area. The options were to add more capacity to the area with an additional dial-a-ride vehicle in the peak hour or to add a fixed route with higher incremental capacity but also with the risk of not being able to attract the passengers to fill that capacity. A single fixed run fitted to the demand patterns (established through dispatching records) was added in the morning peak. This decision was shown to be justified by a resultant voluntary diversion of approximately 25 passengers, allowing a reduction in dial-a-ride service hours in the area with no reduction in service quality. Dial-a-ride demand is being watched closely in the southwest area to determine appropriate timing for expansion of the fixed-route service.

PROBLEMS OF PACKAGING TSM ACTIVITIES: DIFFERING OBJECTIVES, CONFLICTS BETWEEN ACTIVITIES, AND INSTITUTIONAL PROBLEMS

Roberta Remak
Remak/Rosenbloom

This paper addresses the problems of selecting effective combinations of TSM activities in light of the broad and sometimes conflicting transportation goals to be achieved and considers some of the institutional implications of programs calling for the cooperation and approval of several public agencies and private organizations. Various federal and state programs and special local concerns represent a number of different social, environmental, and energy-conservation objectives that can be affected by a TSM program. No TSM activity can meet all of these objectives equally well, and local planners must evaluate the proposed program in terms of first one objective and then another to select the combination of activities that offers the best compromise. Both the feasibility and impact of individual TSM activities can be radically changed by being implemented at the same time. Some function more effectively in combination, and others work against each other. The TSM program must be evaluated as a whole to ensure that necessary supportive activities are included and that incompatible combinations are avoided. It is necessary to establish an institutional framework for incorporating all of the concerned agencies and organizations into the TSM planning process and to coordinate the action programs of participating public and private institutions.

In a study of peak-period traffic congestion performed under the National Cooperative Highway Research Program, a number of techniques were identified that could be effective in reducing peak-period congestion, particularly those representing alternatives to capital-intensive solutions such as new rail rapid transit facilities or expansion of urban freeway systems. Techniques operating on both the supply and demand aspects of the congestion problem were included: those that increased the carrying capacity of the existing road system and those that reduced the number of vehicles on that system at peak commuting times. These ranged from technical approaches to improve transit operations and traffic control; social approaches to modify commuting times by staggered and flexible work hours; socioeconomic approaches of road pricing, parking controls, restricting vehicle access, car pooling, and modifying land use patterns; to a sociotechnical approach of substituting communications for travel to work.

During the course of the study, it became apparent that none of the 17 individual techniques had the potential for solving the peak-period congestion problem or for making more than a modest improvement to traffic flow. But it was found that their effectiveness could be improved, substantially in some cases, by implementing them in combination with one another. In fact, some techniques proved to be useless unless accompanied by another. As an example, peripheral parking lots will not attract many users unless some transit shuttle and CBD circulation service is provided.

Out of this recognition of the interdependence of congestion-reducing techniques developed the concept of "packaging" groups of compatible techniques to be implemented within a coordinated program. Although the objectives of the transportation system management (TSM) program are broader than reducing peak-period traffic congestion, many of the optional TSM activities and the congestion-reducing techniques are identical and both types of programs present similar problems of carrying out joint efforts involving a number of different agencies and organizations.

Our current research is focused on the institutional problems of implementing these packages. The project is still in its beginning phase, but we have identified some common types of institutional barriers and have developed some tentative approaches to dealing with them. This paper primarily addresses the problem of selecting effective combinations of TSM activities in light of the broad and sometimes conflicting goals to be achieved, but it concludes with a consideration of some of the institutional implications of programs involving several agencies and organizations.

DIFFERING GOALS

Only within recent years have we come to recognize not only that the several components of an urban transportation system—roads, transit, parking, bikeways, and pedestrian facilities—are interdependent but that transportation resources themselves affect and are affected by local economic and social conditions, land use patterns, physical environment, and national energy resources. Increasing responsibility has been placed on those who provide local transportation facilities and services to consider not only the internal efficiency of their particular operation but its impact on the rest of the transportation system and the community at large.

