

Multimodal Tradeoffs Workshop

final report

prepared for

Federal Highway Administration

prepared by

Cambridge Systematics, Inc.

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Table of Contents

1.0 Introduction.....	1-1
1.1 Multimodal Tradeoffs Background	1-1
2.0 Workshop Material	2-1
2.1 Workshop Questions on Multimodal Tradeoffs.....	2-1
2.2 Summary of Workshop Material	2-2
3.0 Summary	3-1
3.1 Discussion Topics.....	3-1
3.2 Informal Presentation Key Points	3-1
3.3 Challenges and Solution Strategies	3-6
3.4 Next Steps.....	3-8
3.5 Existing Resources	3-9
Appendix A	
Workshop Participants.....	A-1
Appendix B	
Workshop Responses	B-1

1.0 Introduction

On October 31, 2005, the Multimodal Tradeoffs Workshop was held in Kansas City, Missouri, and was attended by Federal, state department of transportation (DOT), transit agency, and metropolitan planning organization (MPO) representatives. The goal of the peer exchange was to identify how various agencies address the challenges of managing investment tradeoffs among multimodal systems to achieve policy objectives and balance the needs of a diverse customer base.

Peer exchanges offer a unique opportunity to not only engage in discussion and share experiences and lessons learned but also identify potential solutions and prioritize areas for additional advancement through research, technical assistance, and other activities. This report serves to document and further distribute the insights raised during the meeting with the larger transportation community.

The remainder of this section contains background information on multimodal tradeoffs processes taken from an overview memorandum distributed to participants prior to the peer exchange. Section 2.0 contains a synopsis of the multimodal tradeoff questions participants completed before the meeting (full responses are located in Appendix B). Section 3.0 summarizes the case studies presented at the meeting, additional insights, research needs, and existing resources.

■ 1.1 Multimodal Tradeoffs Background

Transportation agencies confront a wide range of tradeoff decisions within and between modes, policy objectives, performance goals, geographic regions, and market segments. All of these tradeoff issues face the same basic question: “How much resource do I allocate to A versus B?” To answer this question and identify the actual tradeoff issue itself, one must ask “What are the consequences of a particular allocation of resources to A and B?” In other words, the allocation decision is based on the set of consequences that the decision-maker prefers.

1.1.1 Key Elements and Framework

The National Cooperative Highway Research Program (NCHRP) Project 8-36 A(07) Phase I – *Development of a Multimodal Tradeoffs Methodology for Use in Statewide Transportation Planning* – defines the elements of and requirements for a tradeoff analysis to include:

- Clearly defined resource or program areas (defining what the tradeoff is between);
- Objectives and criteria to measure the consequences of investing in each resource area;
- A method for relating investment levels in each area to the resulting consequences in that area; and
- A method for comparing consequences generated by each program area as a result of a specific allocation of resources between the areas.¹

Figure 1.1 depicts a conceptual framework for undertaking multimodal tradeoff analysis. The figure suggests that any number of program areas or resource areas might be defined to structure an agency's investment program. Objectives and criteria need to be defined for each program area to measure the consequences of investments in that area. These objectives and criteria create the basis for the "vertical alignment" required within each area to perform tradeoff analysis of the consequences of different funding levels within that area. Overall, agency goals and objectives provide the horizontal alignment that is required to perform tradeoff analysis between program areas. This connection of issues, goals, objectives, and measures in both horizontal and vertical dimensions is a necessary feature of a framework for multimodal tradeoff analysis, because it will generally not be possible to apply identical performance objectives to each program area. The integration or alignment of concerns within and across resource areas helps the analyst and the decision-maker compare results of investment in dissimilar programs in terms of common desired outcomes.²

1.1.2 Current State-of-the-Practice

Most state DOTs and MPOs have management systems in place that provide useful capabilities for assessing needs and recommending work for specific asset types (e.g., pavements, bridges, and public transit or aviation facilities) and specific functions (e.g., highway, airfield, or rail maintenance). In addition, specialized tools for benefit/cost analysis, life-cycle cost analysis, and investment performance analysis for selected types of strategies are in use.³ However, these tools have not yet been integrated in a manner that would support program-level modal tradeoffs that reflect a broad range of policy objectives.⁴

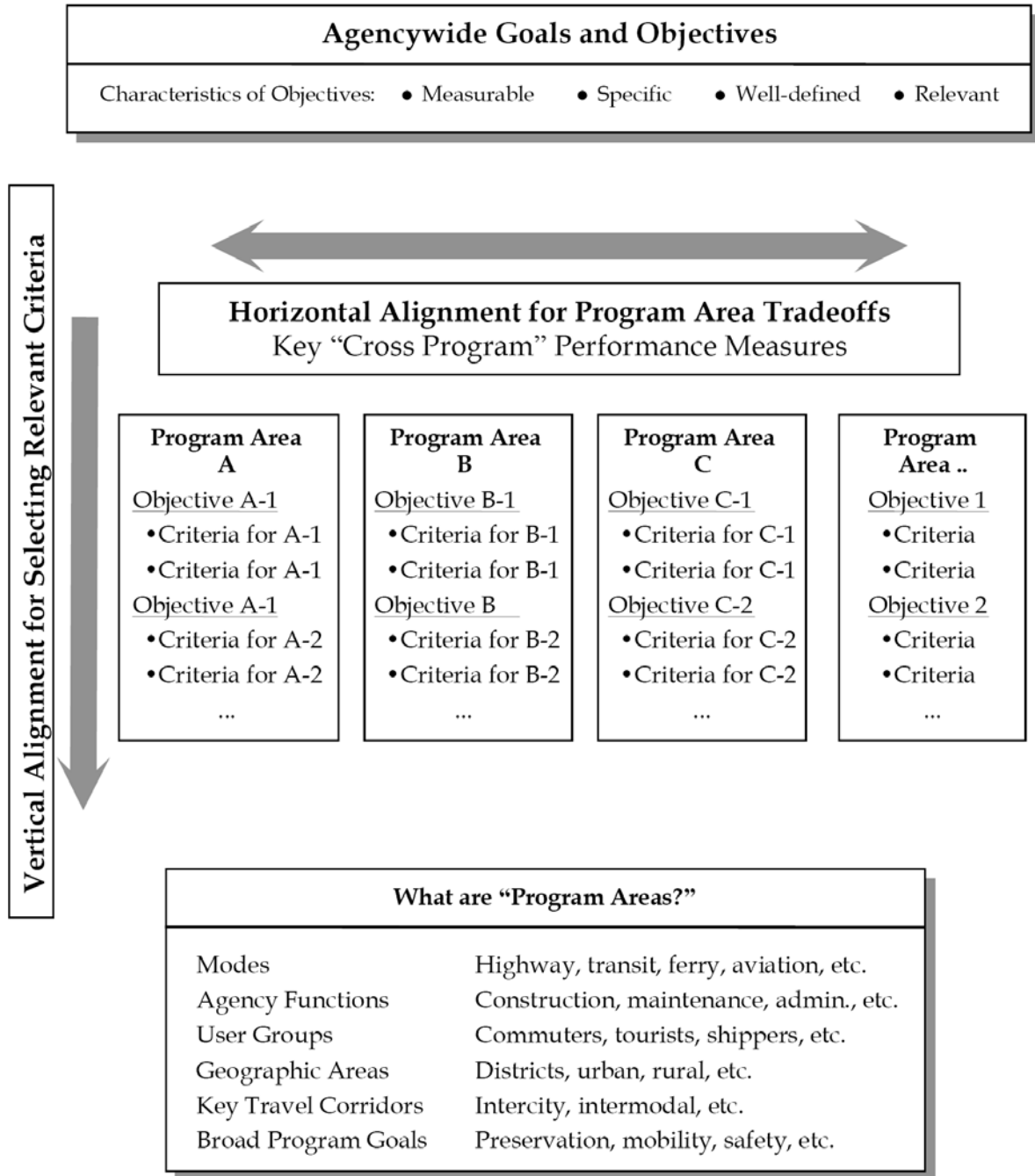
¹ *Development of a Multimodal Tradeoffs Methodology for Use in Statewide Transportation Planning*. NCHRP Project 8-36 A(07) Phase I and Phase II (2001 and 2004).

