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# TCRP Report 53

## **New Paradigms for Local Public Transportation Organizations**

### **Task 1 Report:**

Forces and Factors That Require Consideration of New Paradigms

Transportation Research Board  
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# Report 53

## New Paradigms for Local Public Transportation Organizations

Task 1 Report:

Forces and Factors That Require Consideration of New Paradigms

**CAMBRIDGE SYSTEMATICS, INC.**  
Washington, DC

Subject Area

Public Transit

Research Sponsored by the Federal Transit Administration in  
Cooperation with the Transit Development Corporation

**TRANSPORTATION RESEARCH BOARD**  
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## TRANSIT COOPERATIVE RESEARCH PROGRAM

The nation's growth and the need to meet mobility, environmental, and energy objectives place demands on public transit systems. Current systems, some of which are old and in need of upgrading, must expand service area, increase service frequency, and improve efficiency to serve these demands. Research is necessary to solve operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the transit industry. The Transit Cooperative Research Program (TCRP) serves as one of the principal means by which the transit industry can develop innovative near-term solutions to meet demands placed on it.

The need for TCRP was originally identified in *TRB Special Report 213--Research for Public Transit: New Directions*, published in 1987 and based on a study sponsored by the Urban Mass Transportation Administration--now the Federal Transit Administration (FTA). A report by the American Public Transit Association (APTA), *Transportation 2000*, also recognized the need for local, problem-solving research. TCRP, modeled after the longstanding and successful National Cooperative Highway Research Program, undertakes research and other technical activities in response to the needs of transit service providers. The scope of TCRP includes a variety of transit research fields including planning, service configuration, equipment, facilities, operations, human resources, maintenance, policy, and administrative practices.

TCRP was established under FTA sponsorship in July 1992. Proposed by the U.S. Department of Transportation, TCRP was authorized as part of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). On May 13, 1992, a memorandum agreement outlining TCRP operating procedures was executed by the three cooperating organizations: FTA, the National Academy of Sciences, acting through the Transportation Research Board (TRB); and the Transit Development Corporation, Inc. (TDC), a nonprofit educational and research organization established by APTA. TDC is responsible for forming the independent governing board, designated as the TCRP Oversight and Project Selection (TOPS) Committee.

Research problem statements for TCRP are solicited periodically but may be submitted to TRB by anyone at any time. It is the responsibility of the TOPS Committee to formulate the research program by identifying the highest priority projects. As part of the evaluation, the TOPS Committee defines funding levels and expected products.

Once selected, each project is assigned to an expert panel, appointed by the Transportation Research Board. The panels prepare project statements (requests for proposals), select contractors, and provide technical guidance and counsel throughout the life of the project. The process for developing research problem statements and selecting research agencies has been used by TRB in managing cooperative research programs since 1962. As in other TRB activities, TCRP project panels serve voluntarily without compensation.

Because research cannot have the desired impact if products fail to reach the intended audience, special emphasis is placed on disseminating TCRP results to the intended end users of the research: transit agencies, service providers, and suppliers. TRB provides a series of research reports, syntheses of transit practice, and other supporting material developed by TCRP research. APTA will arrange for workshops, training aids, field visits, and other activities to ensure that results are implemented by urban and rural transit industry practitioners.

The TCRP provides a forum where transit agencies can cooperatively address common operational problems. The TCRP results support and complement other ongoing transit research and training programs.

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The members of the technical advisory panel selected to monitor this project and to review this report were chosen for recognized scholarly competence and with due consideration for the balance of disciplines appropriate to the project. The opinions and conclusions expressed or implied are those of the research agency that performed the research, and while they have been accepted as appropriate by the technical panel, they are not necessarily those of the Transportation Research Board, the National Research Council, the Transit Development Corporation, or the Federal Transit Administration of the U.S. Department of Transportation.

Each report is reviewed and accepted for publication by the technical panel according to procedures established and monitored by the Transportation Research Board Executive Committee and the Governing Board of the National Research Council.

To save time and money in disseminating the research findings, the report is essentially the original text as submitted by the research agency. This report has not been edited by TRB.

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# FOREWORD

*By Staff  
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*TCRP Report 53, "Forces and Factors That Require Consideration of New Paradigms,"* will be of interest to individuals and organizations seeking fundamental change and innovation in public transportation. This report is the first step in examining how new paradigms might be introduced into local public transportation. It summarizes the key forces and factors that appear to necessitate a paradigm shift--a reinvention of the organizations that now have or share responsibility for local public transportation services.

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This report is the first of several products that will be developed by TCRP Project J-8B, "New Paradigms for Local Public Transportation Organizations." This report is intended to (1) present the case for a paradigm shift in local public transportation in terms strong enough that a consensus can be reached on the need for action and (2) trigger a wide-ranging debate and dialogue on the basic premises that necessitate a paradigm shift in local public transportation.

The report discusses the forces and factors that are effecting the relevance of traditional public transportation services in North America. Fixed-route and fixed-schedule public transportation systems, which are the prevailing model for public transportation in most communities, are losing market share as urban sprawl, diffused travel patterns, and changing life styles contribute to increased automobile travel. Decision making for public transportation is complicated and fragmented with many organizations making separate, overlapping, and sometimes competing decisions. While technology is changing rapidly in most sectors of the economy, public transportation lags behind, making it further outdated. This environment has slowed innovation and limited the potential effectiveness of public transportation services.

While there has been much discussion with the transportation community about countervailing forces and their import, there is still uncertainty as to whether public transportation is truly facing a "crisis" and whether circumstances warrant fundamental change in any given locale. Transforming public transportation will require great initiative from management and employees within public transit organizations but will also require significant new public policies and considerable support from many organizations and individuals outside public transit.

The report provides insights from selected organizations, both within and outside the transportation sector, which have pursued and achieved dramatic change. In many instances, these organizations faced forces and factors similar to those being experienced by public transportation systems that have contributed to wholesale "reinvention" or fundamental change to their key business processes and functions.

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# Executive Summary

## The New Paradigms Project

Today, the forces of change are laying siege to traditional ways of doing business. Economic and demographic changes, broadening public policy goals, heightened emphasis on accountability, customer demand and technological innovations require organizations to adapt more rapidly and, in some cases, continuously. Every community, business, household and government agency is being challenged in fundamental ways.

The scope and pace of change, and efforts to accommodate it, are evident all around us. In many instances, wholesale "reinvention" of businesses, industries and public organizations is taking place. In other instances, fundamental change is being pursued in key business processes and functions within organizations.

Alternatively, there are industries, business sectors and public institutions that have been slow to adapt. Public sector organizations, including those responsible for local public transportation, are only beginning to realize that substantial changes in the way they do business may be both necessary and inevitable.

The premise of the New Paradigms project is that local public transportation organizations and the services they currently provide are being marginalized at every turn. More specifically, traditional transit organizations:

- Have been slow to adapt to fundamental changes throughout society;
- Are facing circumstances that threaten their continued relevance in the future; and
- Must act out of a renewed sense of urgency to reinvent themselves as agile, responsive and responsible "managers of mobility."

With these mounting challenges, however, comes opportunity. There is a broadening recognition at the local level that a wider array of travel options is needed to sustain economic growth in major metropolitan areas and to guarantee access to opportunity and basic human services in both large and small communities. At the national level, the role of public transportation has been reaffirmed through the extension of progressive federal programs and increased funding. Yet the opportunity that is at



hand cannot be seized by standing pat. It is increasingly apparent that fundamental change and innovation in public transportation must be pursued as part of the broader commitment to meet widely shared community goals. The New Paradigms project is one part of an effort within the transit industry to catalyze fundamental changes.

The genesis of the New Paradigms project lies most directly in the work of a panel of transportation leaders and experts who convened in 1997 to examine "*New Paradigms for Public Transportation: A Future Search and Next Steps*." Through the TCRP, that group set in motion the current study effort, by resolving that current and emerging circumstances require...

***"...fundamental reinvention of how public transportation services are organized, designed and delivered."*<sup>1</sup>**

## **Purpose of the Report**

Development of this report is a first step in examining how new paradigms might be introduced into local public transportation. It provides a summary of the key forces and factors that appear to necessitate a paradigm shift in local public transportation - a reinvention of the organizations that now have or share responsibility for local public transportation services. In more specific terms, this report is intended to:

1. Present the case for a paradigm shift in local public transportation in terms strong enough that a consensus can be reached on the need for action; and
2. Trigger a wide-ranging debate and dialogue on the basic premises that necessitate a paradigm shift in local public transportation.

Subsequent work on the project will assess models for reinvention that may be useful in considering fundamental change at two levels:

- At the broad institutional level where missions, roles and functions may be redefined across agencies and organizations; and
- Within individual organizations where the key functions required to plan, manage and provide public transportation services, and where traditional business processes may be redesigned (may be redefined), regardless of what institutional structure is in place.

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<sup>1</sup> *Innovation Briefs*, Volume 8, Number 7, September/October 1997.

## **The Forces of Change and Their Implications**

Among the forces and factors that support the need for new paradigms in local public transportation are:

- The shift in federal funding away from support of transit operations and the competition for funds at all levels of government;
- The marginal performance, high cost and fragmented responsibility that characterize public transportation today;
- The societal trends that increasingly reduce the attractiveness and relevance of traditional public transportation services;
- The inability to reconcile competing or contradictory transportation goals and objectives in today's public policy arena, e.g., support for economic growth vs. environmental protection vs. cost control;
- The fact that traditional measures of performance in transportation, e.g., vehicle flows, are not aligned well with broader community goals and expectations, e.g., quality of life, livability, accessibility, etc.; and
- The fact that fundamental changes and paradigm shifts are occurring in businesses and industries, providing important models on which fundamental change in public transportation organizations can be modeled.

## **Characteristics of the Industry That Suggest Fundamental Change Is Necessary**

The prevailing model of local public transportation today is of fixed-route, fixed-schedule systems, operated with significant public capital and operating subsidies by public organizations that operate as monopoly providers in their respective service areas.

While transit ridership in many areas is increasing modestly in parallel with economic growth, other forces and trends pose an increasing threat to the role and relevance of today's public transit services, suggesting fundamental change is needed. Among these factors are:

- Vehicle-miles of travel continue to increase faster than population or economic growth;
- Sprawl on urban fringes continues unabated and is increasingly difficult to serve with traditional transit;

- Transit ridership over the long term has been stagnant and transit's market share continues to decline in the face of rising travel demands;
- The industry continues to rely on a narrow range of traditional services;
- Cost profiles in the industry pose an increasing problem amidst competing demand for public resources and investment;
- Innovation and incentives for change are stifled at several levels, including limited skill sets in the work force, limitations on how resources can be applied, outmoded labor-management dynamics and few incentives for innovation or risk taking; and
- The public image of the industry remains poor in most settings.

In addition to these factors, the "enabling environment" in which public transportation organizations must operate has become increasingly confused and fragmented. Services are planned and operated under governance, management and financing arrangements that may have been appropriate for conditions 30 and 40 years ago, but which are increasingly ill-suited to circumstances and conditions today. A wide range of federal, state and local organizations and agencies have accumulated varied, overlapping and competing responsibility for guiding, directing, regulating and funding public transportation services for separate markets, which retard service integration and improvements in performance. Finally, the ability of today's public transportation organizations to respond to changing conditions and varied travel markets is limited by restrictions and contradictory goals, objectives, policies and regulations that often act to increase cost and limit revenue-raising ability simultaneously.

These industry characteristics and features of the "enabling environment" suggest that fundamental change is needed.

### **Societal Forces and Trends Do Not Favor Traditional Public Transportation**

A number of broad trends in society threaten to further diminish the role and relevance of traditional public transportation services and institutions over time. As indicated in Chapter 3, trends in the economy, demographics, land use and development, life styles and technology all represent mounting challenges to the continued relevance of public transportation as it is provided today.

- In the economy, industrial restructuring from central manufacturing operations to widespread service industries is diffusing travel patterns in ways that reduce the effectiveness, appeal and economic efficiencies

of traditional public transportation. Increasing flexibility in the labor force and work patterns have the same effect. Increasing participation by women in the labor force, and increases in work-at-home and telecommuting also diminish the role and relevance of traditional transit services as travel patterns become more diverse. To some degree, increasing income disparities may offset these negative effects, since individuals in low income households are expected to remain more "transit-dependent." Yet, economic success which we all desire quickly shifts this market into a less transit-dependent posture.

- Changing demographics imply, on the one hand, a growing market for transit within an aging population and from increasing migration and immigration. Yet changing household make-up - single parents, single adults, two-worker households - tends to diminish the usefulness of traditional transit services.
- Continued suburbanization, low population and employment densities and the rise of multiple, outlying "nodes" of development all tend to reduce the usefulness of traditional public transportation services. Similarly, the fact that work trips, the core transit market, now represent less than one-third of all travel further illustrates the growing gap between evolving travel markets and traditional transit services.
- New technologies are impacting business and industry, including public transportation, in several critical ways. New technologies: 1) open up new opportunities to improve existing internal business practices; 2) change travel patterns and markets because of the effects of communications technology on the location of activities and the need for proximity; and 3) drive shifts in traditional hierarchical organizational structures toward diverse networks of managers, employees, customers and suppliers.
- Though there has been noteworthy progress in the introduction of new technologies in some public transportation organizations, the pace has been slow and scope limited. To date, the availability of new technologies has not yet resulted in the type of fundamental change in traditional business practices or institutional structure that has occurred in other industries and organizations.

### **The Public Policy Environment Imposes Constraints and Contradictions**

The ability of local public transportation organizations, as currently constituted, to react and respond to changing travel demands and related external forces is severely limited by public policies that have evolved in areas outside the immediate influence of transportation and transit managers and policy makers. In effect, the "enabling environment" in

which public transportation organizations must operate restricts change and adaptation.

Federal, state and local policies on environmental protection, energy, taxes, land use and regulation of the business practices in related public and private transportation industries have the effect of limiting the integration of services, the use of resources, the ability to control costs and the ability to raise revenues.

The actions and reactions of local public transportation organizations are further constrained by the multiple objectives and expectations that are placed on them. The industry remains driven by the short-term imperative to match service levels to annual budgets rather than by broader impacts and outcomes that are becoming a major rationale for public policy and investment decisions. In effect, no one is yet held accountable for attaining long-term goals and transportation organizations generally have been unable to balance a long-term strategic mission with day-to-day operating responsibilities.