Various federal and state programs as well as special local concerns represent a number of differing goals to be achieved through improvements to urban transportation. These goals are not always compatible. A goal of mobility for those without access to private automobiles because of age, health, or financial circumstances may be in conflict with a goal of minimizing needs for public subsidy of transit services. Measures that improve traffic flow may encourage people to drive their automobiles to work and thus increase fuel consumption. Localized air pollution problems may be relieved by an automobile-restricted zone but add to traffic congestion on adjacent streets.

No TSM activity or combination of activities can meet all goals equally well. The task facing local designers
of TSM programs is to evaluate proposed actions in terms first of one goal and then another and to select those activities that offer the best compromise among the several goals.

Those responsible for the TSM element of a transportation plan will not necessarily find the concerns of all federal and state agencies and local special-interest groups of equal importance to the particular urban area. The degree to which the several goals are held to be critical will be determined by local conditions. A large city with serious problems of air pollution and traffic congestion will assign a high value to TSM techniques that offer benefits in these areas. A smaller city may give preference to activities that will promote mobility for its citizens that have no automobiles. Most urban areas will have available to them a regional long-range transportation plan in which regional goals and objectives have been defined. The task of the transportation planning body is to examine these policy statements in light of current local needs and adopt one of two courses of action: (a) accept the goals and objectives as stated and use them to establish the TSM hierarchy of objectives for evaluating proposed activities or (b) propose a new set of regional goals and objectives that better reflect the present needs of the community and the objectives of recent federal and state programs.

TSM activities must be compatible with the long-range transportation plan. For example, if there is a current need for additional downtown parking but the long-range plan calls for restricting private vehicles in the CBD, then any public parking facilities called for in the TSM program should be located outside of the area that will later be restricted, and, if necessary, public transit into and around the CBD should be provided. This TSM action will help to establish travel patterns compatible with the future restricted area. Locating the parking facilities inside the proposed restricted area not only will reinforce habits of driving into the area but also will provide one more economic disincentive to implementing the restrictions.

Although it is possible under the existing UMTA and FHWA joint regulations to draw up a local TSM program independent of the regional, long-range transportation plan and the requirements of other federal and state programs, it is wiser for the community to reconcile its TSM program to these other elements. In the long run the community will be responsible for its performance in each of these areas, and any future conflicts that can be eliminated at this stage will make that task easier.

CONFLICTS BETWEEN TSM ACTIVITIES

Transportation system management as a designated joint UMTA-FHWA program is recent, but many local transportation agencies have long been carrying out such short-term, low-budget improvements as a normal part of their operations. These agencies will have a number of TSM activities to propose. Other TSM actions will be suggested by the list offered by UMTA and FHWA as possible options for local consideration. Still others may be generated by the area's own special-interest groups or unique situation.

The TSM coordinating body or metropolitan planning organization (MPO) will then be called on to evaluate the various proposals with regard to budget constraints and availability of funding assistance, technical and political feasibility, and potential benefits with regard to overall program objectives. Those that meet these criteria are candidates for inclusion in a final program. Why not simply take all of these practical and desirable actions and say, 'Here is our TSM program'! The answer is that both the feasibility and impacts of these individual actions can be radically changed by implementing them in combination with one another.

Some activities, such as feeder systems and long-haul transit, may function more effectively when combined or one may help to reduce the undesirable social and economic side effects of another, such as a transit circulation system in an automobile-restricted shopping area in the CBD.

Certain activities, however, can work against each other. A new demand-responsive feeder service and a car-pooling program directed to the same small residential area can dilute the demand for either mode and leave both without sufficient riders to be successful. A staggered work-hour program may leave express buses underused at one interval but with insufficient time to complete that run and return in time for the next interval.

There may be conflicts in timing the implementation of related actions. Eliminating on-street parking in the CBD can be carried out in a few weeks, but it may be 2 years before the city can acquire the land and complete the construction of peripheral parking facilities or receive delivery of transit vehicles for CBD circulation and access. It may also take several months for the police department to recruit and train the additional personnel necessary to enforce the new parking restrictions.