² *Ibid.*

³ *Analytical Tools for Asset Management*. NCHRP Project 20-57 (2005).

⁴ *Development of a Multimodal Tradeoffs Methodology for Use in Statewide Transportation Planning*. NCHRP Project 8-36 A(07) Phase I and Phase II (2001 and 2004).

Figure 1.1 Generalized Framework for a Tradeoff Analysis



Source: NCHRP Project 8-36.

In 1999, the Washington State Transportation Center surveyed 50 states in order to assess the state-of-the-practice in multimodal transportation planning. The survey results showed that although some states are interested in multimodal analysis, none had discovered tools they could use to perform such analysis. A few states reported that they were in the early stages of developing an analysis tool. Other states responded that they were uninterested in a multimodal analysis tool for three primary reasons:

- The state DOT deals primarily with highway projects and very few modal tradeoff opportunities exist;
- A state governing body (such as a Transportation Commission) makes subjective decisions based on available data; and
- Multimodal planning responsibilities belong to an MPO rather than the state DOT.⁵

⁵ MULTIMODAL INVESTMENT CHOICE ANALYSIS (MICA), Volume I, Phase I. Washington State Transportation Center (2002).

2.0 Workshop Material

■ 2.1 Workshop Questions on Multimodal Tradeoffs

To facilitate discussion, each participant was asked to answer the following set of questions prior to coming to the workshop:

1. How would you or your agency define a **multimodal tradeoff**?
2. Does your agency conduct a multimodal tradeoff analysis (to address both **passenger and freight** movement)? If so, please describe the process at each of these levels:
 - a. Planning.
 - b. Programming.
 - c. Corridor.
 - d. Project.
3. What tools are used to conduct or make tradeoff decision **within** modes (e.g., Highway Economic Requirements System for State Use - HERS-ST, National Bridge Investment Analysis System -NBIAS, Pavement Management Systems, travel demand forecasting models)?
4. Does your agency employ specific tools to conduct multimodal tradeoff analyses (between modes)?
5. How are results from multimodal tradeoff analyses utilized and presented in your agency (e.g., Long-Range Plans, Strategic Corridor Plans)?
6. What is your agency's most pressing motivation for having or wanting a formalized multimodal tradeoff process?
7. What are the barriers to developing a process for multimodal tradeoffs? How can these barriers be best overcome?
8. Do you feel all state transportation agencies and MPOs would benefit from a multimodal tradeoff process? Do you feel that this may vary depending on individual transportation agency (e.g., population, percentage of urbanized areas)? If so, what characteristics create the need for multimodal analyses?
9. What do you see as the future for multimodal tradeoff analyses in your **agency**? What is needed to further the multimodal tradeoff **state-of-the-practice**?

■ 2.2 Summary of Workshop Material

The participant responses are summarized in the following tables with full responses included in Appendix B.

Responding Agency	1. How would you or your agency define a multimodal tradeoff?
Denver Regional Council of Governments (DRCOG)	Allocation of funding to each of the modes of transportation and selection of modes in a corridor improvement plan
Federal Highway Administration (FHWA) Office of Asset Management	Pertains to choices between transit and highway, rail and marine, and rail and highway
Federal Transit Administration (FTA) Region 7	A broad range of activities could be considered a multimodal tradeoff
Florida Department of Transportation (FDOT)	Process of choosing the combination of modal solutions that will best meet established policies, goals, objectives, and strategies
Houston-Galveston Area Council (H-GAC)	Tradeoffs are amongst highway, transit, and bicycle/pedestrian alternatives
Michigan Department of Transportation (MDOT)	The costs or consequences of one set of investment choices over another - preferred wording would be “integrated investment strategy”
Minnesota Department of Transportation (Mn/DOT)	Mn/DOT does not formally define the concept of “multimodal tradeoffs”; the agency’s vision is to establish a coordinated transportation network
Missouri Department of Transportation (MoDOT)	Maximizing transportation resources to have the greatest transportation benefit
Puget Sound Regional Council (PSRC)	Involves either a choice between various transportation modes to solve a particular transportation problem (project-level tradeoff) or a programmatic investment decision that chooses a funding level for various modal transportation programs (programmatic-level tradeoff)
Tri-County Metropolitan Transportation District of Oregon (TriMet)	TriMet does not deal with the concept directly
Utah Transit Authority (UTA)	A situation where different modal investments could achieve specific objectives; the tradeoff would address how effective and cost effective each would be at meeting objectives
Virginia Department of Transportation (VDOT)	Comparing investments in two modes and determining the better overall investment

Responding Agency	2. Does your agency conduct a multimodal tradeoff analysis (to address both passenger and freight movement)? If so, please describe the process at each of these levels:			
	2a. Planning.	2b. Programming.	2c. Corridor.	2d. Project.
DRCOG	No	Conducted qualitatively as part of the resource allocation	Conducted as part of the environmental process	No
FHWA Office of Asset Management	The FHWA does not itself conduct multimodal tradeoff analysis			
FTA Region 7	The FTA provides funding and technical support to facilitate planning, including multimodal tradeoff analysis for states, transit operators, and MPOs			
FDOT	Florida uses a dynamic multimodal tradeoff process that evaluates progress in meeting established policies, goals, objectives, and strategies; the results of various analyses are used to adjust policies, goals, objectives, and strategies - as well as the evaluation tools themselves - as needed and as desired	FDOT first adopts an overall investment policy, and then reaches consensus among its program managers and decision-makers on the allocation of resources across programs; funding allocation formulas also guide investment decisions	Decisions focus on choosing the right <u>mix</u> of modes to move people and freight	Decisions are driven by policy and supported by data (i.e., from technical analyses, partner input, and financial analyses); priorities determined from a systemwide perspective
H-GAC	No			
MDOT	Our focus is on completing systems, not competing systems; MDOT provides designers with the context information and training needed to incorporate multiple modes	Funding at state and Federal levels is protected or “compartmentalized,” and programming follows the Federal and state programs defined in law	This will be one of the products of our State Long-Range Plan	Yes, as required in the NEPA process
Mn/DOT	Mn/DOT policies and programs guide investment decisions; factors that shape the development of Mn/DOT policies and programs include safety, the integration of transportation modes, service and investment preservation, customer focus, economic development, technology, environment partnerships, and Federal actions			
MoDOT	To date, multimodal tradeoffs have only occurred in highway corridor expansions in urban areas; public transportation alternatives and needs are considered and incorporated where possible			

	2. Does your agency conduct a multimodal tradeoff analysis (to address both passenger and freight movement)? If so, please describe the process at each of these levels:			
Responding Agency	2a. Planning.	2b. Programming.	2c. Corridor.	2d. Project.
PSRC	Developing a framework to better prioritize transportation investments to meet state requirements for “least-cost planning.”; the intent is not a ranked list, but investments divided into high, medium, and low priorities	Projects using STP, CMAQ, and FTA dollars are selected based on policy goals in the transportation plan and input from policy boards; projects are ranked qualitatively based on how well they achieve the policy goal(s)	Corridor planning studies make basic project-level multimodal tradeoff decisions based on criteria established at the beginning of the process; the aim is to select the right mode, or mix of modes, to meet the needs in a corridor	Same as corridor-level decisions
TriMet	As a transit agency, TriMet rarely deals with freight issues except to the extent we move people efficiently; thus, freeing road capacity for truck movements	No, however this does happen at a regional level with Metro, the Port of Portland, Oregon DOT, and road jurisdictions being key players	Same as 2a and 2b	
UTA	A tradeoff analysis would use planning-level costs to assess the range of modal investments that should be examined more thoroughly to meet a defined need	(No response provided)	At a corridor level, an alternatives analysis would be performed that describes specific alternatives and evaluates each against objectives and criteria	During the environmental phase, specific tradeoffs against detail cost, effectiveness, and impacts should be made; in most cases, the project is pretty well defined at this point
VDOT	In the process of developing a multimodal tradeoff method	See 2a	Diversion analyses and mode choice modeling	Same as 2c