The importance of these points is to illustrate that the effort to introduce new paradigms into public transportation is a responsibility that must be broadly shared - if not led by - community leaders and elected officials at several levels, rather than simply expecting fundamental change to emanate from local transit managers and policy board members.

### **Measuring Success and Performance Requires New Yardsticks**

Local public transportation organizations have traditionally measured performance and success by focusing on internal operating efficiencies. While these measures remain important, it has become increasingly necessary to measure the success of transit investment and use in far broader terms that reflect how community goals and expectations are being expressed.

One characterization of this shift is to move from measures of efficiency to measures of *impact*; from measures of output to measures of *outcome*. Underlying this theme is the need for heightened attention to the needs of the customer at all levels and to make services and products available that are market driven, as has been done in a number of other businesses and industries.

Fundamental change in both organizational structure or business processes must be accompanied by appropriate changes in how performance is measured and success is gauged. This effort also must involve community leaders and stakeholders rather than be considered the sole responsibility of public transportation professionals.

## **Successful Paradigm Shifts in Other Businesses Provide Motives and Models for Fundamental Change in Public Transportation**

The call for fundamental change in local public transportation organizations and business processes would be a greater challenge if it had not already met successfully in other quarters. The fact that paradigm shifts have been accomplished in other economic sectors, industries and individual businesses provides strong evidence that: 1) fundamental change is both necessary and possible; 2) the way forward is not uncharted territory; and 3) the need for change and adaptation is continuous.

Examples of recent paradigm shifts come from private industry, quasipublic organizations and the transportation industry, including:

***The U.S. steel industry***, where a number of producers have broken up large scale, integrated organizations and switched to specialty products produced for niche markets using new mini-mill technologies operating at far smaller scales and managed through new, cooperative labor-management arrangements. Continued shifts may be needed to withstand mounting competition in the global market place.

***Telecommunications***, where deregulation has allowed increased competition which has resulted in more rapid introduction of technologies, lower prices in many markets and a far greater emphasis on market research and customer responsiveness.

***Energy industry***, where deregulation has led to an increase in suppliers operating more economically at smaller scales by sharing power grids and distribution systems, and in some cases, leading to mergers between alternative energy providers seeking to better address customer needs.

***General Electric***, where a single visionary executive drove the notion of fundamental change in organizational structure and decision-making processes through a new paradigm in internal collaboration and participatory management called "Work Out," that dramatically increased the quality of products and services and shareholder value, and included new ways of measuring corporate and individual performance and contribution.

***The Nature Conservancy***, where new, innovative strategies and programs were initiated, the mission of the organization fundamentally changed and new staff skills added when it was discovered that the effectiveness of traditional strategies was rapidly decreasing.

***City of Louisville***, where the mayor instituted "City Work," a new style and process of collaboration between executives, managers, employees and citizens to solve specific failures in programs and policy, which

subsequently led to fundamental changes in long-standing business processes and procedures in the interest of better service to area residents and businesses.

***Postal Service***, where new services, greater differentiation in product quality and pricing and a wide array of new technologies were introduced into an increasingly competitive environment, along with new procedures for evaluating employee performance, all in the interest of maintaining and improving universal service, better meeting customer needs and maintaining market share.

***Charter schools***, where declining public school quality, performance, responsiveness and increasing cost led a visionary individual to design a new paradigm, now in use across the country, where school boards, teachers organizations, parents and communities join forces under a contractual arrangement to encourage new educational ideas and techniques.

***SeaLand/CSX***, where the paradigm of exclusive, dedicated assets provided to recognized markets has given way to a customer-focused enterprise. The result is a partnership of former international competitors dedicated to delivering maximum customer benefits in the movement of freight regardless of whose assets are called for to provide the service.

***New York E-Z Pass***, where eleven agencies across five states joined in a unique collaborative effort to drive development of and integrate new technology to ease crisis-level congestion on critical transportation facilities.

***Hong Kong Mass Transit Railway Corporation***, where a single visionary senior manager drove implementation of a totally new business venture and set of services to address the needs of a critical niche market involving rail-to-air passenger connections that fell well outside its traditional mission and capabilities in the effort to deliver on a commitment made at the highest levels of government to integrate transportation services in the interest of economic growth and stimulus.

***Netherlands/Dutch National Railways***, where a visionary mid-level manager saw the potential for integrated application of new technologies to enhance multimodal customer information on a national scale, leading to the restructuring of customer information and services functions across 24 separate companies.

***Privatization of European Passenger Rail Service***, under agreement control, most notably in Britain, where results have included ridership masses and cost reductions.

**Gothenberg, Sweden**, where research in the private sector and the desire to stretch the transit dollar further led to a collaborative effort to use new technologies in development of an integrated routing and dispatching system for all social service transportation systems.

These are but a few of the paradigm shifts that have taken place recently in response to the same forces and factors that confront public transportation organizations today. These experiences suggest basic lessons that can guide the effort of local public transportation organizations to pursue similar fundamental changes:

1. Paradigm change generally comes from a unit of governance (management) higher than that dealing with present operations;
2. Change rarely comes without pain;
3. The evolving transportation paradigm is based on an analysis of the user's full trip, not about segments of that trip;
4. When an organization seeks to serve the user's full trip, partnerships are inevitable;
5. In the management of complex full trips, information technology becomes essential;
6. The measurement of performance becomes key in the implementation of a new paradigm; and,
7. Fundamental changes, once begun, require vigilance and commitment to ensure continuing adaptability.

## **Summary**

Circumstances clearly point toward the need for fundamental change in today's public transportation organizations and services. The examples cited and issues raised are intended to present a compelling case for such change. Subsequent work on the project will focus on development of alternative models of fundamental change and the steps necessary to implement and sustain new paradigms in the interest of enhancing personal mobility and access in the decades ahead. The old models have served their purpose. It is time to chart the change and catalyze action.



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# **1.0 Introduction:**

*Shifting Focus to Mobility Management*

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# **1.0 Introduction:**

## **Shifting Focus to Mobility Management**

*The Interstate Highway era in transportation has drawn to a close. The search for a new paradigm in transportation policy and investment has brought us haltingly to the notion of "mobility management," a concept that is not yet well defined but speaks to:*

- *A better balance among transportation options;*
- *System and service integration;*
- *Explicit attention to the broad impacts and outcomes of transportation investment choices; and*
- *A customer-driven commitment to enhance the travel experience as part of improving the quality of life.*

*As this new era dawns, the continued relevance of traditional public transportation is in question. Some have signaled that a crisis is looming for transit; others seem unconvinced. What kind of response will be needed among the local public transportation organizations in meeting the challenges of this new era?*

*To test your response, consider the propositions that are presented at the end of this and subsequent chapters of this report.*

## **The End of an Era**

In the late 1980s, a wide-ranging debate took place over the continuing relevance of long-standing national transportation policies and programs. These debates were set in motion by the need to enact new federal transportation legislation, known as the Intermodal Surface Transportation Efficiency Act, or ISTEA, which was signed into law in 1991.

Among the early declarations made during the ISTEA debates was the statement that the nation, was 'coming to the end of the Interstate highway era.' The roots of this notion lay in two related premises that have become conventional wisdom among transportation professionals and non-professionals:

- The massive road-building programs that lasted from the 1950s into the 1980s, symbolized by the 104,000-mile Interstate Highway System, have had a host of unanticipated and sometimes negative consequences that continue to pose a threat to our quality of life, particularly across urban areas in the United States.
- A variety of constraints now dictate that reliance solely on the street and highway system to meet burgeoning travel demand is not viable as a basis for 21<sup>st</sup> century transportation policy.

## **A Paradigm Shift in Transportation: Changing the Focus to Mobility and Access**

Out of the ISTEA debates, and following enactment of what is recognized as a sea-change in perspectives about surface transportation, the notion of a paradigm shift in transportation was born. Former Federal Highway Administrator Dr. Thomas D. Larson was one of the first to introduce the notion of paradigm shift in transportation.

Talk of a paradigm shift was, on the one hand, a way of characterizing the philosophy underlying ISTEA. More importantly, reference to paradigm shifts was a way of emphasizing the need for even greater change in how we guide future transportation investment, and what goals and objectives ought to be served in the process.

With the enactment of ISTEA, a case can be made that a paradigm shift has taken place in the last decade, moving the transportation profession, the communities it serves, and their elected leaders from a preoccupation with increasing the *supply of transportation facilities* to broader concerns over *mobility and access* for both people and goods.

As a result, increasing emphasis is being placed on the broad concept of "managing mobility," and on the capacity of current organizations and institutions to assume this role and execute it effectively.

## **The Lagging Response: An Impending Crisis?**

From the enactment of ISTEA and its successor, the Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21), the pursuit of strategic, long-term change in how local public transportation services are provided has been fitful at best.

Despite the federal shift in emphasis toward integrated, multimodal planning and investment in transportation, energies are still being directed largely to reconciling traditional ways of doing business among established institutions and stakeholders.

While some degree of fundamental change is occurring among institutions and organizations, they are primarily small scale and episodic in nature. Examples of wholesale "reinvention" are rare, whether among institutions and organizations, or within key business process and functions.

This lag and the reluctance to explore or embrace fundamental change are evident in virtually every corner of the public transportation community - among entrenched managers and technicians, within the transit labor force and among politicians and policy-makers. The situation is not surprising. It is a natural tendency among all organizations to resist change and, more importantly, fail to recognize the compelling reasons that suggest fundamental change may be urgently needed.

In fairness, there are clearly a number of countervailing forces and unanswered questions that continue to retard both the extent and pace of change:

- Unresolved questions over whether or not the transit industry is truly facing a crisis;
- Uncertainty over whether or not circumstances are urgent enough to warrant fundamental change in any given locale;
- Uncertainty over what responses may be needed; and
- Lack of understanding of the conditions needed to initiate and sustain fundamental change.

The dilemma was characterized more broadly in 1994 by Thomas B. Deen and Robert E. Skinner, Jr., who noted the need for fundamental changes in the "enabling environment" for transportation policy, including changes in existing institutions, statutes, regulations, financial resources and public attitudes.

*"Without changes in the enabling environment, the transportation system would continue down the path of incremental change," rather than enable the kind of paradigm shifts that would bring us to a truly "sustainable transportation system."*<sup>1</sup>

The notion of changing the "enabling environment" provides a powerful concept and a useful base for the present project.

## **The New Paradigms Project**

Despite the resistance to change generally, leaders within the public transportation industry have provided a renewed focus and emphasis on the need for a paradigm shift in local public transportation. The need arises out of a nagging recognition that:

- Little has changed fundamentally in how transit services have been designed and provided in the last half of the 20<sup>th</sup> century.
- The world in which transportation needs arise and are accommodated has changed dramatically.

Based on these observations, the purpose of the New Paradigms project is two-fold:

1. To define and describe the new paradigms for local public transportation; and
2. To catalyze fundamental change in pursuit of a viable, healthy, essential industry.

The approach being taken in the current project involves several steps, highlighted in Figure 1.1.

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<sup>1</sup> Deen, Thomas B. and Skinner, Robert E., Jr., "A Paradigm for Addressing Change in the Transportation Environment," *TR News*, Transportation Research Board, September-October, 1994, pp. 11-13, Washington, DC.

**Figure 1.1      Steps in Examining New Paradigms for Local Public Transportation Organizations**

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1. A review of the forces and factors necessitating reinvention of local public transportation organizations.
  2. An examination of models on which to base fundamental institutional and organizational change at two levels:
    - at a broad, idealized level; and
    - at the level of key business processes and functions critical in the service design and delivery.
  3. A review of strengths and weaknesses of relevant models.
  4. An examination of the process by which new paradigms can be introduced, sustained and made successful.
  5. Development of a 'guide' to outline and support the process of change.
  6. Support to a small number of select organizations and locales committed to undertaking fundamental change and embracing a paradigm shift.
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**Shifting to Mobility Management:  
Conclusions That Require Action**

Throughout the project, stakeholders will be challenged to accept, reject or debate fundamental premises and related study findings. Test yourself on the premises noted below. To what extent do you agree or disagree with these basic premises?

- 1. An historic emphasis on road-building has had undesirable consequences that cannot be tolerated in the future, i.e., the broader goals of transportation investment must be better defined and used more directly in making transportation investment decisions.*

2. *It is neither desirable nor possible to accommodate current and future travel needs through expansion of the street and highway system in our urban areas.*
3. *Increasing the choices available for how we travel is more important than ever.*
4. *Little has changed fundamentally in how transit services have been designed and provided in the last half of the 20<sup>th</sup> century.*
5. *The world in which transportation needs arise and are accommodated is changing dramatically.*
6. *There has been a continuing decline in both the performance of our transportation system and the relevance of public transportation in meeting emerging needs. Reinvention in local public transportation has become essential.*

## Organization of the Report

The remainder of this report is organized to provide an overview of the forces and factors that support the need for a paradigm shift in local public transportation.