The compatibility of TSM actions will vary according to the problem setting: size of city, adequacy of existing road systems and transit services, modal split, type and location of employment relative to residences, distribution of population by income and age, access of the population to private transportation, and focus of the actions (CBD, outlying areas, connecting freeway system). Peripheral parking lots with transit service to the CBD may be a good solution for a localized downtown congestion and air pollution problem, but not the most effective means of reducing areawide congestion, pollution, and fuel consumption on the freeway system. Combinations of transit improvements and parking restrictions work well where employment tends to be concentrated, but ride-sharing and parking incentives for car pools may be more effective where major centers of employment are removed from each other.

Unfortunately, there is no formula of optimum transportation improvements to meet different needs. Existing data for this purpose are neither very much nor very good. No universally applicable system of analysis and selection is yet available for local TSM planners, and they must rely largely on their professional experience and knowledge of their communities. Some general rules, however, can be suggested:

1. Activities that improve the carrying capacity of existing roads—left-turn lanes, synchronized traffic signals, elimination of on-street parking—encourage the use of private automobiles and attract new users to the improved route. In smaller cities where the existing road system is nearly adequate to accommodate the limited number of work trips that its economy generates, reasonably long-lasting benefits can be derived from the application of these techniques. In large cities, however, where great numbers of commuters are critically overtaxing existing roads, benefits of increasing the capacity of a particular route can be short-lived. The more drivers whose destinations can be reached by this route and the more severe the congestion on alternative routes, the greater will be the attraction of the improved route and the more quickly it can become saturated again.

2. Packages of TSM activities that work toward reducing demand for transportation resources, either at
peak commuting times or generally, appear to have longer lasting and broader benefits than those that work toward increasing the capacity of the transportation system. Reducing the number of vehicles by increasing occupancy, lessening trip length, changing travel times and routes and eliminating some needs to travel serve the combined objectives of reducing air pollution, automotive fuel consumption and traffic congestion, and may also provide for greater mobility for those without access to cars.

3. Packages of TSM activities that attempt to increase vehicle occupancy must be directed toward areas, routes, and times for which there is a sufficient demand to provide the necessary level of ridership. When these activities are combined with others (changing work hours, dispersing employment, or substituting communications for trips to work) that work toward diluting travel demand, the feasibility of the original package should be reexamined to determine whether an adequate market for them would still exist.

4. When mobility for private automobiles is to be reduced by parking restraints, road pricing, or restricting entry to certain areas or reserved lanes, sufficient alternative modes of transportation must be immediately available. Packages of TSM activities using such penalties and restrictions must include other actions to improve public transit, bikeways, and pedestrian facilities as necessary to ensure that the former activities do not result in serious economic hardships for those who currently depend on their own automobiles.

INSTITUTIONAL PROBLEMS

Inasmuch as our recognition of the interdependence of the various components of urban transportation systems is relatively new, the authority over existing facilities and services is still dispersed among a number of agencies and organizations that function independently of one another. Transit services are commonly operated by a special transit authority, on-street parking regulations are enforced by the city police department, bridge tolls are usually under the control of a state highway department, and van-pool and car-pool programs may be operated by large private companies.

TSM programs characteristically call for a broad range of improvements throughout the entire transportation system. Although the degree of separation of authority varies from one urban area to another and although many parts of the country have made significant moves toward consolidating certain transportation functions within one agency, it would be the exceptional TSM program that could be implemented entirely by a single existing authority. Rather, the participation of a number of agencies at all levels of government and perhaps some private organizations will be necessary to carry out and support the various activities called for in a TSM program. In addition the program will attract the attention of other public and private institutions concerned with the impacts of proposed changes to the transportation system.

The broader the TSM program is, the greater the number of institutions will be that may become involved. Each additional agency or organization increases the difficulties of coordinating their activities and the potential for conflicts of interest.