Responding Agency	3. What tools are used to conduct or make tradeoff decision within modes (e.g., Highway Economic Requirements System for State Use – HERS-ST, National Bridge Investment Analysis System – NBIAS, Pavement Management Systems, travel demand forecasting models)?
DRCOG	<ul style="list-style-type: none"> • The regional model is used during system planning • A systematic, quantifiable methodology is used during programming
FHWA Office of Asset Management	<ul style="list-style-type: none"> • The FHWA has developed a “Toolbox for Regional Policy Analysis” that offers guidance on a variety of techniques, including benefit-cost analysis that MPOs can use to evaluate investment alternatives • The FHWA has issued benefit-cost analysis guidance (e.g., the Economic Analysis Primer) and is currently developing a web-based benefit-cost analysis tool for the analysis of discrete highway projects
FTA Region 7	FTA funding supports the use of many sketch-planning and modeling tools
FDOT	<ul style="list-style-type: none"> • Transit alternative analysis used to capture Federal funding and in projects that evaluate a transit alternative to additional highway lanes • Other tools, such as the ones listed in the question, are used to provide data to support decisions on prioritizing and selecting projects for funding within each modal program
H-GAC	N/A
MDOT	<ul style="list-style-type: none"> • Prioritization models for pavement • Road Quality Forecasting model (RQFS) and mapscore, for capacity projects • Benefit/cost prioritization model • Statewide passenger and truck model • MPO models, small city models • Economic benefit analysis on the highway element • HERS-ST
Mn/DOT	<ul style="list-style-type: none"> • Pavement Serviceability Rating • Pavement Management System • National Bridge Inventory Scale • Metropolitan Council’s Regional Model
MoDOT	<ul style="list-style-type: none"> • Long-Range Direction • TRACKER Performance Management System • Missouri passenger and freight data
PSRC	<ul style="list-style-type: none"> • STEAM • Bridge and pavement management systems • Travel demand forecasting model
TriMet	N/A
UTA	<ul style="list-style-type: none"> • Cost models • Travel demand models • Comparison matrices

Responding Agency	3. What tools are used to conduct or make tradeoff decision within modes (e.g., Highway Economic Requirements System for State Use – HERS-ST, National Bridge Investment Analysis System – NBIAS, Pavement Management Systems, travel demand forecasting models)?
VDOT	<ul style="list-style-type: none"> • Uses a model that uses performance measures to evaluate highway projects • Bridge model and pavement management system • Travel demand models • Performance measures to evaluate (and tradeoff) freight versus passenger rail projects for new Rail Enhancement Fund

Responding Agency	4. Does your agency employ specific tools to conduct multimodal tradeoff analyses (between modes)?
DRCOG	No
FHWA Office of Asset Management	While Federal requirements specify a wide range of factors, they generally do not specify what analytical tools – such as benefit-cost analysis – planners should use to evaluate alternatives
FTA Region 7	FTA funding supports a very broad range of tools
FDOT	No
H-GAC	Not between passenger and freight but among passenger modes H-GAC employs a travel demand forecasting methodology along with the experiences of local governments’ decision-makers
MDOT	No, MDOT hopes to develop an integrated transportation investment strategy as part of the State Long-Range Plan
Mn/DOT	No
MoDOT	No
PSRC	A least-cost planning methodology is being further developed to help prioritize system expansion projects within the metropolitan transportation plan; this process will use a cost-benefit analysis framework
TriMet	Only within transit modes – generally through corridor studies and associated Alternatives Analysis and demand forecasting
UTA	No
VDOT	Only for passenger versus rail freight; currently all transit funding is by formula

Responding Agency	5. How are results from multimodal tradeoff analyses utilized and presented in your agency (e.g., Long-Range Plans, Strategic Corridor Plans)?
DRCOG	Scenarios involving various degrees of improvement are presented to the advisory committee and to the policy-makers
FHWA Office of Asset Management	MPOs are required to develop a long-range transportation plan; at the state level, each state DOT is expected to work cooperatively with its MPOs to develop a State Transportation Improvement Program (STIP), which is an intermodal program of projects encompassing all the areas of the state

Responding Agency	5. How are results from multimodal tradeoff analyses utilized and presented in your agency (e.g., Long-Range Plans, Strategic Corridor Plans)?
FTA Region 7	The whole concept of multimodal analysis is important in regional short-range and long-range planning; everything from congestion management planning to corridor planning, to maintenance planning benefits from a total look at the transportation network and needs
FDOT	Through documentation of performance measures, the Department and its partners can see how well we are achieving established policies, goals, objectives, and strategies; FDOT produces a multiple performance documents; in addition, FDOT has several viable modal and multimodal performance measures initiatives
H-GAC	N/A
MDOT	The MDOT Five-Year Transportation Program is an integrated multimodal transportation investment document, but does not contain tradeoff analyses; new State Long-Range Plan will contain integrated transportation investment strategy
Mn/DOT	Mn/DOT does not formally define the concept of “multimodal tradeoffs”; it is implied in Mn/DOT’s Planning and Programming Process (i.e., Mn/DOT’s Strategic Plan and Long-Range Transportation Plan)
MoDOT	MoDOT administers single-mode dedicated funding programs that do not allow mixing of funding from one mode to another
PSRC	Congestion management process, least-cost planning approach, and corridor plan analysis used within the metropolitan transportation plan; PSRC’s project selection process is aimed at picking the highest priority investment to move forward for implementation
TriMet	The 20-year Regional Transportation Plan and the TriMet’s five-year Transit Investment Plan (TIP) are coordinated by the MPO and related committees
UTA	Corridor studies use tables with performance and impact information
VDOT	This is still on the horizon for VDOT

Responding Agency	6. What is your agency’s most pressing motivation for having or wanting a formalized multimodal tradeoff process?
DRCOG	<ul style="list-style-type: none"> • Getting the most value out of extremely limited funding • Strengthening the consideration of other factors, such as land use, in the analysis of investment tradeoffs
FHWA Office of Asset Management	Concerned that the public’s resources are being invested efficiently and wisely
FTA Region 7	The value of a multimodal national transportation network
FDOT	Better determination of project outcomes and impacts so better decisions can be made
H-GAC	Provide better information to regional transportation decision-makers
MDOT	Provide Michigan with an integrated multimodal transportation system that makes sense in a time of limited financial resources and increasing and diverse customer expectations
Mn/DOT	Help contribute to the establishment of more refined scenario- and project-level analysis and investment decisions

Responding Agency	6. What is your agency's most pressing motivation for having or wanting a formalized multimodal tradeoff process?
MoDOT	Maximize transportation benefit with limited resources
PSRC	<ul style="list-style-type: none"> On the planning level, to better set priorities among competing investments to meet overall system needs On the programming level, to better select the highest priority transportation projects for implementation with limited funding On the project or corridor level, to make sure the conceptual solution best meets the corridor travel need
TriMet	Support for the <i>2040 Framework Plan</i> (long-range plan); in the long run, transportation problems are best addressed through land use planning; related is assurance of freight mobility, which in turn promotes regional economic development
UTA	Currently engaged in several multimodal studies
VDOT	Making investments across modes