Chapter 2 provides an overview of local public transportation today, the organizations and institutions involved, their evolution, their roles and missions, their business processes and operating characteristics, and the environment in which they operate. *The chapter illustrates that conditions within the local public transportation arena itself provide ample justification for fundamental change if not wholesale 'reinvention.'*

Chapter 3 provides a summary of the broad-ranging societal forces impacting travel demand. Against these forces, a comparison can be made of the capacity of today's local public transportation organizations to respond. *The hypothesis is that these external forces strongly reinforce the need for a paradigm shift in local public transportation organizations.*

Chapter 4 reviews a range of current public policies, their impact on the relevance of transit and the ability of local public transportation organizations to react and respond to external forces and trends in performance. *The chapter illustrates that the responsibility for undertaking a paradigm shift in local public transportation is shared broadly - and extends far*

*beyond industry managers and policy boards, to include federal, state and local officials as well as a wide range of stakeholders.*

Chapter 5 examines how goals, objectives and performance measures are shifting in both the public and private sectors. *The chapter indicates the profound implications for local public transportation organizations of changing measures of success.*

Chapter 6 summarizes successful examples of fundamental change where efforts at reinvention and paradigm shifts have been initiated and sustained in other industries and organizations. *The chapter reinforces the notion that the actions of other institutions and organizations represent useful models for local public transportation organizations.*



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## **2.0 Local Public Transportation Today**

*Fragmented Roles, Marginal Performance  
and Declining Relevance*

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## **2.0 Local Public Transportation Today: Fragmented Roles, Marginal Performance and Declining Relevance**

*There is ample evidence today that local public transportation is facing an impending crisis brought on, in large part, by the failure of the industry to adapt to the fundamental changes taking place throughout U.S. society and the global economy. Among the most obvious indicators are:*

- *Continued increases in vehicle-miles of travel (VMT) by personal vehicles, and resulting congestion;*
- *Continued, unrestrained sprawl on urban fringes;*
- *Long-term ridership stagnation and declining market share;*
- *Reliance on a narrow range of traditional services;*
- *Increasingly unsustainable cost profiles;*
- *Poor public image; and*
- *Broad-based public concern over governmental accountability.*

*While there are noteworthy exceptions to these conditions, the continued relevance of traditional public transportation services and institutions is in question. The terrible irony is that the expectations placed on public transportation are rising and the need for alternatives to personal vehicle use has never been more urgent. Realigning today's fragmented roles and responsibilities for public transportation may be an important step.*

*Conclusions at the end of the chapter about conditions in the industry suggest strongly that the current institutional arrangements for providing local public transportation services be changed. To what extent do you agree or disagree?*

## **A Brief Look Back at Public Transit in the United States**

The U.S. transit industry was born in an industrial era when rapid urban growth and dominant central cities provided a ready market for high-occupancy passenger transport operating on fixed routes and schedules. The post World War II boom in suburban residential development, the rapid rise in auto ownership and the federally sponsored highway building boom of the 1950s and 1960s began a fundamental shift in the urban travel market and in our travel behavior.

In these conditions, private mass transit providers found it impossible to remain financially viable. Both services and capital equipment deteriorated rapidly. In the face of this post-war crisis, the federal government recognized that transit services for the public must be maintained and federal support was provided for the conversion of failed private transit services to publicly owned and operated systems.

The shift from a private to a public enterprise, while breathing new life into a dying industry, has had a number of other consequences that shape the current environment in which transit now operates, and therefore, the performance and the relevance of today's transit services. Among the most significant traditions to emerge have been:

- The increasingly political nature of transportation planning and investment decisions;
- Separately funding transportation modes;
- Separating authority and jurisdiction for elements of the transportation network;
- Increasing governmental mandates and requirements that restrict the responsiveness of organizations and managers; and
- Introducing new expectations and objectives that are often contradictory in nature.

The passage of the federal ISTEA legislation and the recent enactment of TEA-21 as the successor to ISTEA provide a new policy framework for transportation investment as well as clear expectations that these traditions should change.

Whether these federal legislative pronouncements represent fundamental change in the transportation "enabling environment," or whether they can provide the impetus for real, fundamental change in public transportation remains to be seen. Public transportation institutions and services continue to look much as they have for the past five decades - resistant to change and slow to respond to the changes taking place around them.

## **The Institutional Landscape**

The institutional setting in which public transportation services are provided is varied and complex and involves many actors. Figure 2.1 highlights the major organizations and institutions that share responsibility for the provision of public transportation and related services, and their most significant roles.

## **Transit Operating Agencies and Services**

Over 8 billion trips are made each year on public transportation services provided by nearly 6,000 operating agencies across the country. Figure 2.2 indicates how these agencies are organized and the settings in which they operate. Figure 2.3 indicates the balance of transit services being provided.

## **Aggregate Transit Funding Profile**

Funding for public transportation varies from locale to locale and by system size and mode. In aggregate, between 35 and 40 percent of operating costs are covered by riders through fare revenues. The balance of transit operating costs and all of transit's capital costs are provided from federal, state and local sources.

- Federal sources provide, on average, 50 percent of capital investment and 3 percent of operating costs;
- State and local sources each provide, on average, 13 percent of capital investment and 22 percent of operating costs; and
- Other directly generated sources, including directly levied dedicated taxes, cover 24 percent of capital investment and 16 percent of operating costs.

Transit funding is an inter-governmental partnership and the role of states and localities in that partnership is increasing. Each partner, however, requires local public transportation organizations to pursue somewhat varied goals, mandates and requirements. Overlapping and inconsistent objectives, in turn, tend to isolate outmoded practices and increase inefficiencies.

**Figure 2.1 Key Organizations and Institutions Involved in Local Public Transportation**

<b>Institution</b>	<b>Typical Roles and Functions</b>
Regional Transit Authorities	Plan, finance and/or operate transit services
Local Governments ( <i>Municipalities and counties</i> )	Plan, finance and operate transit and other transportation services Control land use and development from which travel demands are derived Finance and operate other public infrastructure and services Regulate various elements and aspects of the overall transportation network, other public service provisions and private enterprise
State Elected Officials	Set policies, priorities, and funding levels
Federal Government	Fund and finance planning, design, construction and operations of transit, highway and other transportation facilities and services Regulate various elements and aspects of the overall transportation network
State Departments of Transportation	Plan, finance and operate transit and other transportation services Regulate various elements and aspects of the overall transportation network
Metropolitan Planning Organizations ( <i>MPOs</i> )	Develop multimodal long-range plans Develop short-term (1-6 year) regional investment and improvement programs Conduct planning and technical studies Serve as a planning, programming and public involvement clearinghouse Manage ride-sharing and other selected operational programs
School Districts and Educational Institutions	Plan, finance and operate school bus services
Health, Human Service and Social Service Agencies	Plan, finance and operate transportation services for specific social and human agency and program clientele
Toll Authorities	Plan, finance and operate highways, bridges and tunnels
Regulatory Agencies ( <i>Taxi Commissions, Public Utility Commissions, Parking Authorities, etc.</i> )	Regulate entry, operations and pricing for various private service providers
Private Businesses	Provide sources to local public transportation organizations Represent client/customer for public transportation sources
Port and Airport Authorities ( <i>and other special purpose authorities</i> )	Plan, finance and operate critical elements of the transportation network
Courts	Regulate and adjudicate on planning, financing and operation of elements of the transportation network Regulate and adjudicate on issues of urban and economic development that impact travel behavior and trends

**Figure 2.2 Transit Operating Agencies and Scope of Service**

Agency Type	Number of Agencies / Organizations	Annual Passenger Trips (Mil)	Percent
Urbanized	554	8,278	96.7
Small Urban and Rural	1,074	280	3.3
Specialized	3,594	(1)	-
Other	753	(1)	-
Total	5,975	8,558	100.0

(1) Ridership estimates not included in APTA data.

Source: 1999 Fact Book, Tables 5, 31, and 32, American Public Transit Association, Washington, DC., pp. 26-28, 68-72.

**Figure 2.3 Transit Operating Agencies and Types of Service**

Type of Service	Number of Agencies / Organizations	Annual Passenger Trips (Mil)	Percent
Bus	2,250	5,199	60.8
Demand Response	5,214	95	1.1
Vanpool	55	(1)	-
Ferryboat	25	(1)	-
Light Rail	22	263	3.1
Commuter Rail	18	357	4.2
Heavy rail	14	2,430	28.4
Trolleybus	5	121	1.4
Other		93	1.0
Total	5,975	8,558	100.0

(1) Ridership estimates not included in APTA data.

Source: 1999 Fact Book, Table 4, American Public Transit Association, Washington, DC., pp. 25.

### **Aggregate Transit Ridership Profile**

As with transit funding arrangements, ridership characteristics also vary considerably from locale to locale and by system size and mode. In aggregate:

- Nearly 67 percent of trips are made on buses; 27 percent by heavy rail;
- Over 60 percent of all trips are made in urbanized areas with over 2.0 million population; 23 percent are made in areas between 500,000 and 2.0 million;
- Slightly over half of all transit trips are for work;
- Slightly over half of all transit riders are women;
- Slightly over half of all transit riders are ethnic minorities;
- Approximately 17 percent of transit riders are under 18 years old or over 65; and
- Approximately 27 percent have family incomes below \$15,000.<sup>1</sup>

### **Two Basic Organizational Models**

The vast majority of local public transit service is provided in urbanized areas under one of two organizational models:

- By independently constituted regional authorities; or
- By operating agencies or offices of county or municipal governments.

Regardless of which organizational model is in place, public entities directly own and operate virtually all urbanized transit services, with funding provided through the federal, state and local partnership.

In small urban and rural areas, service is provided through a mix of publicly owned and operated sources and private, non-profit agencies, often using private contractors to operate services funded by the same federal, state and local partners. The pattern of public ownership and operation has been the norm since the federally supported takeover of failing private systems early 1960s. The current pattern of public ownership and operation is generally considered an appropriate and

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<sup>1</sup> Additional summary information profiling today's public transit services and operations is provided in Appendix Figure A.1. Detailed data on individual systems and agencies can be found in the Federal Transit Administration's National Transit Database (NTD), which can be accessed through the Internet at <http://www.fta.dot.gov>.

necessary response to the circumstances that existed at that time. It is not clear at all, however, that the same can be said for current circumstances and emerging conditions.

***One of the central issues arising in the discussion of new paradigms in local public transportation, therefore, is whether or not these two broad organizational models - based on comprehensive public ownership and operation - represent the most effective approach for the decades ahead. Mounting evidence suggests otherwise, pointing to the need to rethink what the ideal or preferred model(s) might look like if a "clean slate" were available to redesign the local public transportation institutional and organizational structures and processes.***

### **Key Functions and Business Processes**

The provision of public transportation services involves a wide range of actions and activities that traditionally have been described in terms of *administrative, transportation or maintenance* functions. Responsibility for these activities is assigned and carried out under a wide variety of arrangements within the two broad organizational models highlighted above.

In addition to these basic "functions," a number of standard "business processes" are carried out by local public transportation organizations there. Figure 2.4 identifies the most significant functions and business processes involved in delivering public transportation services.

Just as the broader organizational models for delivering services may be ripe for fundamental change, the assignment of responsibilities for and the arrangements for carrying out these individual functions may also require fundamental change.

In looking at the public transportation industry today, one can find significantly different arrangements in how these functions and business processes are being carried out. Significant distinctions can be made in:

- The separation of planning, budgeting and asset ownership from on-street operations;
- The degree of emphasis on broadly based vision planning and goal-setting through extensive public involvement programs;
- The amount of competitive contracting being done; and
- How deployment of new technology is being advanced.

***By and large, roles and responsibilities for "mobility management" remain scattered and fragmented, a circumstance that is reinforced by how***



**Figure 2.4 Examples of Key Functions and Business Processes**

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Goal-setting	Coordination
Service planning and development	Licensing
On-street operations	Research
Budgeting	Public affairs, public involvement
Financing	Governmental affairs
Taxing	Asset management
Prioritization, programming and resource allocation	Marketing
Procurement	Customer service
Contracting	Public education
Human resource management	Advocacy
Labor relations	Engineering and construction
Regulation	Legal services

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*funds flow from federal and state sources to surface transportation and the associated regulations, requirements and procedures that dictate how business processes are to be carried out. Clearly, the "enabling environment" requires change as a prerequisite or as an adjunct to fundamental institutional and organizational change if the broad notion of mobility management is to be executed effectively.*

### **Other Key Organizations and Roles**

Aside from transit operating agencies, several other institutions noted in Figure 2.1 play central roles in the design and delivery of local public transportation services.

## **The Federal Government**

The federal government has set the overall policy, institutional and financial framework for the design and delivery of local public transportation services in the U.S. The federal government acts as:

- The senior partner in transit funding and finance, although the financial burden is shifting to the state and local level; and
- A regulator of transit planning and operations through mechanisms that both proscribe and limit the actions of system managers and policy board members.

Concurrent with increases in federal investment in public transportation, federal policy and program objectives have steadily broadened. Increasing attention is being placed on long-range, regionwide social, economic and environmental outcomes and increasing quality of life.

The steady build-up of multiple, often conflicting, objectives and mandates has placed significant constraints on the ability of transit managers and policy boards to control costs, increase revenues or introduce new service innovations. To the extent that there are "inefficiencies" that can be noted in traditional public transportation operations, they are often a direct or indirect result of the policies and regulations under which these agencies are required to operate.

***The implication is that the federal government must be a willing and supportive partner in almost any effort to alter the "enabling environment" and introduce new paradigms into local public transportation.***

## **State Governments**

State involvement in local public transportation varies widely across the country. A few states continue to play a minimal role, acting only as processing agents in programming and passing through federal funds. A few states serve as direct owners and operators of local public transportation services, including Connecticut, Delaware, New Jersey and Rhode Island.

Most states, however, now serve as major funding partners; participate actively in transit planning, programming and resource allocation; and direct state transit and related transportation programs. Aggregate state support of local public transportation has increased over the past two decades. States now provide a level of funding roughly equivalent to that provided by local governments for both transit capital investment and operating expenditures. Levels of funding and financial support, however, still vary greatly from state to state.

As importantly, states have the legal authority to organize and reorganize transit organizations on a regional and local level, to assist in designating agency recipients of federal transit funds, and to determine the extent to which local jurisdictions can levy local or regional taxes to support transit and transportation investment. While the role of local officials and agencies continues to grow under ISTEA and TEA-21, states continue to exercise significant leverage over the planning, programming funding and financing of local public transportation.

Because the state role in transportation historically has been focused on streets and highways, a natural tension has grown up between states with their priority given to road building, and local public transportation agencies. Tension between highway and transit interests and agencies and competition across modes for available funds continues to be a feature of the current transportation context, even though a more multimodal perspective has been introduced at the federal level with the enactment of ISTEA and TEA-21. These continuing tensions are reinforced at several levels and are reflected in significantly different and relatively rigid corporate cultures and business practices among state and local agencies and organizations.

Recently, some progress has been made in selected states and localities toward effective intermodal and multimodal collaboration, planning and investment strategies. In some state departments of transportation, mission statements have been broadened and DOT organizational structures have been changed to exhibit a multimodal scope.

Decades of tradition and past practice, however, still make it hard to integrate governance, management, operations and investment across state agencies whose major responsibility is for highways, and local government agencies responsible for public transportation.