Institutional Roles

Institutions become involved in TSM programs in different capacities that can be categorized into three general types of institutional roles.

1. Agencies and organizations will be called on to carry out the designated transportation improvements, such as operating supplementary transit services, enforcing parking and reserved-lane restrictions, or managing ride-sharing programs. Their roles are determined by the specific kinds of activities selected for the TSM program and, for the most part, must be continued over time.

2. Some institutions function primarily in the initial planning and implementation phases to coordinate and select combinations of TSM activities, evaluate and approve proposed programs, provide funds, modify restrictive legislation, or provide the public with information on forthcoming changes in local transportation facilities and services. Their roles are derived largely from the TSM process and the kinds of transportation resources affected rather than from the specific program activities.

3. Many institutions take no active part in carrying out the program, but represent the interests of special groups whose concerns or well-being may be affected by the program. These include welfare-oriented agencies, downtown merchant associations, senior citizen groups, taxpayer associations, and environmental groups. The involvement of such institutions in supporting or opposing the TSM program will be determined by the specific changes proposed: restricting the use of automobiles in parts of the CBD, modifying transit services and fare structures, or establishing bikeways. However, the number and kind of institutions participating in this role also appear to be a function of the political and social characteristics of the particular community.

An institution's involvement with the program is not necessarily confined to one of these roles. In fact, it is highly desirable that the agencies or organizations that will in the end perform the activities called for in the program be involved in the planning process. Moreover, it has been observed that any cooperative undertaking that actually succeeds in being carried out can invariably be traced to the strong leadership of an individual representing one of the participating institutions. This institution, then, takes on the responsibility for many of the key functions. It coordinates planning, seeks funding assistance, lobbies for essential changes in existing laws and regulations, and, most important, persuades other public agencies and private organizations to participate in or give their approval to the program.

The participation or approval of the institutions is essential to the successful implementation of the TSM program. However, a variety of practical and attitudinal problems, such as lack of sufficient funds and personnel, legal and regulatory restrictions, or vested interests, may stand in the way of obtaining this support. Some of these problems will be generated by the particular circumstances of a given urban area—its existing transportation resources, environmental problems, and political structure and personalities. Other institutional problems, however, appear to be inherent in the TSM process regardless of the particular setting.

Example of TSM Planning

As a preliminary step to identifying common problems and perhaps some strategies which might be useful in dealing with them, let us look at an example of TSM development in a small city. The planning area and its existing transportation resources, institutional framework, and TSM program presented here are largely
The area is strongly automobile oriented; shopping, many community facilities, and residential developments are dispersed. A sizable number in the population, however, have no automobiles. In addition, many of the university students and elderly who have retired in this community also do not have automobiles. A transit district provides fixed-route bus service, although routes are limited and frequency in the outlying areas is low. Like so many other areas, new shopping centers and housing developments beyond the city limits have drawn activity from the CBD, and an urban renewal program is under way to counter this trend.

Institution Structure

The five county supervisors and the mayors of the five incorporated areas in the county have for a number of years formed a regional planning council. In addition to its responsibilities for land use and development planning and federal clearinghouse function, this body has recently been designated as the regional transportation planning agency.

To assist in its transportation activities, the council created a transportation advisory committee, whose 18 voting members are the county and city planning and public works directors, directors of the transit and airport districts, and two regional representatives of the state transportation department. Ex officio members include the U.S. district engineer, the statewide coordinator of transportation planning, and a transportation planning engineer employed directly by the council to supervise the work of the committee's planning staff.

In addition, 216 private concerns, citizens groups, and social service agencies have the opportunity to review and comment on proposed transportation programs. In all, the TSM development process in this small urban area involves 242 public and private institutions.

Transportation Plans

A regional transportation plan has recently been completed that calls for the balanced long-range development of public transit, roads, and bikeways as well as for the development of airport and harbor facilities. Within the context of this plan a TSM program was subsequently drawn up. Not all of the options suggested by the UMTA and FHWA were included, since some were found to be inappropriate to the size of the city and its current needs. Nonetheless, the plan contained 25 potential transportation improvements that call for the active participation of 53 public agencies and 37 nongovernment institutions.