Responding Agency	7. What are the barriers to developing a process for multimodal tradeoffs? How can these barriers be best overcome?
DRCOG	<ul style="list-style-type: none"> Finding a good common denominator that is not data intensive, costly, or requires a significant amount of time to acquire Agency turf issues and political issues often get in the way of allowing projects to be objectively selected Potential Solution: Decision-makers understanding the process
FHWA Office of Asset Management	<ul style="list-style-type: none"> Inflexibility in the use of some Federal and local funding Constraints on fiscal and human resources needed to conduct more detailed tradeoff analysis Difficulty in coordinating between private sector (e.g., freight railroads) and public sector (e.g., highway and transit) planning objectives Physical constraints that restrict the use of some modal options (e.g., limited land for additional port facilities) Local political constraints Multijurisdictional coordination problems Lack of data and analytical tools that can capture the full range of regional impacts of multimodal decisions
FTA Region 7	Awareness of the possibilities
FDOT	<ul style="list-style-type: none"> Lack of normalization across the modes to allow an apples-to-apples comparison Data availability Potential Solution: Select a limited set of variables that can be used in each mode, and devote enough resources to gather and analyze the data
H-GAC	Data and modeling software capability
MDOT	<ul style="list-style-type: none"> Legislatively mandates restrict funding flexibility Potential Solution: Set priority, based upon an overall needs assessment, to the funding distribution process

Responding Agency	7. What are the barriers to developing a process for multimodal tradeoffs? How can these barriers be best overcome?
Mn/DOT	A multimodal tradeoff process would need to be vetted through Mn/DOT organization for accuracy, veracity, robustness
MoDOT	<ul style="list-style-type: none"> Any redirection of traditional highway and bridge funding to other modes is seen as a take away Public wants more road and bridge improvements Potential Solution: Education
PSRC	<ul style="list-style-type: none"> Lack of performance measures/evaluation criteria that overcome differences among modes so that the analysis is conducted in an “apples-to-apples” way Inability to incorporate varying and often conflicting goals and policies along with more quantitative benefit-cost information in the decision process
TriMet	Resources at both the Federal and local levels
UTA	(No response provided)
VDOT	Transit funds are provided by formula – even nine percent of STP money that is flexed to transit – so there is little incentive to identify multimodal performance measures; but, politically (and professionally), there is an interest in doing so

Responding Agency	8. Do you feel all state transportation agencies and MPOs would benefit from a multimodal tradeoff process? Do you feel that this may vary depending on individual transportation agency (e.g., population, percentage of urbanized areas)? If so, what characteristics create the need for multimodal analyses?
DRCOG	Yes, all states would benefit; the benefits would vary by the number and complexity of decisions needing to be made; scarcity of funds will likely be the primary driver
FHWA Office of Asset Management	Yes, the benefits would depend on the complexity of existing transportation system
FTA Region 7	A process would be beneficial and might be similar to the concept of Human Services Coordination; it does not need to be an “all-or-nothing” approach
FDOT	Yes, all states would benefit from a process that is flexible enough to allow for major differences in the type/size of the entity doing the evaluation and making decisions
H-GAC	All agencies would benefit from a process and the benefits would likely vary by MPO and state DOT, with relative size and complexity, and the presence of major freight facilities
MDOT	Yes, a process is beneficial; the need for a multimodal analyses/process is primarily driven by: 1) a more diverse customer base, and 2) expanding customer expectations
Mn/DOT	Larger urban areas might benefit to a greater degree than smaller urban/rural areas; population, employment, land use, and travel growth patterns, as well as existing and future transit service, defined linkages between highway and other intermodal facilities/modes
MoDOT	All would benefit from a formal process, but it will be difficult to develop a process that will work for all states

Responding Agency	8. Do you feel all state transportation agencies and MPOs would benefit from a multimodal tradeoff process? Do you feel that this may vary depending on individual transportation agency (e.g., population, percentage of urbanized areas)? If so, what characteristics create the need for multimodal analyses?
PSRC	All state transportation agencies and MPOs make investment decisions and would benefit from a multimodal tradeoff process; smaller urban areas and rural areas may need much simpler tools than larger urbanized areas, but a way of comparing across investments is needed in all areas
TriMet	Yes
UTA	UTA would benefit from a formalized process
VDOT	A multimodal tradeoff method can provide data to inform decision-makers

Responding Agency	9. What do you see as the future for multimodal tradeoff analyses in your agency? What is needed to further the multimodal tradeoff state-of-the-practice?
DRCOG	<ul style="list-style-type: none"> • Demand exists for a rigorous tradeoff analysis • An easy-to-use methodology would be helpful to practitioners
FHWA Office of Asset Management	The FHWA will continue to provide more and improved tradeoff tools and guidance for use by states and MPOs; the decision to apply these tools will continue to reside at the state and local levels
FTA Region 7	Peer exchanges offer an opportunity to share successful practices; good ideas should be shared and bits and pieces of techniques melded together
FDOT	<ul style="list-style-type: none"> • FDOT and its partners will continue to improve their working relationships, their understanding of the contributions of each mode of transportation in various scenarios, and their ability to agree on the best package of multimodal solutions and choices for travel and transport • This can best be accomplished by ensuring that all transportation, environment, land use, and economic partners work together to achieve their respective policies, goals, objectives, and strategies
H-GAC	Agencies need a basic understanding of the state-of-the-practice and the benefits and shortfalls of the current approaches
MDOT	MDOT will continue to lead the effort to develop and implement an integrated transportation investment strategy; in addition, we need an economic benefits model for all modes and continue to involve stakeholders/customers in development of performance measures
Mn/DOT	Mn/DOT is moving in that direction through the development of modal/intermodal measures as part of its long-range transportation system/improvement plans and programs
MoDOT	MoDOT will implement some type of process in the future, especially if high fuel prices continue and the resulting increase in demand for alternative transportation options
PSRC	Need improved tools and improved understanding of the core concepts on the part of decision-makers
TriMet	To the extent it is tied to the 2040 Framework Plan and the balanced development of modes, it is a cornerstone for transportation planning in the Portland region

Responding Agency	9. What do you see as the future for multimodal tradeoff analyses in your agency? What is needed to further the multimodal tradeoff state-of-the-practice?
UTA	We need test cases
VDOT	VDOT is in the process of developing one and what is needed is better methods

3.0 Summary

■ 3.1 Discussion Topics

The responses to the workshop questions indicated that multimodal tradeoffs are not widespread as of yet but that there is movement and desire to go in that direction. To further explore this topic, the peer exchange began with presentations from participants about their agencies' use of a multimodal tradeoff analyses. The second part of the day was spent discussing existing challenges, potential solution strategies, next steps, and existing resources.

■ 3.2 Informal Presentation Key Points

During the informal presentations, participants described several multimodal tradeoff analyses processes used in their respective agencies and the current challenges.

3.2.1 Denver Regional Council of Governments (DRCOG)

In the past, modal allocations were driven by: Interstate Transfer (1977-1978) (where highway funds were transferred to transit services), criteria and tradeoff methodology (1980s), and Federal funding categories (1990s). The 1980 tradeoff methodology used basic evaluation matrices with vehicle miles of travel (VMT) as the common denominator to compare across modes. This methodology proved to be too data intensive and was discarded. Currently tradeoffs are done qualitatively based on quantitative rankings of highway and transit projects by type. As is common in other agencies, DRCOG does not have generalized "transportation funds" but has specific "highway" and "transit" funds.