***The institutional framework, funding policies and operational environment in which local public transportation is provided are structured to a considerable degree by state governments. As a result, states, like the federal government, must be willing and supportive partners in almost any effort to alter the "enabling environment" and introduce new paradigms into local public transportation.***

## **Local Governments**

Both counties and municipalities directly or indirectly fund and govern local public transportation investment and operations. In some instances, transit services are owned and operated directly by local governments. In most cases where regional authorities operate services, local elected officials or their appointees serve as policy board members.

As importantly, local governments also exercise primary control over several other aspects of urban life that have profound effects on the demand for public transportation services and the ability of those services to attract and serve local residents:

- ***Control of land use and development*** that has been the traditional province of local government determines to a considerable degree the nature of travel demand and the degree to which various transportation services, like transit, will be effective in serving the demand.
- ***Control of local infrastructure and public facilities investment*** provides an opportunity to coordinate land use, transportation, parking and public facility investment or to introduce conflicts and reduce the effectiveness of those investments.
- ***Regulation of other key transportation functions*** like taxicabs, private service providers and municipal and private parking also provide opportunities to reinforce or to confound investment and operation of local public transportation services.

***Local officials and local public transportation organizations remain at the center of the institutional landscape in which public transportation services are planned and delivered. Any effort to alter the "enabling environment" and introduce new paradigms into local public transportation will require a reformulation and reconciliation of roles and responsibilities at the local level.***

## **MPOs**

Another major institutional actor in the planning and delivery of local public transportation services are the 339 Metropolitan Planning Organizations (MPOs) that have been established in response to federal law and regulation. MPOs provide the official forum for cooperative transportation planning and programming in urbanized areas throughout the country. The MPO role typically involves:

- Formulation of the region's long range transportation plan;
- Development of the multi-year Transportation Improvement Program (TIP) that outlines the specific projects, improvements and investments to be implemented in the immediate five-year period;
- Conduct of various technical planning studies in support of the decisions required as part of regional planning and programming; and
- Preparation of air quality conformity analyses to demonstrate how plans and TIPs result in compliance with and/or progress toward achievement of applicable air quality standards.

In some areas, MPOs have also assumed responsibility for service delivery through management of regional ridesharing programs. In a few others, MPOs have taken direct roles in system operations and investment activity, including the area of Intelligent Transportation Systems (ITS) planning and applications. Some MPOs, serving as more broadly empowered regional planning agencies, also play roles in local land use and development planning as well as planning and investment in other public services on a regional scale.

MPOs are directed by boards made up of local elected officials and typically maintain technical planning staffs to support their role.

Throughout their existence, the role of MPOs has been made complicated by: 1) the difficulty inherent in balancing the goals and objectives of member local governments; and 2) the fact that they have not historically had direct authority over the funds available for transportation investment. Federal funds for highway investment are allocated to and controlled for the most part by the states; federal funds for transit investment are allocated or granted directly to "designated recipient" agencies in the region, typically area transit authorities and/or municipalities that own and operate transit services.

This funding dynamic has changed somewhat in recent years with enactment of ISTEA in 1991 and TEA-21 in 1998. Greater flexibility has been added in the use of formerly narrow categorical funding programs. The new flexibility has forced greater coordination and collaboration in many areas over how funds are to be used.

Finally, greater emphasis has been placed on public involvement, broad-based, community-wide "vision planning" and interagency collaboration during the planning and programming processes. Together, these changes increased the opportunity for MPOs to influence the transit and transportation decisions, providing increased leverage at the local and regional level.

***While new opportunities exist to influence investment decisions at the local level, actual shifts in influence have been marginal. The result in many areas is a continuing level of fragmentation and tension among state, regional and local institutions, and between planning and operating agencies over the mix and pace of transportation investments.***

## **School Districts and Educational Institutions**

For many urban areas, school children and students make extensive use of public transportation services. In suburban settings and in smaller urban and rural areas, however, local public school districts have long owned and operated their own school bus fleets or contracted with private operators for school service. Funding for school bus operations has come

from a combination of state and local sources that have typically been available to broadly support public education. At the same time, federal regulations have precluded local public transportation agencies from providing service exclusively intended to directly serve school trips and markets.

In recent years, however, rising costs and tax limitations have made it impossible to maintain an economically operate totally separate services for general public and school use. In a number of instances, local public transportation organizations and local public school officials have undertaken successful collaborative efforts to find ways to provide and coordinate needed services with the objective of controlling or decreasing costs, and improving services.

Much the same situation has occurred with respect to private and university transportation systems. Many universities have rethought both parking and transportation policies and have either abandoned their own separate transit operations or successfully downsized and integrated them with local public transportation services.

***The trend toward increased collaboration is clear and the potential advantages of greater cooperation and integration are substantial, though the level of activity remains modest. Additional progress is possible in updating restrictive policies and practices in the educational arena.***

## **Health, Human Service and Social Service Agencies**

Health, human service and social service agencies have long operated and supported the provision of transportation for their respective clients. For several decades, the Federal Transit Administration has provided a small amount of funding annually to private non-profit, community-based organizations to provide transportation services to targeted markets and riders.

Human service transportation is also supported, however, through a variety of federally funded health and human service programs that focus transportation spending on individual clients rather than agencies. Operationally, these services closely resemble the small vehicle, demand response systems operated by local transit agencies, though they are provided for the exclusive use of specific human service agencies and program clients.

Largely because of federal and state procedures governing the use of human service funds for transportation and accounting procedures required to track them, it is difficult to clearly understand how much is being expended on transportation through federally supported health and human service programs. There is little doubt, however, that spending on transportation within health and human service programs is substantial.

Although efforts have been underway for some time to coordinate federal transportation and federal health and human service programs and funding, progress has been limited. Still, local human service agencies and local public transportation organizations have, in some notable cases, begun effective coordination efforts with the same objectives as noted earlier for the school services - increased service and reduced costs.

***Significant opportunities for enhanced coordination and synergy exist in the coordination of public transit and health and social service transportation. Further progress and fundamental change are likely to involve significant revision to federal human service programs and procedures before the full benefit of coordinated efforts and integrated services can be realized.***

### **Toll, Parking and Related Authorities**

A number of independent toll authorities exist across the country, predominantly in larger metropolitan areas. They exercise responsibility for construction and operation of bridges, highways and parking facilities and, therefore, have a direct and indirect impact on travel patterns and transportation finance. In addition, independent parking authorities and parking management within local units of government exert a considerable impact on travel behavior. In a few cases, these agencies have direct ties to local public transportation organizations and help broaden the base of or cross-subsidize transit investment. In most areas, however, toll and parking authorities operate autonomously and independently of traditional local public transportation organizations.

***Advancing the notion of mobility management may require reconsideration of relationships between facility-based organizations and broader-based service planning and operating organizations, particularly with respect to the flow of funds over an integrated, multimodal transportation network.***

### **Regulatory Agencies**

A variety of regulatory agencies play an important role in serving the mobility needs of local residents. Taxicab commissions, parking commissions and authorities, public utility commissions and similar organizations all exercise varying degrees of regulatory authority over transportation service providers. In earlier times, these services - taxis, private commuter buses, tour operators, charter operators and others - were considered unrelated and, in fact, competitive with local public transportation. In fact, federal regulations have protected these largely private operators from being disadvantaged through competition from federally subsidized local public transportation agencies.

Today, however, these agencies and the services they oversee are moving into the mainstream of local public transportation with the rise of the concept of "mobility management." The expansion of private, regionwide shuttle services and the reintroduction of legalized jitney services have come about because viable, growing travel markets have not been well-served by traditional public transportation services.

Acceptance of the role and importance of these types of services as part of the mobility management concept is occurring slowly as is actual integration of services and coordination of regulatory agencies and local public transportation agencies.

***Considerable progress remains to be made in the integration of these non-traditional services in the overall public transportation arena.***

### **Local Private Providers**

Another set of institutional actors in the local public transportation arena are the various private and other non-profit transportation providers that are increasingly active in both urban and rural settings. For the most part, however, these providers operate in largely independent spheres, directed and controlled by different statutes, regulations, policies and agencies, at the federal, state and local level, as discussed above.

The rise of and obvious viability of these types of services are a result of two important conditions: 1) the inability of current public transportation services and operators to design and deliver services to obvious travel markets; and 2) the long-standing federal, state and local restrictions that often tend to preclude effective integration of services.

Coordination of agencies, services and programs has been a widely embraced objective for many years. In some communities, significant informal progress is being made in integrating and coordinating services in ways that better address customer needs, produce cost savings and increase revenues available to support and improve services. By and large, however, it has proven difficult, if not impossible, to move toward meaningful integration that would make the concept of "mobility management" a reality. Among the most significant barriers is the politics of redistributing power, authority and control over resources among mature agencies and organizations with often powerful constituencies.

***The clear implication is that actions, commitments and incentives at the federal, state and local levels are required to direct resources more effectively and provide truly integrated services in both urban and rural settings.***



## **The Role of Labor in Public Transportation**

It is impossible to assess local public transportation organizations and institutions without considering the central role of labor in the delivery of services. Between 70 and 80 percent of the total operating costs of public transportation go to labor. As a condition of federal support for the buy-out of private transit companies and conversion to public operations in the 1960s, federal legislation was enacted and regulations put in place to guarantee that employees of the private operators would not be harmed in the process.

Through the subsequent maturation of local public transportation agencies and services, these labor protections, administered by the U.S. Department of Labor, have remained largely unchanged, although some argue that the initial impetus for their enactment has long since disappeared. Also during the transition from private to public, transit labor has been organized and collective bargaining procedures have been instituted.

In the eyes of most observers and professionals familiar with today's public transportation operations, continued adherence to the original federal labor protection provisions and well-established collective bargaining processes have had several negative effects. Taken together, these have often limited the ability of today's managers and policy board members to innovate or to control the single largest cost component of service delivery because of a limited ability to:

- Plan and deploy alternative types of services and more market-responsive service schemes;
- Establish more cost-effective work rules;
- Make more extensive use of part-time employees; and
- Contract for on-street services, maintenance and other key functions.

The human resources and labor relations arena is fraught with challenges across many industries and in public transportation, involves powerful political forces at the federal, state and local level.

***The need for new paradigms in local public transportation is, in part, a consequence of outmoded labor relations and arrangements. More importantly however, new paradigms cannot be pursued and instituted effectively without the direct participation of and support from the work force.***

## **Conditions in the Transit Industry: Conclusions That Require Action**

To what extent do you agree or disagree with these basic premises?

- 1. Independent regional transit authorities and local government transit operations were a reasonable organizational response to earlier circumstances.*
- 2. Considerable fragmentation of authority and responsibility exists among local public transportation organizations and institutions. Separate, overlapping and/or competing authority and roles reduce the effectiveness of traditional services, slow innovations and limit integration among sources and organizations.*
- 3. Fragmented roles and responsibilities need to be rationalized and reconciled so they positively reinforce one another and result in a wider range of more integrated travel options.*
- 4. The current institutional framework through which local public transportation services and activities are managed is a product of federal and state law, regulation and policy. Introduction of new organizational paradigms will require significant action at the local, state and federal levels.*

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## **3.0 Societal Forces and Trends**

*An Increasing Disadvantage for Traditional Transit*

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## **3.0 Societal Forces and Trends: An Increasing Disadvantage for Traditional Transit**

*Continuous change is a constant feature in today's world. As a result, there is a premium placed on the agility of organizations to react and respond to changing conditions, circumstances and markets.*

*Changes taking place outside the control of public transportation managers and policy makers have substantial influence on the performance of transit services, and ultimately on the role, relevance and long-term viability of public transportation organizations.*

*Recent assessments suggest that current societal trends largely act to reduce the effectiveness of traditional public transportation services.*

*The case for introducing new paradigms in local public transportation is, therefore, strongly reinforced by contrasting the unchanged nature of traditional public transportation services with the scope, scale and pace of change throughout society.*

## The Key Dimensions of Change

In recent years, a full-blown industry has grown up around assessments of societal trends and the development of strategic responses. A nearly endless variety of frameworks and perspectives are being used to chart societal changes.

*TCRP Report 28*, "Transit Markets of the Future: The Challenge of Change."<sup>1</sup> provides the most recent, comprehensive assessment of forces and factors impacting local public transportation action organizations. The material below highlights major findings from that report, focusing on changes in:

- The economy;
- Demographics;
- Land use and development patterns;
- Lifestyles and social relationships; and
- Technology.

In summarizing the effect of current societal forces and factors on today's local public transportation organizations, the report concluded that:

***"...most trends act to the detriment of public transit."***

While the forces and factors described below may not affect every community or transit system the same way, this statement provides another confirmation of the need to consider a paradigm shift in local public transportation.<sup>2</sup>

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<sup>1</sup> Rosenbloom, Sandra, "Transit Markets of the Future: The Challenge of Change," Transit Cooperative Research Program, Report 28, Washington, DC, 1998.

<sup>2</sup> A caution about aggregate figures: Efforts to assess broad societal trends and their implications for public policy are usually rooted in national aggregate statistics. In some cases, national figures are broken down or disaggregated to reflect conditions in different subareas or subgroups of the population. While the analysis reported in *TCRP Report 28* summarizes societal trend information in disaggregated form, the references below are national in scale. Both the authors of the *TCRP Report 28* and the "New Paradigms" research team recognize that national averages and trend rarely reflect conditions in any single locale. Strategies and policies for the future must always be guided by how these same forces and factors are playing out in the local or regional setting.

## **Forces in the Economy**

The United States has consistently led the world in personal mobility, and past advances in physical mobility have been a major factor in the economic success of business and industry and personal economic advancement.

Today, transportation of people and goods remains a critical factor in the success or failure of business and industry, and in the economic well-being of households and individuals:

- The most well-conceived product development, production and marketing systems can fail if efficient transportation choices are not available;
- Households and individuals eager to earn a living and better themselves financially can lose the opportunity without adequate transportation; and
- The economic viability and quality of life of whole communities is reduced by a substandard or poorly performing transportation system.

These broad generalities are well-documented and widely accepted. It has proven more difficult, however, to arrive at a balance of transportation strategies and actions that satisfy economic objectives as well as other community goals. The role and relevance of public transportation in a more balanced strategy can only be enhanced, however, if local public transportation organizations are fully responsive to the trends outlined below. Today the evidence suggests they are not.