Table 1 gives the activities and indicates the institutions primarily responsible for their implementation. Thirty-nine of the agencies and all but two of the private entities will be involved only in the staggered work hour and car-pooling programs, and major contributions must be made by the transit district to 13 TSM elements, the city's public works department to 8 TSM elements, and the county's road department and the city's parking district to 4 elements each. The chamber of commerce and the citizen planning association, although nongovernment entities, will perform important roles in marketing transit and organizing car pooling.

In addition, implementation of several program elements calls for technical and funding assistance from UMTA, FHWA, HUD, and the Bureau of Outdoor Recreation (BOR) at the federal level and from the departments of transportation and natural resources (state beaches division) at the state level. Activities will also have to meet the approval of federal and state agencies concerned with air quality, energy conservation, and welfare and of the many diverse special-interest groups if the program is to avoid legal or public acceptance problems.

Common Institutional Problems

Even within this relatively simple example of a TSM program we can recognize potential problems that are not necessarily unique to this community. These problems fall into the following categories:

1. Dispersion of transportation authority,
2. Separation of planning and implementation functions,
3. Incompatibility of laws and regulations,
4. Unequal availability of financial resources, and
5. Profusion of special interests.

As an initial step toward identifying barriers to TSM implementation and perhaps suggesting some possible strategies for dealing with them, let us look closer at each of the five problem categories.
Table 1. TSM activities and institutional responsibilities for implementation.

<table>
<thead>
<tr>
<th>Activities</th>
<th>Primary Implementation Responsibility</th>
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<tbody>
<tr>
<td></td>
<td>Government</td>
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<td></td>
<td>City</td>
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<tr>
<td>Actions to ensure the efficient use of existing road space</td>
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<tr>
<td>Traffic operations improvements</td>
<td>Public works</td>
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<tr>
<td>Channelize traffic</td>
<td>Public works</td>
</tr>
<tr>
<td>Install and modify traffic signals</td>
<td>Public works</td>
</tr>
<tr>
<td>Coordinate traffic signals</td>
<td>Public works</td>
</tr>
<tr>
<td>Preferential treatment for transit and other high-occupancy vehicles</td>
<td>Public works</td>
</tr>
<tr>
<td>Create exclusive bus lanes</td>
<td>Public works</td>
</tr>
<tr>
<td>Construct bus turnouts</td>
<td>Public works</td>
</tr>
<tr>
<td>Exempt buses from selected traffic restrictions</td>
<td>Public works</td>
</tr>
<tr>
<td>Provisions for pedestrians and bicycles</td>
<td>Parks</td>
</tr>
<tr>
<td>Create bicycle paths and exclusive lanes</td>
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<tr>
<td>Provide storage areas for bicycles</td>
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<tr>
<td>Initiate other bicycle facilitation measures (bike-bus service in which an</td>
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<td>express bus tows a bike trailer)</td>
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<tr>
<td>Management and control of parking</td>
<td>Public works</td>
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<tr>
<td>Eliminate selected on-street parking</td>
<td>Public works</td>
</tr>
<tr>
<td>Establish preferential policies for short-term CBD parking</td>
<td>Police</td>
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<tr>
<td>Provide park-and-ride facilities</td>
<td>All</td>
</tr>
<tr>
<td>Enforce parking restrictions</td>
<td></td>
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<tr>
<td>Changes in work schedules</td>
<td></td>
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<tr>
<td>Actions to reduce vehicle use in congested areas</td>
<td>All</td>
</tr>
<tr>
<td>Car-pool program</td>
<td></td>
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<tr>
<td>Automobile-restricted zones</td>
<td>Redevelopment</td>
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<tr>
<td>Close selected CBD streets to private vehicles</td>
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<tr>
<td>Improve peripheral parking facilities</td>
<td>Redevelopment</td>
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<tr>
<td>Provide new intrazone transit service</td>
<td>Redevelopment</td>
</tr>
<tr>
<td>Actions to improve transit service</td>
<td></td>
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<tr>
<td>Bus services</td>
<td></td>
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<tr>
<td>Improve frequency and accessibility of fixed-route service</td>
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<tr>
<td>Expand express bus service</td>
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<tr>
<td>Establish selected demand-responsive service areas</td>
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<tr>
<td>Provide shuttle service within the CBD</td>
<td>Parking district</td>
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<tr>
<td>Provide bus shelters and benches</td>
<td></td>
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<tr>
<td>Improve passenger information services</td>
<td></td>
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<tr>
<td>Actions to increase internal transit management efficiency</td>
<td></td>
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<tr>
<td>Increase marketing activity</td>
<td></td>
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<tr>
<td>Improve cost accounting and other management tools</td>
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Dispersion of Transportation Authority