3.2.2 Federal Highway Administration (FHWA), Office of Asset Management and Office of Planning

The FHWA agreed with the other meeting participant statements that multimodal tradeoff analyses could help agencies allocate limited resources in an efficient and effective manner possible. The FHWA also acknowledged that funding flexibility is a large barrier to multimodal tradeoff analysis because agencies are locked into certain investment decisions. In addition, as more and more funds are devoted to the preservation of existing infrastructure, the ability to conduct multimodal tradeoffs may be reduced. The FHWA Office of Planning

emphasized that conducting multimodal discussion at the planning level is of particular importance. Regarding data issues, it will be tough to integrate various databases, so the second-best option could be linking databases or simply making data more available.

3.2.3 Federal Transit Administration (FTA), Regional Office

Having a “balanced tradeoff” versus a “tradeoff” is something that can be done by getting the right people at the table – lots of little decisions can help balance the system.

3.2.4 Florida Department of Transportation (FDOT)

In Florida, multimodal tradeoff is about collaboration and ensuring that all partners work together to make better decisions. For the Florida Transportation Plan update in 2000, Florida brought more than 80 leaders together to discuss the issues and decided collectively to establish a Strategic Intermodal System as a first step in refining roles and responsibilities throughout the State. Florida then created another steering committee of 40 people to develop a system that could be quantitatively identified. They proposed three systems and perspectives to cover all transportation facilities in Florida: State, Regional, and Local. They identified the Strategic Intermodal System as the State’s primary focus, and recommended further discussions to refine roles and responsibilities for defining regional and local systems. Another steering committee was formed to accomplish this, resulting in adoption of the 2025 Florida Transportation Plan. One of the outcomes of this effort was the recognition that because the state transportation fund is flexible, FDOT is able to make true multimodal choices on the Strategic Intermodal System, and that this same flexibility is needed at the regional and local levels.

3.2.5 Houston-Galveston Area Council (H-GAC)

The Houston area’s long-range transportation plan is close to \$65 billion. In the late 1980s, Houston focused on expanding capacity to address congestion. This approach was successful until about four or five years ago. With the doubling of population almost every 10 years, mobility and congestion is the biggest issue in the transportation improvement plan (TIP). Attitudes have changed in Houston – most people are in support of light rail and transit. In the past, the typical corridor approach has been to first pick a mode and then perform analysis to support the chosen mode. H-GAC is hoping to move towards identifying “needs” in a corridor first and then identifying what modes would best benefit those needs.

3.2.6 Michigan Department of Transportation (MDOT)

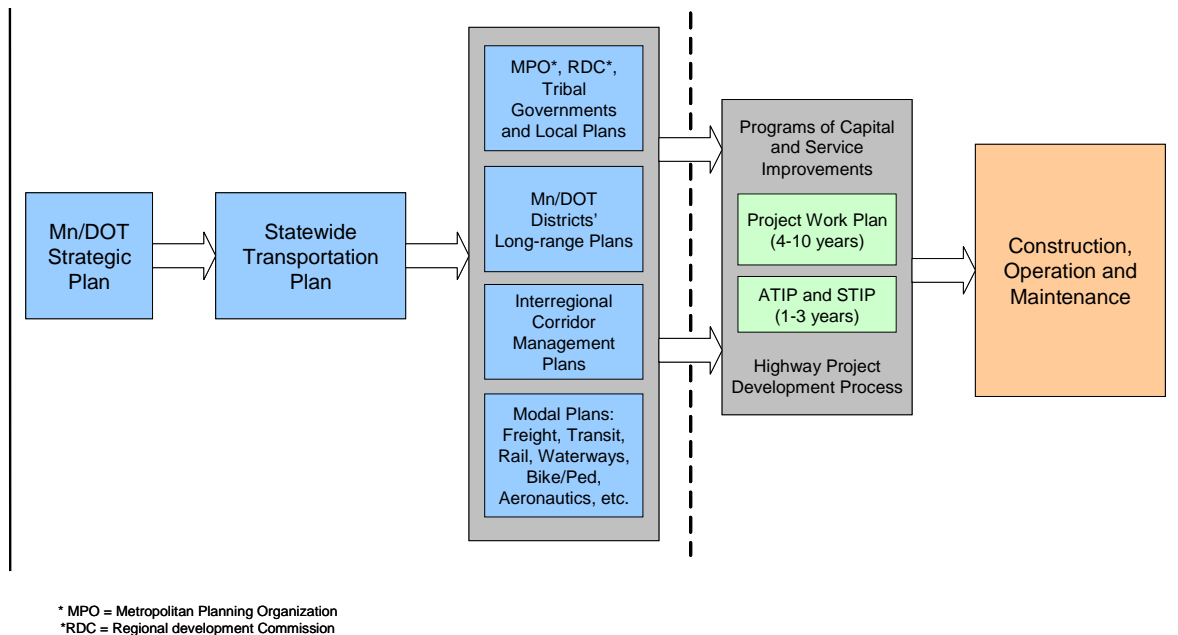
One of MDOT’s goals is to “balance highway investments.” Transit is eligible for Surface Transportation Program (STP) funds and last year, \$2.0 million in road funding was flexed to rural transit agencies. The factors affecting multimodal planning are due to traditional funding (formula from 1951), funding disparities, political realities, and inadequate

evaluation tools. When making investment decisions, MDOT develops numerous alternatives to test the outcomes through the use of forecasting tools and derives strategies to further achieve its goals. The end result is a framework that helps guide program and project selection decisions.

3.2.7 Minnesota Department of Transportation (Mn/DOT)

The agency is moving towards making choices between modes using performance-based planning. However, there are pre-set funding levels set for each mode, so many decisions are made in advance of any planning or analysis. Figure 3.1 shows Mn/DOT’s project selection process. Even though there is not a formal multimodal tradeoff process, the *Strategic Plan* calls for the establishment of a “coordinated transportation network, including highways, bridges, airports, water ports, freight, bus, rail, intermodal facilities, and bikeways.”

Figure 3.1 Mn/DOT’s Performance-Based Planning and Project Selection Process



3.2.8 Missouri Department of Transportation (MoDOT)

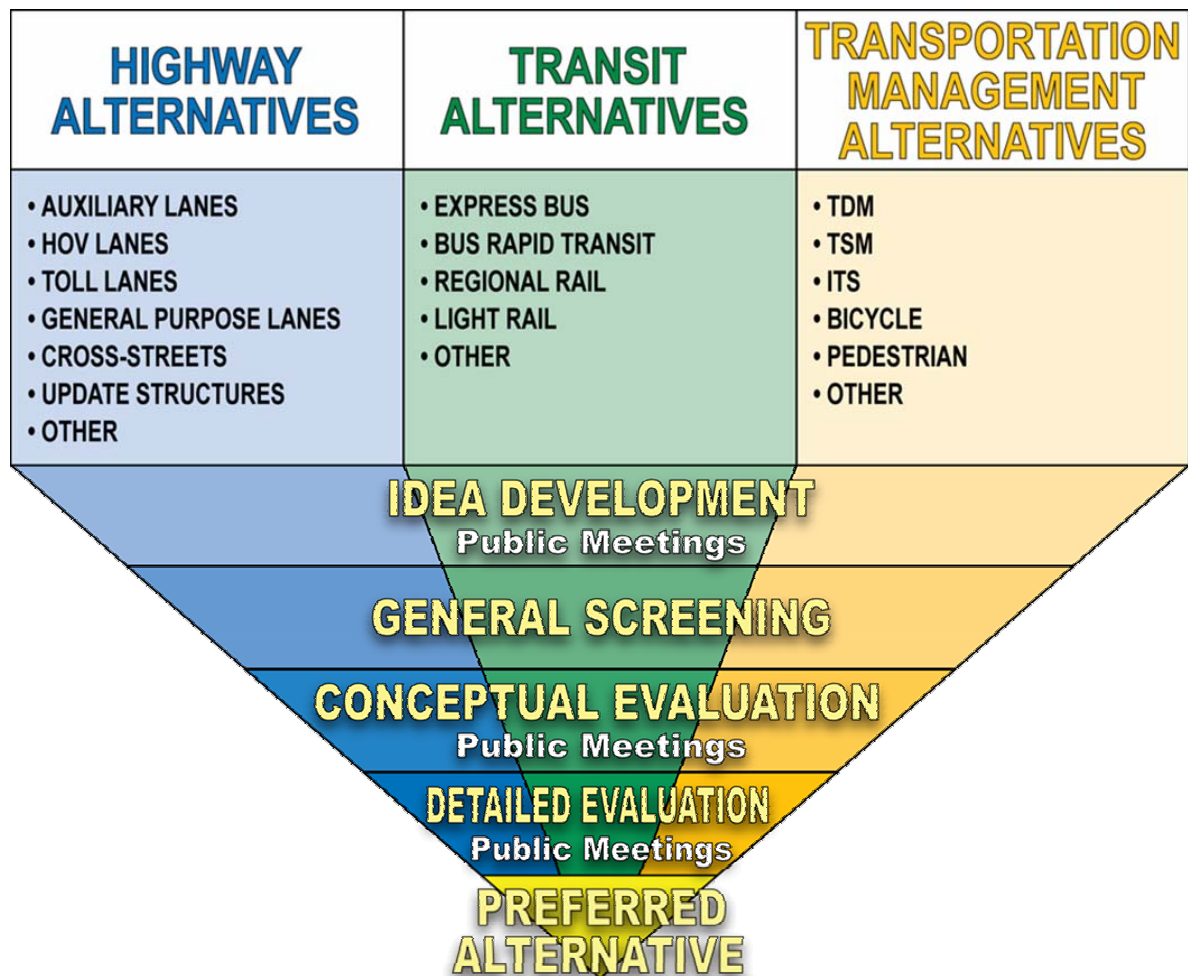
The MoDOT Multimodal Office is responsible for statewide planning and grant administration in the modal areas of aviation, railroads, transit, and waterways. The success of MoDOT’s multimodal office is that it creates the opportunity for all the modes work