## **Industrial Restructuring**

Two critical aspects have been cited in the continuing examination of how economies are "restructuring." Both have significant implications for transit:

- The shift away from an industrial/manufacturing economy toward a service and information-based economy; and
- The growing income gap among workers.

Figures 3.1 and 3.2 highlight key facts and implications for local public transportation organizations.

## **Flexible Labor Force**

The U.S. work force is becoming increasingly "flexible" in a number of important respects. The most important dimensions of work force flexibility are:

- Schedules which vary over the short-term;
- Multiple jobs at multiple locations; and
- Dispersed employment sites.

Today's transit services, however, are largely fixed in terms of both routes and schedules, and limited in coverage and service hours. Today's service patterns are becoming less well suited to changes in the commuting market. Figure 3.3 summarizes the implications of increasing work force flexibility.

## **Work at Home and Telecommuting**

Travel patterns are changing with the increase of non-traditional working relationships between employers and employees. The steady rise in telecommuting and working at home is allowing further separation of residences from traditional workplaces.

An additional factor is the rise in workers who conduct daily business from their cars rather than traditional offices. Sources cited in *TCRP Report 28* indicated that this phenomenon may increase 25 percent by the end of the decade.

Increasing diversity in working relationships between employers and employees reduces the usefulness of public transportation services and organizations which have traditionally focused service design on regularly scheduled home-base work trips to office commercial and industrial employment sites.

## **Women's Labor Force Participation**

The rapid increase in the number of women in the labor force has been one of the most noteworthy and important socio-economic phenomena in recent decades. Research has determined that the travel patterns of women in the work force vary significantly from traditional travel patterns of male heads of households. One obvious outgrowth that affects traditional transit services has been the apparent need to have additional cars available in the two-earner household. Figure 3.4 summarizes the implications of the rise of women in the work force.

**Figure 3.1 Implications of a Service-Based Economy**

<b>Facts</b>	<b>Likely Implications</b>
<ul style="list-style-type: none"> <li>● 73% growth in service jobs nationally, 1970-1990; 2% growth in manufacturing</li> <li>● 72% of civilian employees are in the services sector</li> <li>● Retail trade expected to replace manufacturing as second largest employment category</li> <li>● Service sector job growth is diffused/dispersed, not concentrated</li> <li>● Service businesses tend to be smaller in size</li> <li>● In more densely developed old or urban areas, the effect on travel behavior of the shift to a service- oriented economy may be less pronounced</li> </ul>	<ul style="list-style-type: none"> <li>● The most rapidly growing job market cannot be served effectively with traditional transit</li> <li>● Traditional transit services do not provide convenient access to typical service employment sites</li> <li>● Traditional transit services do not adequately cover typical service job hours and schedules</li> <li>● The most rapidly growing job market cannot be served effectively with traditional transit</li> <li>● Diffused travel demand and less concentrated trip-making reduces the efficiency of traditional transit services</li> <li>● Density and development mix continue to support traditional transit systems and sources</li> </ul>

Summarized from *TCRP Report 28, Appendix C.*

**Figure 3.2 Implications of Income Disparities**

<b>Facts</b>	<b>Likely Implications</b>
<ul style="list-style-type: none"> <li>● Service sector requires both highly paid "knowledge" workers and low paid "support" workers, resulting in a growing wage gap</li> <li>● 70% of service workers are not in well-paid jobs</li> <li>● The wage gap will result in growing numbers of low-income workers concentrated in minority populations</li> </ul>	<ul style="list-style-type: none"> <li>● The traditional low-income transit dependent population will grow and require service</li> <li>● Service-oriented job access will be diffused/dispersed</li> <li>● Inattention to transportation needs of low-income persons may have large public costs in other areas - health, welfare, unemployment, law enforcement, etc.</li> </ul>

Summarized from *TCRP Report 28, Appendix C.*



**Figure 3.3 Implications of Work Force Flexibility**

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<b>Facts</b>	<b>Likely Implications</b>
<ul style="list-style-type: none"><li>● 25% of workers have a "flexible" work regime; in 2000, the figure will be 50%</li><li>● 90% of new jobs created monthly are 'involuntary' part-time jobs</li><li>● 40% of all women workers do not have a typical 'day-shift' job</li><li>● The rise in the flexible labor force reflects economic hardship</li></ul>	<ul style="list-style-type: none"><li>● Traditional fixed route, fixed schedule transit services are of limited usefulness to an increasingly large part of the work force.</li><li>● Places and hours of employment change regularly</li><li>● Access to jobs must be available over non-standard hours</li><li>● The ability to pay for transportation is diminished for a major segment of the job market.</li></ul>

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Summarized from *TCRP Report 28, Appendix C.*

**Figure 3.4 Implications of the Rise of Women in the Work Force**

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<b>Facts</b>	<b>Likely Implications</b>
<ul style="list-style-type: none"><li>● Over 60% of all women have paid employment</li><li>● Less than 33% of married women were employed in 1960; in 1990, the figure is nearly 60%</li><li>● By 1990, more than 44% of all mothers returned to work before their babies were 6 months old</li><li>● Work force participation by women is higher among minority groups than for whites, but is increasing for all groups</li></ul>	<ul style="list-style-type: none"><li>● Women's travel is more likely to include "linked" or "chained" trips that increase auto dependency in the absence of useful options</li><li>● Auto dependence has grown in a key sub-market</li><li>● Changing family structure is reinforcing auto dependence.</li><li>● Income and ethnic characteristics may provide a counter balance to gender in terms of transit's appeal.</li></ul>

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Summarized from *TCRP Report 28, Appendix C.*

## **Demographic Factors**

**The underlying theme in current demographic trends is one of increased diversity.** Whether one speaks of economics, race, age, gender, lifestyle or household characteristics, the role and relevance of traditional public transportation services and organizations is being threatened.

Changing demographics raise questions about the overall responsiveness of local public transportation organizations as well as the effectiveness of key business processes such as service planning, market research, service coordination and resource allocation. In addition, demographic trends also call into question how basic roles, missions and responsibilities are dispersed among local public transportation agencies and organizations.

Among the most important demographic factors affecting public transportation organizations are:

- Growth in the aging population;
- Growth in single parent households;
- Growth in single-adult households; and
- Migration and immigration.

### **Growth of the Aging Population**

Improved health, fitness and medical treatment have resulted in a steady increase in life expectancies for U.S. residents. As a result, the age mix of the U.S. population is changing with an ever higher proportion falling into the older age groups.

Several important implications for local public transportation organizations flow out of this trend. While the aging travel market has been part of the traditional "captive" core of transit ridership, many of the characteristics of people entering the older age cohorts suggest that this market may not continue to be "captive" to the same degree in the future.

Facts about the aging population and the implications for local public transportation organizations are summarized in Figure 3.5.

### **Growth of Single Person and Single-Parent Households**

In recent years, the number of households has increased at a rate faster than population. The major cause of this phenomenon has been the

**Figure 3.5 Implications of the Growth in the Aging Population**

Facts	Likely Implications
<ul style="list-style-type: none"> <li>● The elderly are the fastest growing component of U.S. population</li> <li>● In 1990, more than 25% of the population was over 60 years old</li> <li>● By the middle of the next century, it is possible that 50% of the population could be over 50 years old</li> <li>● In 1992, 90% of men and 70% of women were licensed drivers</li> <li>● The elderly tend to remain in locales where they lived while working</li> <li>● 2 of every 5 poor households were elderly in 1990</li> </ul>	<ul style="list-style-type: none"> <li>● Requirements for access, assistance and travel options will increase</li> <li>● The work trip and services designed to accommodate it are no longer important</li> <li>● Safety is of increasing concern because of reliance on personal vehicles</li> <li>● Reliance on personal vehicle use into old age is taken for granted</li> <li>● Personal services may not be as easily accessed by the elderly</li> <li>● Two key transit sub-markets are converging.</li> </ul>

Summarized from *TCRP Report 28*, Appendix C.

increase in single person and single-parent households. In addition to the increase in the numbers households, research has shown that these households own more autos per person and make more trips per day than larger, two adult households.

In the case of single-parent households, the demands on one adult to manage their own daily schedules as well as those of one or more children clearly indicate that this growing market will be less likely to view traditional public transportation as a viable travel option. Figure 3.6 summarizes key factors with respect to this trend and the implications for public transportation.

### **Migration and Immigration**

Across regions of the country, U.S. residents have continued to move to the south and west from the northeast and midwest. Within regions of the country, migration has focused on metropolitan areas. In general, however, internal migration has tended to relocate people from more dense areas to less dense areas.

**Figure 3.6 Implications of the Growth in Single Person and Single-Parent Households**

Facts	Likely Implications
<ul style="list-style-type: none"> <li>● 1969 to 1990 households grew 50% and population grew only 21%</li> <li>● Both single person and single-parent household growth exceeded population growth</li> <li>● Work and household schedule demands on single adults are more severe than two adult households</li> </ul>	<ul style="list-style-type: none"> <li>● The increase in households increases auto ownership and use</li> <li>● These households take more trips than households with two adults</li> <li>● These households are less likely to use transit</li> </ul>

Summarized from *TCRP Report 28*, Appendix C.

**Figure 3.7 Implications of Migration and Immigration**

Facts	Likely Implications
<ul style="list-style-type: none"> <li>● Trends show migration from the northeast and midwest to the south and west</li> <li>● Migration is focused on metropolitan areas</li> <li>● Immigration is focused on the south and west</li> <li>● Immigrant workers tend to have low income</li> <li>● Immigrants employment patterns and job sites tend to be scattered</li> </ul>	<ul style="list-style-type: none"> <li>● Movement is away from transit intensive regions to those that have less transit intensity</li> <li>● Transit can be effective in these settings</li> <li>● Transit is less intensive in these regions</li> <li>● They represent a traditional transit market that is growing</li> <li>● Typical travel patterns are difficult to serve via transit</li> </ul>

Summarized from *TCRP Report 28*, Appendix C.

Like internal migrating populations, the largest concentrations of immigrants to the United States are found in the south and west. Because they typically have low incomes they represent a prime market for public transportation, but there are some mitigating factors, as indicated in Figure 3.7.

## **Land Use and Development**

Suburbanization and changing development density of U.S. cities and towns present one of the most perplexing problems faced by local public transportation organizations. As population and employment spread farther across the landscape and densities fall, the ability of traditional transit services to attract and serve significant numbers of riders and to operate efficiently is diminished, along with the overall relevance of transit in people's daily lives.

The issue of development density is complex, however. Development patterns and density have changed in interesting ways in recent decades. High density nodes are emerging in suburban locations and at the periphery of metropolitan areas while surrounding areas largely remain at low suburban densities. Researchers have found, however, that population density of urbanized areas has begun to increase slightly after a long post-war period of decline. However, the largest shares of both population and job growth are occurring in suburban settings and result in travel patterns that are far more difficult to serve with traditional transit services.

Development patterns and their consequences have been examined in great detail in recent years. Figure 3.8 highlights the more obvious dimensions of land use and development trends and their implications for public transportation organizations.

## **Life Styles and Social Relationships**

Life styles and social relationships are changing and are more diverse than ever before. Among the most significant of these factors for local public transportation organizations and services are family dynamics and concern for personal safety and security. As in other cases, emerging trends do not favor reliance on traditional public transportation. Figure 3.9 highlights the most important aspects of these concerns and their implications for public transportation.

**Figure 3.8 Implications of Land Use and Development Trends**

Facts	Likely Implications
<ul style="list-style-type: none"> <li>● Slight increases have been noted in urbanized area population density, particularly in medium-sized metropolitan areas</li> </ul>	<ul style="list-style-type: none"> <li>● Increased density is advantageous to transit</li> </ul>
<ul style="list-style-type: none"> <li>● Employment density is continuing to decline</li> </ul>	<ul style="list-style-type: none"> <li>● Dispersion of a major market reduces traditional transit's appeal, relevance and viability</li> </ul>
<ul style="list-style-type: none"> <li>● Development is being focused in urban activity centers and nodes</li> </ul>	<ul style="list-style-type: none"> <li>● Multiple, dispersed activity centers are difficult and costly to serve, but represent a distinct market and opportunity at a sub-regional level</li> </ul>
<ul style="list-style-type: none"> <li>● CBDs continue to represent the largest single concentration of employment, shifting from manufacturing to services</li> </ul>	<ul style="list-style-type: none"> <li>● Transit's traditional primary market remains important, but is declining in relative significance</li> </ul>
<ul style="list-style-type: none"> <li>● The proportion of total travel for work trips has declined to roughly 30%.</li> </ul>	<ul style="list-style-type: none"> <li>● Travel growth is occurring in markets that are not well served by traditional transit</li> </ul>

Summarized from *TCRP Report 28*, Appendix C.

**Figure 3.9 Implications of Social Relationships**

Facts	Likely Implications
<ul style="list-style-type: none"> <li>● <i>Family structure and support</i> The ratio of dependent population to working age population will increase 50% from 1990 to 2030</li> </ul>	<ul style="list-style-type: none"> <li>● Care-giving responsibility by family members will increase with an expected emphasis on personal vehicles for transportation</li> </ul>
<ul style="list-style-type: none"> <li>● <i>Balancing household responsibilities</i> Basic household responsibilities are being shared more evenly among spouses as women enter the work force</li> </ul>	<ul style="list-style-type: none"> <li>● Neither adult in a household may find the use of traditional transit practical</li> </ul>
<ul style="list-style-type: none"> <li>● <i>Safety and security</i> Perceptions of personal safety getting to and using transit stops is a significant factor in choosing modes</li> </ul>	<ul style="list-style-type: none"> <li>● Segments of traditional markets actively resist transit use</li> </ul>

Summarized from *TCRP Report 28*, Appendix C.

## **The Rise of Technology**

Technological advances over the past two decades have become powerful agents of change throughout the economy, both nationally and globally. The ability to identify, adapt and integrate new technologies on a continuing basis in the service of clients and customers is a hallmark of successful enterprises, both public and private.