In many urban areas the current long-range plans and TSM programs represent the initial undertakings of newly created MPOs; in others they represent new functions for a longer established regional planning authority. Transportation planning areas rarely conform to an existing political unit, and these bodies are commonly coalitions of several county and city governments brought together because of requirements of state and federal policies. The ability of these bodies to exert authority over transportation developments depends on the commitment of the representatives to common goals and their political power within their political units.

In some urban areas the MPO will be a well-established, highly effective institution. In others it will be a weak organization, possibly because of serious conflicts of interest among members, lack of technical background in transportation planning, or experience in dealing with the complexities of state and federal transportation assistance programs. There are institutional problems inherent where either of these situations is extreme. The strong MPO may develop a TSM program without sufficient consultation with operating agencies to accurately determine feasibility and probable public response. If the MPO is weak, the operating agencies may develop a TSM program that is insufficiently coordinated and balanced to prevent undesirable economic or social side effects.

Both political skill and technical knowledge are required for successful TSM planning. The institutional structure of the MPO in the example suggests one method of ensuring that both can be drawn upon. The MPO is organized into different levels. At the top are the political representatives of local units of government whose functions are to set transportation goals and policies, evaluate the overall desirability and political feasibility of the several proposed TSM actions, and commit their separate political units to joint courses of action. At the second level are the representatives of local operating agencies, such as the transit district and road and public works departments, who, with the assistance of federal and state transportation advisors, propose specific TSM activities and develop detailed action plans. Continuity of the TSM process is ensured by the appointment of a professional transportation engineer as the program coordinator.
Separation of Planning and Implementation

It is highly desirable that all of the institutions that are to carry out implementation tasks under the transportation system management (TSM) program be brought into the planning process. There is the temptation to simplify procedures by confining the planning activity to those public agencies that have direct access to UMTA and FHWA funds. Agencies or private organizations not consulted may later refuse to participate in the TSM program because of procedural, staffing, or regulatory problems or simply because they feel threatened by the unexpected interference in their operations. Even the exemplary planning organization discussed in the example failed to include the local redevelopment agency, which will be highly involved with the proposed ARZ, and the county and city enforcement agencies, which will be required to enforce new parking restrictions and exempt buses from certain traffic regulations.

Bringing such agencies into the planning process will bring to light any problems they might face in carrying out their future TSM responsibilities. The plan can be modified to accommodate these problems or steps can be taken to alleviate them. In addition, these institutions can also be excellent sources of information of value to the planning process. Both the redevelopment and enforcement agencies, for example, work closely with the public and can anticipate acceptance or rejection of certain TSM actions while these are still being discussed as options. This advice can be of value in avoiding an unexpected negative public response after the program is underway.

It may not be possible before the TSM element of the transportation plan is conceptualized to identify all of the institutions that will eventually be involved, but provisions can be made for adding them to the planning structure when their roles become apparent.

Incompatibility of Laws and Regulations

Legal and regulatory problems relating to TSM will vary considerably from one urban area to another because most of the activities called for in these relatively modest changes to the transportation system will be affected primarily by existing local and state legislation.