together. However, there is a state provision that does not allow the use of dedicated “highway” funds for other uses. Dedicated highway funds are important to MoDOT due to the large number of river crossings in the State, but it would be useful if the funds were flexible especially given large reductions in Missouri’s general fund. Typically, tradeoffs only occur at the project level.

3.2.9 New Mexico Department of Transportation (NMDOT)

Multimodal tradeoff is conducted on corridor levels. Figure 3.2 depicts the generalized process in which NMDOT conducts tradeoffs on a corridor level. This same process could be applied on a project level. Corridor projects become challenging when travel demand models and data from two MPO areas are used.

Figure 3.2 New Mexico Generalized Multimodal Process for Corridor Analysis



3.2.10 Puget Sound Regional Council (PSRC)

PSRC is developing a framework to better prioritize transportation investments within its metropolitan transportation plan. The framework is designed to meet state requirements for “least-cost planning.” Least-cost planning is a process that looks at supply and demand-side solutions, with benefit-cost analysis at its core. The framework defines multimodal measurements and uses a weighted cost-benefit analysis approach. The focus of the analysis is on projects and programs that add capacity to the existing transportation system and their alternatives. PSRC’s policy boards identify priority issues to be addressed and assign weights to various objectives and goals that the plan is trying to achieve. The intent is not a ranked list, but investments divided into high, medium, and low priorities. This methodology is intended to be embedded into the regional travel demand forecasting model as a post-processor to better automate the benefits calculation output.

3.2.11 Tri-County Metropolitan Transportation District of Oregon (TriMet)

TriMet serves 575 square miles of the urban portions of the tri-county area around Portland, Oregon. One of the goals of TriMet is to manage transportation through land use. In the region, there is an elected regional body that governs transportation and land use. Tradeoffs between preservation and expansion of the roads are usually decided at a local level. The agency uses regional flex funds to make tradeoff choices between transit modes, such as rail and bus. TriMet faces opposition from the public at times because it is still difficult to convincingly state that adding capacity will not solve congestion problems when historically this has been a rather successful approach. On the other hand, as the share of transit, bicycling, and walking increases, the public and decision-makers may be more convinced that these are options when it may make more sense to make roadway improvements.

3.2.12 Utah Transit Authority (UTA)

In the past, UTA has conducted analysis between modes through corridor studies. However, the agency has not conducted a formal “tradeoff” analysis.

If a tool is developed to perform “tradeoffs,” the tool must measure congestion relief with regard to cost effectiveness. Congestion relief is a major issue for UTA; however, some regions may be interested in the land use impacts while others are interested in the economic development aspect. To adequately develop a tool, everyone must first agree on a common set of objectives and buy into the process.

3.2.13 Virginia Department of Transportation (VDOT)

A major element of VDOT's long-range transportation plan, *VTrans2025*, is the concept of the multimodal investment network or MIN. MINs are typically large-scale groups of projects that approach statewide significance, represent multiple modes, connect major activity centers, are a freight corridor, and/or meet the goals of the Commonwealth (e.g., tourism and economic development). The purpose of orienting statewide multimodal planning around MINs is to integrate transportation planning across all modes, coordinate transportation investments, and create a transportation system that is more responsive to users.

The plan legislatively mandates the development of objective and performance-based criteria for project selection in Virginia. This criterion is a straightforward project rating process similar to a process followed by the New Jersey DOT. Points are applied based on an "all-or-nothing" basis. The point scale is +1 for project connecting more than one modes, 0 for no change, and -1 if negative effect.

■ 3.3 Challenges and Solution Strategies

The second part of the workshop focused on answering the questions on how we can meet the challenges identified during the presentations. Four major challenges were discussed.

- Clear definition for Multimodal Tradeoffs.
- Identifying a process for Multimodal Tradeoffs.
- Identifying tools for Multimodal Tradeoffs.
- Limited flexibility of Federal and state funds.

3.3.1 Clear Definition for Multimodal Tradeoffs

Based on the responses in Section 2.2 as well as from the group discussion, a clear definition for "multimodal tradeoffs" does not currently exist. To assist in the development of a definition, the workshop participants suggested the following guidelines:

- Clearly distinguish the framework versus the tool(s) necessary to conduct a multimodal tradeoff analysis;
- Refer to a choice amongst various modes;

- Compare investment options between two modes; and
- Criterion used in tradeoff analyses should be weighted by some factor such as costs, benefits, or connection to agency goals.

3.3.2 Identifying a Process for Multimodal Tradeoffs

The group discussed ways on how transportation professionals can make better tradeoff decisions and what types of “processes” would be useful in making balanced investment decisions. A summary of the comments are listed below.

- In developing a practical and useful tradeoff framework, more than one process may be necessary to address decisions on various levels (e.g., program level versus project level, or state versus local).
- A multimodal tradeoff process may also depend upon agency characteristics or transportation system characteristics (e.g., state versus regional/local, or urbanized versus rural).
- Mode-neutral measure(s) for all modes are necessary. Cost is often used, but this may not be the best comparative measure across modes. Another possibility is VMT. Because no two regions, states, and projects are alike, it may be difficult to have one set multimodal framework.
- Strategies need to be identified that establish successful interagency relationships such as a collaborative process to support multimodal tradeoffs.

3.3.3 Identifying Tools for Multimodal Tradeoffs

Agencies lack the tools to help decision-makers understand options across modes. Along with processes within a multimodal framework, participants discussed the challenges of developing tools as well as the variety of tools that are necessary to perform multimodal tradeoff analyses.

- Given different data availability and data inequality between modes, tools would vary at a statewide level and local level.
- Decision-makers may resist the recommendations identified through tools, given the desire to make policy-based decisions based on other criteria.
- A set of tools should only be developed after a multimodal tradeoffs decision process is defined. These tools may need to be tailored for both project- and program-level analyses.