Underlying current advances in technology is the rise of what is described as the "information age" or the "knowledge age." The major driving forces are:

***Globalization*** in the movement of people, goods, money and information;

***New information technologies*** that increase productivity and invite new business processes; and

***A focus on shareholder (or stakeholder) value*** through new approaches to goal-setting, strategic planning, resource allocation, performance measurement, compensation and communications.<sup>3</sup>

The rise of the information age has far-reaching implications for local public transportation organizations which are, in many ways, trapped in an outmoded industrial era production paradigm.

- At one level, new information technologies can improve current business practices and performance.
- On a second level, the rapid rise of new information technology is fundamentally changing business practices throughout the economy. As a result, physical location and proximity have become less dominant factors, changing travel demands and traveler response to options.
- Finally, new information technologies are prompting new business processes and fundamental changes in organizational structures. Traditional hierarchical organizations are giving way to virtual networks of managers, employees, customers, suppliers, associates and shareholders.<sup>4</sup>

The classic pyramid model of organizations has given way to matrix models and circle models of organization. Local public transportation

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<sup>3</sup> Chase, Roy L., "Knowledge Navigators," *Information Outlook*, September 1998, pp. 17-26.

<sup>4</sup> Chase, *Ibid.*

organizations, however, remain structured around the classic hierarchical model.

The opportunity and the necessity to embrace fundamental organizational change and redesign of business processes through the application of new information technologies is highlighted in recurring observations about how best to apply new information technologies.

*"Use computers to redesign – not just automate – existing business processes." "It is time to stop paving cow paths. Instead of embedding outdated processes in silicon and software, we should obliterate them and start over. We should 'reengineer' our businesses; use the power of modern information technology to radically redesign our business processes in order to achieve dramatic improvements in their performance."<sup>5</sup>*

### **Public Transportation Has Been Slow to Adopt New Technologies**

A host of new technologies are emerging and the industry itself has organized to take advantage of new technology. But the pace at which new technologies are being introduced and put into widespread use has been agonizingly slow. In a recent review of effective techniques to enhance traditional services, interviewers were quick to observe that even in the case of traditional services and business practices:

*"Transit has been generally slow to experiment and implement new technology."<sup>6</sup>*

In contrast, private participants in the local transportation arena, including taxi and livery services, have been quicker to identify and embrace new technologies in the service of their customers, markets and performance goals.

In looking at local public transportation organizations, a variety of barriers have been cited for the slow introduction of new technology and, therefore, the minimal impact technology has had to date on organizational structure and business processes. Among the most significant of these barriers are:

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<sup>5</sup> Hammer, Michael, "Reengineering Work: Don't Automate, Obliterate," *Harvard Business Review*, July-August, 1990.

<sup>6</sup> Center for Urban Transportation Research, University of South Florida, "Lessons Learned in Transit Efficiencies, Revenue Generation, and Cost Reduction," for the Federal Transit Administration, U.S. Department of Transportation, Washington, DC, June 1997, p. 8.



- An industry that is, in some respects, too small a market to support front-end technology research, development and deployment;
- Lack of knowledgeable leadership to champion technological change;
- A lack of clarity about what problems, missions or objectives should be the target of new technologies;
- Risk/reward dynamics in the industry that are not conducive to innovation;
- Inadequate funding to pursue and sustain introduction of new technologies;
- Inadequate employee skills and knowledge to introduce and manage new systems and technologies;
- Inadequate data to support use of new information technologies;
- Poor implementation plans for deployment; and
- Cumbersome governmental procurement processes that limit, segment, complicate and stretch out the solicitation process, specification writing, system development, system testing and full-scale deployment.

Before new technologies can be introduced, widely deployed and ultimately trigger fundamental change in organizations and business processes as suggested by Hammer, these barriers must be addressed and overcome.

Much of the responsibility to do so lies with decision-makers and policy-makers acting outside today's local public transportation organizations. Increasing the receptivity to and introduction of new technologies requires changes in the "enabling environment" for transit, as suggested earlier.

In addition, to take full advantage, organizations need to establish a comprehensive strategy for the use of new technologies, and perhaps even adjust mission, goals and objectives in the process – a step that public transit managers and policy-makers *can* pursue themselves.

## **An Overview of Emerging New Technologies**

There is a wide array of new technologies emerging that have direct application to transportation generally and public transportation specifically. The effort to develop and adapt the technologies that are based on advanced computer, electronic and communications applications has been dubbed "Intelligent Transportation Systems," or ITS.

The specific ITS applications that are relevant to public transportation fall under the heading of "Advanced Public Transportation Systems," or APTS. In addition to the advances being made in computer and communications technologies, there are a host of other new technologies being examined which are of obvious and immediate importance to local public transportation organizations. Many of these are in very early stages of deployment and testing; others are more widespread.

Figure 3.10 provides a broad summary of the most significant new technologies that have the potential to change the way public transportation services are provided and how local public transportation organizations are organized and run.

The critical question is how these technologies can be integrated into public transportation systems most effectively, and the scope of organizational changes needed to achieve the full potential of these technologies.

**Figure 3.10 Major New Technologies for Public Transportation**

Technology	Characteristics
<b>Advanced Public Transportation Systems (APTS)</b>	
<i>Fleet Management Applications</i>	
Communications systems	Voice and data systems for vehicle links
Geographic information systems (GIS)	Computerized data and mapping
Automatic vehicle location systems (AVL)	Global Positioning Systems via satellite or ground communications
Automatic passenger counters	Real-time counts and database development for service evaluation
Transit operations software	Planning, scheduling, dispatching, monitoring, data acquisition, supervision and security applications, among others
Traffic signal priority treatment	Priority for transit at signalized intersections
<i>Traveler Information</i>	
Pre-trip information	Real-time information/multiple locations via computer linkages and systems
Wayside information	Real-time information to transit users en-route
In-vehicle information	Real-time audio and visual information en-route
Multimodal traveler information	Real-time multimodal information throughout the transportation network
<i>Electronic Fare Payment</i>	
Automated fare payment systems	Magnetic, credit or "smart" cards Smart cards as contact, "contactless," or combination Provided through multiple issuers and providers ("open systems") or through single issuers and providers ("closed" system)
<i>Travel Demand Management</i>	
Dynamic ridesharing	Real-time ride-matching
Automated service coordination	Multiple agency/provider operations linkages
Transportation management centers	Combines traffic and transit operations, communications and control
HOV facility monitoring	Video, infrared, transponders, etc. to monitor for enforcement

**Figure 3.10 Major New Technologies for Public Transportation (continued)**

Technology	Characteristics
<b><i>Advanced Technology Transit Bus (ATTB)</i></b>	
Compressed natural gas Electric drive and subsystems Modular engine components Low floor (14")	Under development and testing through a consortium effort
<b><i>Small Vehicle Applications</i></b>	
	Introduction of small vehicles (15-19-22 passenger vehicles) into service in place of standard transit coaches
<b><i>Other Vehicle Applications</i></b>	
<i>"Bus-Train"</i> <b><i>Advanced materials (composites, etc.)</i></b> Intelligent vehicles	Small vehicles circulating independently and joined to form a single "train" Provides weight reduction Electronic/automated vehicle guidance and accident avoidance systems
<b><i>Fuel and Propulsion</i></b>	
Compressed Natural Gas (CNG) Liquified Natural Gas (LNG) Methanol Diesel-electric "hybrid" Electric vehicles Fuel Cell (hydrogen/oxygen electricity production) Clean Diesel Energy storage systems	Provide varying degrees of emission reduction Provide varying degrees of fuel cost savings

## **Forces and Societal Trends: Conclusions That Require Action**

The forces and factors described above generally lie outside the direct control of current public transportation organizations, managers and policy makers. Yet they frame the environment and help characterize the current and emerging markets for improved access and mobility. To what extent do you agree or disagree with these basic premises?

1. *Societal forces and trends act to the detriment of traditional forms of public transportation and the organizations involved in planning and providing those services.*
2. *Local public transportation organizations have shown little ability to react and respond to these forces and trends.*
3. *The nature and pace of change, as described, demands greater responsiveness from local public transportation organizations, including:*
  - Enhanced knowledge of today's travel markets;*
  - Greater variety and differentiation in products and services;*
  - More effective delivery processes;*
  - Higher levels of integration across services and organizations; and*
  - Increased accountability in whether and how service is provided.*
4. *These requirements, in turn, call for fundamental change both in the structure and roles of local public transportation organizations, and in the basic business processes by which current services are provided.*

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## **4.0 The Public Policy Arena**

*Constraints and Contradictions*

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## **4.0 The Public Policy Arena: Constraints and Contradictions**

*Public policies and regulations are a critical element of the "enabling environment" in which local public transportation organizations must act and react. Public policies cover an increasingly wide range of subjects, often reflect contradictory goals and expectations, and act as significant constraints on the types of fundamental change that might be pursued as part of a paradigm shift in the industry.*

*The fact that public policies act to restrict the responsiveness of local public transportation organizations, strongly suggests that change in the policy arena will be an essential part of the pursuit of new paradigms.*

*The responsibility for formulating and revising public policy, however, lies largely outside the span of control of local public transportation managers. In order to undertake fundamental change, new policy guidance from elected officials at all levels of government will be needed, along with more strategically enlightened and effective transportation managers.*

## **Today's Policy Landscape**

The policy arena in which local public transportation organizations operate involves every level of government and deals with a wide range of substantive issues. To a large degree, however, the transportation policy arena is dominated by the federal government.

- A substantial share of local surface transportation investment is provided through federal programs.
- Federal programs establish which organizations and institutions will be eligible to receive federal funds, what actions and improvements are eligible for funding and how those organizations will relate to each other at various steps in the planning and decision-making process.
- In recent years, the impact of federal policy on transportation generally has expanded through formulation of federal policies on environmental protection, safety, energy conservation, civil rights and, more recently, welfare reform, among others.

In addition to federal policy, states also exercise a considerable degree of authority. State funding for transit and transportation is structured, in large part, to parallel federal programs and requirements, although allocation mechanisms and priorities are different, state-to-state. In some policy arenas, like welfare and education, states are playing increasingly larger roles as authority is shifting from the federal to the state level.

Local governments also exert major influence on transit and transportation organizations and services through their funding and regulatory authority. Local governments, in fact, are unique in their authority - jealously guarded - to guide and control land use and development within their borders, a critical element in fashioning effective transportation plans, services and facilities.

The policy landscape is complex and is in many ways confining. As a practical matter, local public transportation organizations have a limited span of authority and control and, therefore, a limited ability to respond and react to the changing circumstances they confront.

## **Critical Policy Dimensions**

Public policy is formulated and executed at the federal, state and local level through two basic mechanisms - investment and regulation. A 1997 study sponsored by the TCRP developed a framework for assessing the



effects of public policy on transit and transit's market share.<sup>1</sup> In addition to documenting the steady decline of transit's market share, the report identified several key areas where public policies influence the travel behavior of individuals and households. Policies in these same areas also act to constrain local public transportation organizations, both in their ability to react and respond to changing conditions and in their ability to pursue more fundamental institutional change. These include:

- Transportation policies;
- Environmental policy;
- Energy policy;
- Tax policy;
- Land use policy; and
- Other policies and program features.

Figure 4.1 uses these same categories of broad public policy to highlight instances in which current public policy may influence the choices available to local public transportation organizations.

## **Conflicts in Policy Objectives**

One of the reasons to consider change in the "enabling environment" in which local public transportation agencies operate is the emergence of conflicting goals, objectives and expectations that have arisen as the scope of public policy affecting transportation has broadened.

As a result, there are multiple goals and objectives that have been placed at the doorstep of local public transportation organizations that often conflict with one another. These include the goals of:

***Increasing ridership***, which is being accomplished in many systems today;

***Increasing market share***, which is being met in some niche markets but is generally in long-term decline across the industry;

***Reducing subsidy levels***, through expenditure reductions or fare increases, which reduce service and/or reduce ridership;

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<sup>1</sup> Charles River Associates, Inc. "Building Transit Ridership: An Exploration of Transit's Market Share and the Public Policies That Influence It," Transit Cooperative Research Program, Report 27, Washington, DC, 1997.

**Figure 4.1 Selected Public Policies Affecting Local Public Transportation**

<p style="text-align: center;"><b>Transportation Investment Policy</b></p> <ul style="list-style-type: none"><li>• Federal investments in transportation require varying levels of state and local "match," an incentive to pursue projects whose local cost is lowest</li><li>• The use of federal funds in support of joint public-private ventures is limited</li><li>• Federal requirements to meet the needs of specific travel markets increase the costs of service</li></ul>
<p style="text-align: center;"><b>Transportation Pricing Policy</b></p> <ul style="list-style-type: none"><li>• Federal requirements for reduced fares and limited service to specific markets reduce revenue-raising ability</li><li>• Federal restrictions on the use of tolls on federally supported highways restrict the ability to introduce economic incentives into travel choice</li><li>• Parking pricing and availability are controlled through separate agencies and institutions and are largely uncoordinated with transit planning and services</li></ul>
<p style="text-align: center;"><b>Environmental Policy</b></p> <ul style="list-style-type: none"><li>• Conformance with national air quality standards provides an incentive to introduce more and better transit services, as well as requirements to implement specific transit-related strategies</li><li>• Federal requirements to reduce tailpipe emissions in transit vehicles increase transit capital and maintenance costs</li><li>• No federal funding is provided to support mandated air quality policies and conformity, putting added strain on local resources and unbalancing local transit service structures and budgets</li></ul>
<p style="text-align: center;"><b>Energy Policy</b></p> <ul style="list-style-type: none"><li>• Federal policies to reduce reliance on petroleum and carbon-based fuels require increased capital and operating costs for introduction of alternative fuels</li><li>• Little federal funding is provided to support mandated energy policies, putting added strain on local resources and unbalancing local service structures and budgets</li></ul>

**Figure 4.1 Selected Public Policies Affecting Local Public Transportation (continued)**

<b>Tax Policy</b>
<ul style="list-style-type: none"> <li>• State constitutional restrictions prohibit the use of fuel tax revenues for public transportation in many states</li> <li>• Employer support of employee commute choices is taxed at different rates, disadvantaging transit users</li> <li>• Mortgage interest and home finance policies have contributed to development patterns that are difficult for transit to serve</li> </ul>
<b>Land Use Policy</b>
<ul style="list-style-type: none"> <li>• Local land use controls and development policies limit the viability of transit through low densities, segregation of uses, expansive parking requirements, generous street design standards and poor accommodation of non-motorized travel</li> <li>• Local land use and development policies are not well coordinated with transportation investment policies</li> <li>• Local public facility and service investment policies are not well-coordinated with transportation investment policies</li> </ul>
<b>Other Policy Areas</b>
<ul style="list-style-type: none"> <li>• Regulation of private transportation providers is housed in separate agencies and institutions, where rate structures, market entry, safety and service levels are controlled independently of local public transportation</li> <li>• Health and human service agencies operate under policies and procedures that make it difficult to engage in joint service delivery and financing arrangements with public providers</li> <li>• Long-standing federal labor protection policies sustain an environment in which cost-reduction and product diversification are severely constrained</li> </ul>

Source: Adapted from *TCRP Report 27*, "Building Transit Ridership: An Exploration of Transit's Market Share and the Public Policies That Influence It."