Our hypothetical TSM program calls for closing the main shopping street to private vehicles, revising the rate structure for public parking lots, developing a new one for the new dial-a-ride service, and exempting buses from certain traffic restrictions. All of these fall under local jurisdiction, and it has been observed (with regard to new uses of taxis and jitneys in public transit) that local government is able to move quickly and effectively to remove restrictions and provide enabling legislation. Where the mayors or county supervisors serve in the MPO and have already reached agreement on the need to modify existing local laws and regulations, they can be expected to expedite such changes.

The TSM programs of other urban areas may call for the creation or extension of a state-authorized transit district or may conflict with existing state regulations with regard to licenses and insurance for car pools. Federal regulations and policies may appear as barriers to establishing new demand-responsive or van-pool operations if another transit system is currently providing service. Recent studies of legal and regulatory problems relating to car pools and van pools, road pricing, and parking controls, however, cite instances in which courts and regulatory agencies have supported innovative actions to improve urban transportation, basing their decisions on recognition of critical needs for mobility, air quality, and fuel conservation. The precedents established in these decisions may be helpful in overcoming legal and regulatory barriers to other TSM activities.

Unequal Financial Aid for Participants

The existing system of financing TSM implementation has two undesirable features.

First, it reverses the impetus toward integration of transportation action that has characterized the entire TSM planning process. Each applies directly to its particular sources of implementation funds (public agencies to UMTA, FHWA, HUD, state departments of transportation, local property taxes, or the city's general budget and private organizations to dues and subscriptions from members, donations and private grants, or current operating budgets). Each institution finds itself functioning again as a separate entity, conforming to the particular process through which funds are obtained and dealing with individual problems of restrictions on their use, timing, and amount. Conflicts can occur, e.g., between transit and road agencies as to who will benefit most and whose grant should pay for construction in providing new bus-loading wells along heavily traveled streets.

Second, funding is not equally available to all TSM participants. The scope of activities that can be funded under UMTA and FHWA programs for TSM has been broadened to include diverse needs such as pedestrian facilities in ARZs and enforcement of reserved lanes. However, funds from combined federal and state sources are more readily available in some areas, such as transit, than in others. This cannot help but encourage local TSM planners to weigh their plans in favor of activities for which more assistance can be obtained. The resulting plan may not be the optimum balance of activities for the community.

For example, the present UMTA-FHWA list of potential TSM elements does not include actions to promote changes in land use and relocating residences and places of work closer together. Short-term benefits might be achieved at modest cost in some communities by remodeling downtown hotels or underused business properties into apartments for those who work in the CBD. Since such activities are not suggested, and no federal or state transportation assistance is available in this area (nor have we as yet identified any other federal program for such small-scale rehabilitation), potential solutions of this nature are omitted from local consideration.

The trend in federal funding, however, has been toward coordinating assistance and extending the scope of eligible activities. Recent directions of UMTA's research program and policy statements indicate a growing interest in the interrelation of land use and urban transportation, and it is possible that the TSM program may be expected to include all activities that seek to reduce needs to travel as well as those that increase the efficiency of the transportation system.

Profusion of Special Interests

The broad scope of changes to the transportation system called for in a TSM program cannot help but affect the lives of nearly everyone in the community in some degree. Concerns over the impact of these changes will be expressed by a number of private businesses, public agencies responsible for social services, and nonprofit special-interest groups. At first glance, it hardly seems possible that the community of 200,000 population used as our example could produce 216 such institutions. We do not yet know how typical of all urban areas this ratio is, but suspect that the relatively small size of the city, the presence of the university, a large number of retired residents, and a significant minority population may all be contributing to the proliferation of organizations attempting to influence local transportation decisions. Nonetheless, it should be anticipated that the TSM program in any urban area will attract the attention of a number of institutions with special interests.
The concerns of these institutions are highly divergent. Employers will want to ensure that the proposed changes will neither interfere with the ability of their present employees to travel to work nor create internal work-scheduling or parking problems. Schools and several agencies will be concerned about access to these facilities for their clientele. Merchant associations will worry about loss of trade if restrictions are placed on driving and parking private automobiles, and taxpayer associations will worry that proposed transit improvements will require higher property taxes.