3.3.4 Limited Flexibility of Federal and State Funds

Limited flexibility in transportation funding significantly affects the ability for agencies to conduct tradeoffs amongst the modes. Many agencies confront pre-set funding levels set for each mode. As agencies face this constraint, a solution strategy would be to build consensus among agency partners regarding how the state's portion of funding should be spent. In addition to pre-set funding levels, most transportation departments face the issue of coordination amongst the various transportation organizations, such as transit or freight. While many states are moving toward creating multimodal offices to streamline the state's transportation goals and objectives, silos are a huge barrier. One way to address this problem is to create stronger partnerships within agency departments and amongst state and local agencies.

■ 3.4 Next Steps

The challenges with finding a generalized framework for conducting multimodal tradeoffs are substantial and the issues they represent are only going to become stronger in future years. To further examine the role of multimodal tradeoffs, several activities were recommended:

- Increase state, local, and regional agencies' awareness of existing research, guidance, and tools available through the FHWA (e.g., Toolbox for Regional Policy Analysis, Economic Analysis Primer, and Intelligent Transportation Systems Deployment Analysis System (IDAS)). Potential strategies include an interactive "Community of Practice" web site and targeted peer exchanges.
- Conduct additional research on how agencies and other countries conduct multimodal tradeoff decisions, document more successful examples of the use of multimodal tradeoff analysis, and pursue research and best practices that identifies a real-world, program-level tradeoff analysis.
- Develop a framework approach where data are gathered from a variety of tools and sources as available and put into a standardized framework to facilitate tradeoffs analysis as best as possible given the limitations of the data. A potential framework could build upon the generalized approach outlined in the NCHRP Project 8-36 A(07) report.⁶
- Conduct a comprehensive review of models and analytical procedures available or under development that might fulfill the need for a tool that estimates the benefits that

⁶ *Development of a Multimodal Tradeoffs Methodology for Use in Statewide Transportation Planning*. NCHRP Project 8-36 A(07) Phase I and Phase II (2001 and 2004).

would be generated by a given level of investment in a particular modal program (*currently underway through Development of a Multimodal Statewide Corridor Planning Guidebook NCHRP Project 8-58*).

- Develop training for multimodal tradeoffs analyses on all aspects of multimodal tradeoffs (planning, program, corridor, and project) for state and regional agencies.
- Apply the Washington State Transportation Center MULTIMODAL INVESTMENT CHOICE ANALYSIS (MICA) model to a real-world, planning- or program-level tradeoff analysis. Testing MICA will determine if this model is able to support program-level tradeoff evaluation.
- Develop new tool(s) where necessary to address all levels of analysis – planning, programming, corridor, and project.
- Refine the NCHRP Project 8-36 Phase I generalized approach for multimodal tradeoff analysis to incorporate findings from Phase II of the report.⁷
- Involve both the American Public Transportation Association (APTA) and the Community Transportation Association of America (CTAA) in further research and peer exchanges.

■ 3.5 Existing Resources

The following resources were identified by workshop participants. Although limited research exists about the **process and tools** that agencies use to carry out multimodal tradeoff analyses and decision-making, the following tools, reports, and resources are useful to agencies.

- “Toolbox for Regional Policy Analysis” developed by the FHWA offers guidance on a variety of techniques, including benefit-cost analysis that MPOs can use to evaluate investment alternatives. Information is available on the FHWA’s web site: <http://www.fhwa.dot.gov/planning/toolbox/>.
- “Economic Analysis Primer” issued by the FHWA is benefit-cost analysis guidance. The agency also is currently developing a web-based benefit-cost analysis tool for the analysis of discrete highway projects. Information is available on the FHWA’s web site: <http://www.fhwa.dot.gov/infrastructure/asstmgmt/primer.pdf>.
- IDAS is software developed by the FHWA that can be used in planning for intelligent transportation systems (ITS) deployments. IDAS can be used to estimate the benefits

⁷ Ibid.

and costs of ITS investments, which are either alternatives to or enhancements of traditional highway and transit infrastructure. IDAS can currently predict relative costs and benefits for more than 60 types of ITS investments.

- *Development of a Multimodal Statewide Corridor Planning Guidebook (Pending Project 8-58) for the NCHRP (2006).*
- *Development of a Multimodal Tradeoffs Methodology for Use in Statewide Transportation Planning for the NCHRP Project 8-36 A(07) Phase I and Phase II (2001 and 2004).*
- *Analytical Tools for Asset Management for NCHRP Project 20-57 (2005).*
- *MULTIMODAL INVESTMENT CHOICE ANALYSIS (MICA), Volume I, Phase I; Washington State Transportation Center (2002).*
- *Final Report – Multimodal Statewide Transportation Planning: A Survey of Statewide Practices, John S. Miller, Virginia Transportation Research Council (2005).*

Appendix A

Workshop Participants

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Virginia Department of Transportation

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Appendix B

Workshop Responses

■ B.1 Workshop Questions on Multimodal Tradeoffs

Participants were asked to answer the following questions prior to attending the workshop:

1. How would you or your agency define a **multimodal tradeoff**?
2. Does your agency conduct a multimodal tradeoff analysis (to address both **passenger and freight** movement)? If so, please describe the process at each of these levels:
 - a. Planning.
 - b. Programming.
 - c. Corridor.
 - d. Project.
3. What tools are used to conduct or make tradeoff decision **within** modes (e.g., Highway Economic Requirements System for State Use – HERS-ST, National Bridge Investment Analysis System –NBIAS, Pavement Management Systems, travel demand forecasting models)?
4. Does your agency employ specific tools to conduct multimodal tradeoff analyses (between modes)?
5. How are results from multimodal tradeoff analyses utilized and presented in your agency (e.g., Long-Range Plans, Strategic Corridor Plans)?
6. What is your agency’s most pressing motivation for having or wanting a formalized multimodal tradeoff process?
7. What are the barriers to developing a process for multimodal tradeoffs? How can these barriers be best overcome?
8. Do you feel all state transportation agencies and MPOs would benefit from a multimodal tradeoff process? Do you feel that this may vary depending on individual transportation agency (e.g., population, percentage of urbanized areas)? If so, what characteristics create the need for multimodal analyses?
9. What do you see as the future for multimodal tradeoff analyses in your **agency**? What is needed to further the multimodal tradeoff **state-of-the-practice**?

■ B.2 Denver Regional Council of Governments (DRCOG)

1. How would you or your agency define a multimodal tradeoff?

The allocation of funding to each of the modes of transportation. Selection of mode or modes in a corridor improvement plan.

2. Does your agency conduct a multimodal tradeoff analysis (to address both passenger and freight movement)? If so, please describe the process at each of these levels:

Multimodal tradeoff analysis is conducted differently at each of the levels. Freight has not yet been considered separately.

2a. *Planning.*

We do not conduct a quantifiable multimodal tradeoff analysis during the system planning process. We have tried to consider tradeoffs using alternative scenarios. This has not been as successful as we would have liked. Thus far, traffic congestion has been the only freight issue identified. As this issue is the same for autos, freight is not separately considered.

2b. *Programming.*

Multimodal tradeoff analysis is conducted qualitatively as part of the resource allocation.

2c. *Corridor.*

Multimodal tradeoff analysis is conducted as part of the environmental process.

2d. *Project.*

We do not implement construction projects.

3. What tools are used to conduct or make tradeoff decision within modes (e.g., Highway Economic Requirements System for State Use - HERS-ST, National Bridge Investment Analysis System -NBIAS, Pavement Management Systems, travel demand forecasting models)?

The regional model is used to help make tradeoff decisions within modes during system planning. A systematic, quantifiable methodology is used to select projects within modes during programming.

4. Does your agency employ specific tools to conduct multimodal tradeoff analyses (between modes)?

No.