***Expanding service to specific populations***, that results in costs far in excess of regular services, and under budget constraints may result in reductions of service to other markets;

***Increasing economic efficiency or reducing expenditures in the short-run***, which can be done by shrinking the systems and services to a point where they are irrelevant in a regional context;

***Maintenance of service levels*** across a region in proportion to local jurisdictions' support, which usually frustrates progress toward other objectives.

***Increase revenue***, which may either reduce ridership and/or reduce subsidy levels.

As a practical matter, however, most planning and decision-making in public transportation is dominated by short-term perspectives reflecting:

- the need to maximize service within annual budget constraints that may vary year-to-year; and
- the need to respond in a political environment where leadership and policy agendas can change with biennial elections.

***The nature of an organization shaped and conditioned to respond to these stimuli is much different, and arguably much less effective, than an organization shaped and conditioned to respond nimbly to changing markets, external conditions and new technologies.***

***To the extent that the public policy environment has served to limit and constrain the responsiveness of local public transportation organizations, aspects of that policy environment must be changed or reconciled as a prerequisite to the introduction of new paradigms.***

## **The Public Policy Action: Conditions That Require Action**

Shifts in long-standing public policies are a necessary prerequisite to paradigm shifts in local public transportation organizations. To what extent do you agree or disagree with the following basic premises?

- 1. A wide variety of public policies dictate the shape of today's local public transit organizations, the nature of their services and the processes through which they operate.***
- 2. These policies introduce complexity, inconsistency and conflict that cannot be resolved by transit professionals acting independently. In many cases, they introduce inefficiencies in day-to-day operations and seriously constrain the ability of local public transportation organizations to respond to the changing environment and travel markets.***

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## **5.0 Yardsticks for Measuring Success**

*Performance Measures Need to Reflect  
Broader Goals*

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## 5.0 Yardsticks for Measuring Success: Performance Measures Need to Reflect Broader Goals

*Most fundamental change results from concerns about or failures in organizational performance. Yet the basis on which we assess performance and establish the value of various investments and actions is, itself, undergoing significant change in many quarters.*

*In transportation, performance has traditionally been measured in terms of how efficiently vehicles can move throughout a network. Only recently have the freight industry and the passenger transportation industry broadened their views to focus on the flow of people and goods, rather than the flow of vehicles. Even more significant is the increased attention being paid to performance measured in terms of the **outcomes and impacts** of transportation choices, rather than the outputs and efficiency of transportation services and investments.*

*Expanding concept of performance measurement to assess the broader outcomes of transportation investment provides another avenue for increasing the relevance of local public transportation in a multimodal context. But taking advantage of this opportunity requires a new framework for service planning, operations and management, for reinvention of performance measurement in local transportation.*

## **The Broadening Goal and Objective Framework for Transportation: Measuring Outcomes and Impacts**

Measurements of performance reflect the goals and objectives we seek to accomplish. Traditionally, transportation goals have been defined somewhat narrowly. Performance measurement in transportation traditionally has reflected an engineering orientation focused on: 1) the efficiency of vehicle flows on different types of varying design and facilities with operational characteristics; and 2) how efficiently resources are being used to improve vehicle flows.

Today, however, our travel needs are not viewed only in engineering terms. Transportation is understood to be a "derived demand." With few exceptions, we travel in order to satisfy other more fundamental needs - to reach various activities and opportunities that can increase our economic well being, our health, welfare and personal security, and the quality of our environment.

Our ability to reach these destinations - our level of *access* - and the ease with which we travel - our *mobility* - together help to determine our quality of life and the livability of our communities. It is these broader goals that are the true outcomes of our transportation choices.

The passage of ISTEA and TEA-21 enlarged the concept of performance with their emphasis on access and mobility for both people and goods, not just vehicles. Access and mobility have become critical outcomes - the measures by which we can better evaluate the performance of the transportation system.

While this new orientation to performance measurement represents an important "paradigm shift," development and use of new measures of access and mobility are still in their infancy. The true paradigm shift advanced by ISTEA and TEA-21 will only occur when these measures are put into use, allowing us to link transportation investments and alternatives to broader outcomes.

### **Emerging Performance Frameworks and Measures**

Some limited progress is being made in the search for more effective frameworks for measuring accessibility and mobility and, in turn, the effect they have on meeting more fundamental personal and societal needs.

The emerging frameworks generally:

- Are multimodal in scope, i.e., they look at the performance of the entire transportation system at various levels;

- Include dimensions that go well beyond the internal operating efficiency of a particular system; and
- Include assessments of organizational capacity to attract, retain and reward human talent needed to evolve and adopt as a fundamental dimension of performance.

With a broader set of measures in place, the impact of various public transportation services and delivery mechanisms can be evaluated more thoroughly. Figure 5.1 summarizes new approaches to performance measurement that are being explored. It is noteworthy that the examples shown are from organizations other than traditional transit operating agencies, suggesting that local public transportation organizations are somewhat behind the curve in matching measures of performance to broader goals and expectations they must serve.

While these examples may not yet represent a paradigm shift in the realm of performance measurement, they do reinforce two critical notions:

- There are new and broader means emerging to measure performance that are better aligned with the broadening goals, objectives and expectations that public transportation is being asked to address; and
- That performance measurement must shift away from efficiency measures to assess *impacts*, and away from output measures to assess *outcomes*.

### **Beyond Access and Mobility: The Next Paradigm Shift in Performance Measurement**

An even broader perspective in measuring the outcomes of transportation choices may lie on the horizon. An article in *The Amicus Journal* in the fall of 1996, observed that:

*"If we try to induce people to use transit through guilt, while the automobile industry is saying, 'if you drive this car you're going to get more and better sex,' it's not an equal contest. In transit coaches, there's no place to put groceries, there's no place to hang dry cleaning. Every time you get on a bus the message is: We assume you're going to vandalize this; we assume you are going to be dirty. And every time you get in a car the message is: We're going to pamper you the way you deserve to be pampered. As long as we have an 'alternative' that's not a real alternative psychologically, then the automobile is going to win. **It's not an issue of mobility. It's an issue of freedom and self-worth**" [emphasis added].<sup>1</sup>*

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<sup>1</sup> Lawrence, Gary, "A Forum on the Future of Sprawl," *The Amicus Journal*, Fall 1996, p. 23.



**Figure 5.1 New Ideas in Transportation Performance Measurement**

Source	Aspects of Performance	Measures
TEA-21	<p><i>Outcomes Sought</i></p> <ul style="list-style-type: none"> <li>Economic vitality</li> <li>Safety and security</li> <li>Access and mobility</li> <li>Environment, energy and quality of life</li> <li>System integration, and connectivity</li> <li>Efficiency</li> <li>Preservation</li> </ul>	
Florida DOT	<p><i>Travel Markets</i></p> <ul style="list-style-type: none"> <li>Intrastate/Intercity</li> <li>Urban Area</li> <li>Interstate</li> </ul>	<p><i>Measures</i></p> <ul style="list-style-type: none"> <li>Quantity (supply/demand)</li> <li>Quality (time and cost)</li> <li>Accessibility (coverage/connectivity)</li> <li>Performance (efficiency, cost-effectiveness, customer satisfaction, safety)</li> </ul>
Twin Cities Metropolitan Council (MPO)	<p><i>Transit Service Types</i></p> <ul style="list-style-type: none"> <li>Mobility services</li> <li>Commuting services</li> <li>Reverse commute services</li> <li>Livability services</li> <li>ADA services</li> </ul>	<p><i>Measures</i></p> <ul style="list-style-type: none"> <li>Proximity to service</li> <li>Service per capita</li> <li>Investment per capita</li> <li>Ridership</li> <li>Cost</li> <li>Customer satisfaction</li> <li>Change in quality</li> </ul>
Minnesota DOT	<p><i>Performance Dimensions</i></p> <ul style="list-style-type: none"> <li>System performance</li> <li>Investment/operational impacts</li> <li>Organizational performance</li> </ul>	
Delaware DOT	<p><i>Investment focus</i></p> <ul style="list-style-type: none"> <li>Multimodal areas (for capacity expansion)</li> <li>Management Areas</li> <li>Preservation Areas</li> </ul>	<p><i>Measures</i></p> <ul style="list-style-type: none"> <li>Customer satisfaction</li> <li>Travel time</li> <li>Sustainability of investment</li> </ul>

**Figure 5.1 New Ideas in Transportation Performance Measurement (continued)**

Source	Aspects of Performance	Measures
Intermodal Freight Industry	<p><i>Principles</i></p> <p>Understand customer needs</p> <p>Develop mode-neutral service concept/plan</p> <p>Examine quality of the transfer</p>	<p><i>Mobility Measures</i></p> <p>% on-time delivery</p> <p>Door-to-door reliability</p> <p>Door-to-door time</p> <p>Door-to-door cost</p> <p>Market share</p> <p>Consumer satisfaction</p>

Even the shift in focus to access and mobility may still leave us short of the type of paradigm shift that is needed. Underlying the quote from Gary Lawrence, above, is the admonition to look more closely at what the customer values most. The question is, what organizational arrangement, what types of services, what business processes, what system of incentives and rewards and what measures would allow local public transportation organizations to be successful if performance is ultimately measured in more basic and more personal terms, as is the case in a host of other businesses and industries?

**Measuring Performance:  
Conditions That Require Action**

To what extent do you agree or disagree with the following basic premises?

1. *Performance is measured too narrowly in transportation.*
2. *Engineering oriented measures of output and efficiency must be broadened to incorporate measures of outcome and impact that can be related directly to broader community goals and expectations.*

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## **6.0 Characteristics of Change**

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## 6.0 Characteristics of Change

*The forces and factors cited in prior chapters affect more than public transportation organizations. In many instances, these same factors have driven wholesale "reinvention" of all types of businesses, industries and organizations. In other instances fundamental change is being pursued in key business processes and functions within well-established organizations.*

*Alternatively, there are industries, business sectors and institutions that have been slow to adapt and change, and these have generally paid a heavy price in terms of profitability, market share and relevance in today's changing world.*

*There are critical lessons to be learned from both ends of the spectrum – from the successes and from the failures. In the process, there is certainty about one thing – failure to change and adapt is a certain road to irrelevance if not extinction.*

*The examples cited below indicate clearly how fundamental changes – the introduction of new paradigms – have been pursued and sustained in a variety of contexts. These stories, and the lessons they offer, provide a final rationale and models for embracing new paradigms in the provision of local public transportation services.*

## **Works in Progress: Examples of New Paradigms and Fundamental Change**

The forces and factors highlighted in earlier chapters have triggered significant changes and adaptations in a wide variety of organizations and institutions. From these experiences, those involved in guiding and managing local public transportation organizations can:

- Gain a sense of confidence that fundamental change is both desirable and possible; and
- Adapt strategies and approaches from the lessons of these organizations.

Among the more interesting and provocative examples of new paradigms and fundamental changes being made to business processes are those described briefly below.

### **The Private Sector**

Transformational change in the private sector is driven by declines in profitability and market share and is initiated and sustained through the direction of top managers.

#### **General Electric "Work Out"**

To increase GE's productivity and responsiveness, corporate CEO Jack Welch instituted a program of regular, structured meetings of employees and managers, or "Work Out" sessions. Participants from throughout the company engaged in direct, two-way communications to identify and pose solutions to problems that could be considered on their merits and required an on-the-spot response from management. The notion of "boundarylessness" replaced a sense of bureaucratic barriers and hierarchical management, and new energy and creativity were tapped in the service of shared corporate values, business purpose and operating ideas. The result was a dramatic and sustained increase in shareowner value.

#### **Mini Mills in the Steel Industry**

Several large, monolithic, integrated steel companies were losing huge segments of the market to low cost foreign manufacturers because they were slow to react to changing global economics and the rise of new

technologies. These failures resulted in the breakup of larger companies and the separation of functions and the use of outside contractors under competitive conditions. Specialized products were introduced for niche markets using new technologies applied at smaller scales. In companies that remained highly integrated, workers traded wage and benefit concessions for increased participation in management. Restructuring and rethinking the business reestablished world leadership for North American steel.

### **Integration in the Energy Industry**

Historic regulation had maintained the price of electricity at unacceptable levels. The resulting deregulation allowed independent power producers and suppliers to enter the market, operate on power grids owned by traditional utilities and sell directly to either consumers or the utilities. Decentralized electrical production has lowered prices, new corporate alliances have been formed, mergers between electric utilities and gas companies have taken place and new customer services have been introduced to reinforce customer loyalty.

### **Telecommunications**

Uneven service provision and rising costs led to deregulation in local and long distance telephone service that has increased competition in what was a monopolistic environment. Increased competition has resulted in more rapid introduction of new technology and lower prices to consumers. The drive to remain competitive has spurred providers to expand market research and introduce new services in order to be more cognizant of and responsive to customer needs and price sensitivity.

### **Public and Quasi-Public Organizations**

Transformational change in public and quasi-public organizations must be initiated and sustained in a broader "political" environment where mandates must be sought and accountability shouldered in an environment that frequently lacks adequate risk-reward mechanisms.