The problem facing the MPO is how to deal with these institutions so that they will support, or at least not block, the implementation of the TSM program. Citizen participation in the TSM process is required under joint UMTA-FHWA regulations (section 450.120 a3, Code of Federal Regulations, chapter 1 of Title 23 and chapter VI of Title 49, as amended October 17, 1975), but without specification as to how this is to be accomplished.

Other federal programs, such as urban renewal, have the same requirement. Local redevelopment projects require the appointment of representatives of citizen groups to an advisory board and make use of neighborhood public meetings and newsletters to keep residents and property owners of the redevelopment area informed. Some of these techniques can be applied to TSM, and some of the existing institutional organization might be made use of in communities where citizen groups have already been formed for other purposes.

Another alternative is suggested by our exemplary urban area. Information on program development is distributed and opinions solicited by mail rather than in general meetings. When drafts of proposed transportation plans are completed, each of the 216 public agencies, private firms, and special-interest groups on the mailing list receives a review copy and is asked to comment or raise questions. Their responses are studied, and any modifications to the plans that appear desirable or necessary can be made before the final version is adopted locally and submitted for federal approval.

One final observation about the attitudes of special-interest groups and the segments of the public they represent has been suggested by our initial research. Not only do these various groups view transportation-related problems with different degrees of concern, as one might expect, but many groups and the public at large do not seem to view the problems of traffic congestion, air pollution, and automotive fuel consumption with as much concern as do transportation planners.

This discrepancy in attitude is most apparent with regard to traffic congestion. One has only to observe the numbers of drivers who insist on adding their vehicles to already overcrowded freeways at rush hour rather than change their established travel patterns. Irrationally, such drivers appear to be willing to tolerate intense levels of congestion that they have grown accustomed to and to resist efforts to reduce congestion that interfere with their usual commuting habits.

Many drivers seem to feel their rights threatened by newly imposed user penalties for traveling over a bridge during peak periods or for long-term parking or by the removal of a freeway lane for the exclusive use of buses and car pools. On the other hand, the public seems more willing to accept programs based on exempting high-occupancy vehicles from existing user fees or providing new facilities for their exclusive use.

The Los Angeles diamond lane demonstration is a case in point. Drivers in congested lanes were expected to see traffic flowing freely on the reserved lane and rationally come to the conclusion that they should form car pools or switch to transit. Some did, but the majority continued to drive as before, and through their protests the experiment was finally brought to a halt by a court decision.

Because the experiment was short-lived and there is some question as to how much the opposition of local news media contributed to the protest movement, we do not know whether it might have proved more successful over time or under different circumstances. But it does suggest that transportation planners should not rely on finding in the community at large a concern with transportation, environmental, or energy goals equal to their own and should, where possible, use positive incentives and new transportation options rather than penalties and restrictions.

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METHODOLOGICAL FRAMEWORK FOR THE TSM PLANNING PROCESS

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This paper describes a systematic TSM planning process that begins with setting objectives and ends with monitoring the effectiveness of implemented projects. The technical requirements for the process are also discussed.

There is a growing awareness that transportation facilities and services and the people and vehicles that use them constitute a system that can be managed. As an increasing proportion of urban America achieves a physically mature transportation infrastructure, system management will gradually become the dominant focus of transportation improvement strategies. This inevitable shift to transportation system management (TSM) represents a radical departure from the historic preoccupation with capital-intensive system additions designed to accommodate increasing demand for transportation service.

TSM encompasses a range of improvement strategies that are nonfacility and low-capital oriented and that use both demand management and supply optimization to capitalize on existing highway and transit facilities to achieve transportation-related goals. Under this broad definition, TSM planning is now the required focus for the short-range transportation element in transportation improvement plans required by DOT of metropolitan areas.