission on the Environment. *Choosing a Sustainable Future*. Island Press, Washington, D.C., 1993.
29. Tiffany, E. *Sustainable Transportation: A Conceptual Analysis*, School of Civil and Environmental Engineering, Georgia Institute of Technology, Atlanta, Ga., Oct. 1994, unpublished paper.
30. Burwell, D. What Is Sustainable Transportation? *Bulletin, III: F, Surface Transportation Policy Project*, Washington, D.C., Sept. 1993.
31. Nelson, D., and D. Shallow. Sustainable Transportation Through an Integrated Planning Process. *Proc., OECD International Conference on Toward Sustainable Transportation*, Vancouver, B.C., March 24–27, 1996.
32. Cervero, R. Paradigm Shift: From Automobility to Accessibility Planning. Presented at 15th EAROPH World Planning Congress, Auckland, New Zealand, Sept. 1996.
33. Crosbie, L., and K. Knight. *Strategy for Sustainable Business, Environmental Opportunity and Strategic Choice*. McGraw-Hill, London, 1995.
34. Meyer, M. *Mobility Measures in Transportation Planning*. Final Report. Federal Transit Administration, Dec. 1995.