### **New Strategies in Conservation**

The Nature Conservancy has traditionally preserved and protected valuable ecosystems by purchasing and holding tracts of land. In recent years, however, ecological threats have risen on such a scale that outright purchase has become financially unfeasible. As a result the Conservancy has had to fundamentally alter its mission, core business strategies and practices. New innovative approaches were added to the land purchase strategy, including pollution credits, development loans and joint ventures. In the process, the capabilities of the organization had to be

expanded and new staff skills added to maintain the Conservancy's effectiveness.

### **City of Louisville "City Work"**

City Work is an initiative begun by the Mayor of Louisville that replaces top-down command and control management with broad-based collaboration between employees and management and across departments. Business processes and organizational structures have been permanently altered and the ability to innovate has been institutionalized through problem-solving sessions patterned after the GE "Work Out" program. Substantial cost savings have been achieved and Louisville citizens are being included in the City Work process as well.

### **Postal Service Reforms**

Rapid technological change, private sector competition and growing customer dissatisfaction led to federal legislation requiring that the U.S. Postal Service become a self-supporting, independent establishment governed by a private sector style Board of Governors. With this impetus, fundamental changes continue to occur despite the mandate to provide universal service and the necessity to cross-subsidize service to some markets with revenues from others. New services have been introduced with greater differentiation in service quality and price. Significant automation and new technologies have been introduced in both operations and for direct customer use, including bar-coding, Smart Cards and hand-held scanners. New business practices have been adopted, including compensation plans based on objective performance criteria and franchising through private businesses.

### **The Charter School Movement**

Dissatisfaction with the quality, responsiveness, performance and cost of the public education system has been building significantly in recent years. In response, a New England educator introduced an alternative approach to establish contracts between small groups of teachers and local school boards and/or communities that would allow and encourage new educational ideas and techniques. The concept has been supported and advanced by teacher associations and unions and has found broader favor than some other more controversial new paradigms in education, including outright privatization and vouchers. The concept has spread rapidly with more and more states enacting enabling legislation. There have been noteworthy, sustained successes as well as failures along the way.

## **Transportation**

### **SeaLand/CSX**

As a successful innovator in containerized shipping and intermodal freight transportation, SeaLand/CSX had long operated under a paradigm involving the use of dedicated assets to serve recognized markets under competitive and cost pressures. Led by insights from top corporate management, this traditional approach has been replaced by what one SeaLand/CSX Vice President described as "an obsession for the consumer." This reorientation led to the development of a partnership with a major rival that was driven by enlarging customer benefits through improved scheduling, enhanced frequency of service, shorter travel times and rationalization of terminals. Strategic direction for the new partnerships was provided at the top levels of the company; attention to internal communications provided the basis for sustaining the partnership at the mid-level.

### **New York E-Z Pass**

Access to Manhattan is constrained by water and the existing system of bridges on which congestion has grown to crisis proportions in recent years. The emergence of new electronic toll collection technologies had prompted several organizations across five states to undertake independent investigations of the potential for their application as a solution to the crippling congestion. Agreement was reached among the leaders of eleven agencies to pursue the concept of one-tag electronic toll collection through a joint collaborative effort, in part because of economies of scale and in part because of the opportunity to drive the technology rather than visa-versa. Integrating multiple agencies on a common enterprise was the greatest challenge, not the technical issues involved. The collaborative challenge was met through a sustained commitment by top management, equal representation by agencies in all aspects of the effort, decision by consensus, and purposeful informality that overcame predictable early resistance from most agencies.

### **Hong Kong Mass Transit Railway Corporation**

Intermodal access has become an increasing problem in the overall performance of urban transportation systems worldwide. The concept of fully integrating ground access from downtown Hong Kong with remotely located air services was a commitment made by the Crown Colony Government. Implementation, however, was driven by a single, visionary and committed senior executive. In the process, the MTRC had to redefine itself and its role to provide new products and services totally outside its traditional mission and function, e.g., a seamless package of services including baggage handling, boarding passes, flight schedule information, express services with premium fares and complex financial



agreements with the airlines. The niche market was exhaustively researched and every element of the new service and function tailored to meet customer needs.

### **Dutch OVR System**

The vision and persistence of one person at the mid-management level of the Dutch National Railways was the sustaining force that has resulted in the consolidation and full integration of customer information services that had been independently provided by 24 separate companies nationwide. Previously, 50 telephone numbers were available for transit information, plus the ability to call 380 railroad stations. The door-to-door trip-planning functions of these agencies has been enhanced, relocated and consolidated in a single, separate agency. The availability of suitable technologies and the persistence of a single individual drove a commitment by executives of three organizations, Dutch National Railways, the Municipal Transit Operations and the national bus companies, to support collaboration that led to major institutional restructuring with the purpose of improved customer service and efficiency.

### **Gothenburg, Sweden**

Concern over poor utilization of costly human service transportation led to the design and implementation of a fully automated routing and dispatching system that is provided jointly to all transportation services other than fixed route through operation in a highly developed mobility management center within a city department. Over 6,000 trips a day are dispatched to services operated by contract group services and taxi companies. Development of the technology was sustained over 20 years through overarching political support and because of the appeal of enhancing service to those in need and reducing cost in the process.

## **Barriers to Change: Learning from Failures**

Barriers to change are many and exist at both the organizational and personal levels. It is critical to note that change, by itself, does not automatically result in process or sustained improvements in performance. Similarly the status quo does not always produce failure in executing missions and meeting objectives. However, research on over 100 companies that failed in their attempts to achieve significant organization transformation identified eight principal barriers to change, most of them involving leadership in one way or another. The chief errors made in the attempt to introduce fundamental change were:

- Not establishing a great enough sense of urgency;
- Not creating a powerful enough guiding coalition;
- Lack of a vision;
- Under-communicating the vision;
- Not removing obstacles to the new vision;
- Not systematically planning for and creating short-term wins;
- Declaring victory too soon; and
- Not anchoring changes in the corporation's culture.

### **Change as a Process**

The complexities of motivating fundamental change will be addressed as part of the work to be done in the implementation task of the New Paradigms project. To learn from the successes and failures described above, however, some observations about the process of change are important.

First, the effects of the organizational system on the individual are greater than those of the individual on the system. Effectively planning and managing the change process can help break down these individual barriers to change. Some of the familiar bromides and possible actions to deal with the concerns of individuals are noted in Figure 6.1.

Typically, barriers to change and errors by leadership will be frequent and persistent in any transformation initiative. The critical thing is to recognize this and prepare for it. A great deal of literature has developed over the past decade concerning the process of managing change. Advocates and practitioners of continuous quality improvement and similar approaches have generated some of the best material, with W.E. Deming and J.M. Juran perhaps offering the most accessible literature. In their research and writing during the past decade, David Nadler and Michael Tushman have also created a substantial body of literature on organizational change and the leadership of change. They offer a reasonably well integrated theory about the systemic nature of strategic change in organizations and a solid rationale for approaching it on a comprehensive basis. They offer support for change approaches at the level of:

- Executive leadership;
- Operational and administrative restructuring (i.e., change in key functional areas); and
- Long-term organizational cultural levels.

**Figure 6.1      Actions to Reduce the Resistance of Individuals**

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<b>Concern</b>	<b>Possible Responses</b>
Loss of Control	Allow room for participation in the planning of change.  Leave choices within the overall decision to change.
Excess Uncertainty	Provide a clear picture of the change; a "vision" with detail about the new "state."  Repeatedly demonstrate leadership's commitment to the change.
No Surprises	Share information about change plans to the fullest extent possible.  Minimize surprises; give people advance warning about new requirements.
The "Difference" Effect	Divide a big change into more manageable and familiar steps; let people take a small step first.  Allow for digestion of change requests; provide a chance to become accustomed to the ideas of change before making a commitment.
Loss of Face	Allow expressions of nostalgia and grief for the past, then create excitement about the future.
Concerns About Future Competence	Make standards and requirements clear; tell people exactly what is expected of them in the change.  Offer positive reinforcement for competence; let people know they can do it.
Ripple Effects	Look for and reward pioneers, innovators and early successes to serve as models; focus on successes not obstacles.
More Work	Help people find or feel compensated for the extra time and energy change requires.
Past Resentments	Avoid creating obvious losers from the change.

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While there is no single right way to approach such broad-scale change, they believe that practice supports the need for systematic change at all three levels.

## **Lessons from Real Experience**

In the transportation-related examples cited earlier, organizations have been more concerned with retaining the goodwill and the long term bond with the customer than with achieving maximum use of "the dedicated assets" they own and operate.

The provision of mobility to the customer is seen as more important than the act of providing a service within the company. In order to broaden the range and increase the efficiency of services offered to the customer, the use of partnerships emerges as a characteristic of the new transportation management paradigm.

## **Six Key Observations**

Overall, information available to the research team from a host of experiences gives rise to six observations about the nature of change associated with the adoption of the new transportation management paradigms:

### ***1***

***Paradigm change starts from a unit of governance (management or separate agency or institution) higher than that dealing with present operations.***

The need for change may be revealed in a public process, but the implementation of change often comes about by the hand of someone who has assembled raw political power within that organization. It has been argued that the first responsibility of the politician is to get reelected, and the second responsibility is to do some good. Without accomplishing the former, he/she has no potential to do the latter. So it may be said of the "advocate" of change. While fundamental change can be set in motion from the bottom up, most observers and successful business leaders have commented on the need for the direction, and the communication of that direction, to come from the top. Leaders must at some point provide a focus and commitment to sustain effective change.

**2**

***Change rarely comes without pain.***

In a number of instances, successful managers of change noted that there is usually a price to be paid for change. In some cases, jobs are lost when retaining does not succeed. One official of a private firm that had undergone significant change said, "You have to establish control over the warlords. They will seek to optimize their own empires. You have to take power away from them, and optimize the operations of the whole company!"

**3**

***The evolving transportation paradigm is based on an analysis of the user's full trip, not about segments of that trip.***

In assessing the relevance of various examples for the transit industry, a management philosophy has been adopted in which the needs of the customer are seen as full trips rather than trip segments.

**4**

***When an organization seeks to serve the user's full trip and addresses the broader outcomes of how these trips are to be served, partnerships are inevitable.***

As soon as the management task at hand is defined as facilitating origin to destination needs of the customer, the concept of partnerships emerges. A company that does well in distributing goods from Rotterdam (Maersk) may not be the company that does best at assembling trains at Elizabeth, New Jersey (SeaLand). Companies that do well in collecting air passengers in Kentucky (Delta) may not be companies that do best in distributing passengers to Prague and Milan (Swissair). Companies that do well in owning rail track (Burlington Northern) may not be the best at managing specialized points of transfer (United Parcel Service). Even the most vertically integrated of the largest organizations, UPS, uses complex partnerships in the hauling of its specialized trains over the tracks of the major railroads. Clearly, companies that attempt to do everything with their dedicated assets are rare indeed.

The same is true as considerations broaden beyond trip making to the larger community impacts and outcomes of transportation choices and alternatives. With this broader perspective, partnerships across industries, among stakeholders and across public service sectors are increasingly vital.

**5**

***In the management of complex full trips and their broader societal outcomes, information technology becomes essential.***

In each of the instances explored to date, information technology was a key element in making partnership concepts meaningful. In the

intermodal freight industry, communications and management systems allow analysis of both time-sensitive customer needs and cost-sensitive customer needs.

**6**

***The measurement of performance becomes key in the implementation of the revised paradigm.***

In the cases presented above, the ability to measure the success or failure of the system is key in the establishment of management systems over complex operations. Performance is measured in three fundamental dimensions:

- Measures of performance that characterize the operational efficiency of a mode;
- Measures of performance that describe the attributes of the product (service) as perceived by the user; and
- Measures of performance that link the provision and operation of the transportation network to progress against broader community goals.

Understanding of the appropriate use of *both* kinds of measurement is key to the understanding of the use of incentives which establish systems of risk and reward within the organization. In order to *reward* those acts, which improve the performance of the system, we must first know how to *measure* the performance of the system.

## **Models of Change: Learning for Ongoing Success**

- 1. A wide range of businesses and industries have successfully pursued fundamental change and affected paradigm shifts.***
- 2. These experiences can be used by local public transportation organizations to assess the need for fundamental change and chart the course toward paradigm changes.***

To what extent do you agree or disagree with these basic propositions?

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# **Appendix A**

*Selected Transit Industry Standards*

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**Figure A.1 Summary Profile of 6,000 Transit Operating Agencies**

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<b>Transit Modes</b>	2,248 operate buses			
	5,228 operate demand response systems			
	26 operate ferry boats			
	22 operate light rail			
	17 operate commuter rail			
	14 operate heavy rail			
	5 operate electric trolley buses			
<b>Annual Service Levels and Use</b>	Mode	Miles	Hours	Trips
	Bus	59%	66%	62%
	Demand Response	17%	17%	
	Heavy Rail	15%	11%	27%
	Commuter Rail	7%	3%	
	All Other			11%
<b>Employees</b>	297,000 Total Employees			
	49% Vehicle Operators			
	17% Vehicle Maintenance			
	9% Non-Vehicle Maintenance Personnel			
	14% Other Operations Personnel			
	11% Administration Staff			
<b>Annual Funding</b>		<u>\$7 Bil Capital</u>	<u>\$20 Bil Operating</u>	
	Federal	<b>50%</b>	3%	
	State	<b>13%</b>	22%	
	Local	<b>13%</b>	22%	
	Generated	<b>24%</b>	16%	
	Directly			
	Fares	<b>NA</b>	38%	
<b>Operating Expenses</b>	47% Vehicle Operations			
	17% Vehicle Maintenance			
	17% General Administration			
	10% Purchased Service			
	9% Other Maintenance			
	47% Salaries and Wages			
	25% Fringe Benefits			
	9% Materials and Supplies			
	5% Service			
	4% Utilities			
	3% Insurance			

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Source: American Public Transit Association, "Transit Fact Book," Washington, DC, 1998.



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Abbreviations used without definitions in TRB publications:

AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
IEEE	Institute of Electrical and Electronics Engineers
ITE	Institute of Transportation Engineers
NCHRP	National Cooperative Highway Research Program
NCTRP	National Cooperative Transit Research and Development Program
NHTSA	National Highway Traffic Safety Administration
SAE	Society of Automotive Engineers
TCRP	Transit Cooperative Research Program
TRB	Transportation Research Board
U.S.DOT	United States Department of Transportation