5. How are results from multimodal tradeoff analyses utilized and presented in your agency (e.g., Long-Range Plans, Strategic Corridor Plans)?

During the system planning process, scenarios involving various degrees of improvement emphasis were developed and presented to the advisory committee and to the policy-makers.

6. What is your agency's most pressing motivation for having or wanting a formalized multimodal tradeoff process?

Getting the most travel improvement value out of extremely limited funding. Could strengthen the consideration of other factors such as land use in the analysis of investment tradeoffs.

7. What are the barriers to developing a process for multimodal tradeoffs? How can these barriers be best overcome?

Finding a good common denominator that is not data intensive, costly, or requires a significant amount of time to acquire. Process needs to be easily understood by decision-makers. Agency turf issues and political issues often get in the way of allowing projects to be objectively selected.

- 8. Do you feel all state transportation agencies and MPOs would benefit from a multimodal tradeoff process? Do you feel that this may vary depending on individual transportation agency (e.g., population, percentage of urbanized areas)? If so, what characteristics create the need for multimodal analyses?**

Yes to first question. Usefulness would vary depending on how many decisions need to be made and the complexity of the issues. In our region, the scarcity of funds would be the primary driver.

- 9. What do you see as the future for multimodal tradeoff analyses in your agency? What is needed to further the multimodal tradeoff state-of-the-practice?**

There does not appear to be a demand for a rigorous tradeoff analysis. The current practice of professional judgment and policy decisions based on values seems to be satisfactory at this time. An easy to use methodology would be of help to practitioners.

■ B.3 Federal Highway Administration (FHWA), Office of Asset Management

1. How would you or your agency define a multimodal tradeoff?

FHWA does not have a formal definition for multimodal tradeoff. However, a multimodal tradeoff pertains to choices between transit and highway, rail and marine, rail and highway, etc. Such tradeoffs may be quantitative (e.g., economic analysis) or qualitative (e.g., based on public comments and expert opinion).

States, metropolitan planning organizations (MPOs) and local governments confront a wide range of tradeoffs within and among modes, within and among policy objectives or performance goals, and within and among various geographic regions and market segments. These tradeoff issues face similar questions and involve similar elements. A generalized tradeoff in transportation planning asks, “How many resources do I allocate to A versus B?” The actual tradeoff issue itself is “What are the consequences of a particular allocation of resources to A and B?” and the choice becomes the allocation and set of consequences that the decision-maker prefers.

2. Does your agency conduct a multimodal tradeoff analysis (to address both passenger and freight movement)? If so, please describe the process at each of these levels:

2a. *Planning.*

The FHWA does not itself conduct multimodal tradeoff analysis. Responsibility for planning and funding decisions resides with states, MPOs, and local governments. The Government Accountability Office (GAO) has recently prepared reports focusing on “Many Factors Affect Investment Decisions (GAO-04-744)” and “Options for Improving Information on Projects’ Benefits and Costs and Increasing Accountability for Results (GAO-05-172)” that support multimodal tradeoff analysis. As noted by GAO, Federal planning guidance emphasizes the goal of establishing a systemwide, intermodal approach to addressing transportation needs. Various factors such as funding sources, public and private interests (e.g., freight railroads), and physical environment (e.g., limited room at port facilities), complicate the ability of states and MPOs to do tradeoff analysis. In addition, travel demand models and other tools necessary for tradeoff analysis are often not well suited to intermodal tradeoff analysis.

Accordingly, GAO found that there are relatively few instances in which decisions involve tradeoffs among the various transportation modes to meet passenger and freight mobility needs, according to local planning officials. Decision-makers also are required to seek public input and involve a wide range of public and private stakeholders in reaching a consensus on investments. Ensuring that investment choices will maintain the existing infrastructure or improve its operation, rather than expand the transportation system’s

capacity, also appears to be an important priority for decision-makers. Finally, decision-makers are recognizing the importance of longer, multistate transportation corridors and the special challenges that they pose for investment decisions (GAO-04-744, page 29).

The FHWA has supported efforts to develop tools that can accommodate multimodal tradeoff analysis including support for improved travel demand models and some economic analysis tradeoff tools such as the Surface Transportation Economic Analysis Model (STEAM). As noted by GAO, several major transportation organizations – TRB, FHWA, FTA, AASHTO, AMPO, and APTA – conduct research to help MPOs address some of the practical challenges of implementing benefit-cost analysis, as well as other analytic tools (GAO-04-744, page 29). FHWA has also supported activities such as this peer exchange to share examples and best practices for multimodal tradeoffs among states and MPOs.

2b. Programming.

Similar comments to 2a.

2c. Corridor.

Similar comments to 2a.

2d. Project.

The FHWA continues to provide guidance and tools to practitioners to facilitate the application of economic tradeoff analysis to individual projects. However, most of these tools remain specific to highway projects.

3. What tools are used to conduct or make tradeoff decision within modes (e.g., Highway Economic Requirements System for State Use – HERS-ST, National Bridge Investment Analysis System –NBIAS, Pavement Management Systems, travel demand forecasting models)?

The FHWA has developed a “Toolbox for Regional Policy Analysis” that offers guidance on a variety of techniques, including benefit-cost analysis that MPOs can use to evaluate investment alternatives. MPOs also may adopt best practices developed by other MPOs or use consultants to assist with analysis and modeling. Initiatives such as the Transportation Planning Capacity Building Program – sponsored by FHWA and FTA – offer peer exchanges, roundtables, and workshops to facilitate such information sharing. In addition, the FHWA is currently developing a web-based benefit-cost analysis tool for the analysis of discrete highway projects, and has issued guidance (e.g., the *Economic Analysis Primer*).

4. Does your agency employ specific tools to conduct multimodal tradeoff analyses (between modes)?

In selecting projects for a long-range plan, states and MPOs must consider a wide range of planning factors specified by the Federal government, such as:

- Economic Vitality;
- Safety;
- Security;
- Accessibility and Mobility;
- Environmental Enhancement;
- Integration and Connectivity;
- Efficiency; and
- Preservation.

While Federal requirements specify a wide range of factors, they generally do not specify what analytical tools – such as benefit-cost analysis – planners should use to evaluate alternatives. Instead, decisions on specific projects/activities to include in the planning process and programs are left to states and MPOs.

Benefit-cost analysis is a useful tool for integrating the social, environmental, economic, and other effects of investment alternatives and for helping decision-makers identify projects with the greatest net benefits. In addition, the systematic process of benefit-cost analysis helps decision-makers organize and evaluate information about, and determine tradeoffs between, alternatives. Research and best practices indicate key steps are to ensure that the analyst defines the project objectives, identifies all reasonable alternatives, and systematically evaluates and compares the projected effects of each alternative.

5. How are results from multimodal tradeoff analyses utilized and presented in your agency (e.g., Long-Range Plans, Strategic Corridor Plans)?

As summarized by GAO, MPOs are required to identify the criteria and process for prioritizing proposed transportation projects, including the extent to which comparisons among modes were considered. In addition, all surface transportation projects that are to receive Federal funding must be included in the metropolitan and state programs to receive Federal funds (GAO-04-744, page 24). These are presented in the metropolitan long-range transportation plan, which is subject to an extensive public involvement process. At the state level, each state DOT is expected to work cooperatively with its MPOs to develop a State Transportation Improvement Program (STIP), which is an intermodal program of projects encompassing all the areas of the state. The STIP incorporates TIPs developed by the MPOs within the state, and a project in a metropolitan

region must be included in the TIP before it may be included in the state program. As part of the plan and program development process, states and MPOs evaluate various multimodal options and select individual projects/programs for funding or additional study. In addition, the NEPA process requires a thorough examination of all reasonable alternatives to meet a specific purpose and need.

6. What is your agency's most pressing motivation for having or wanting a formalized multimodal tradeoff process?

The FHWA is concerned that the public's resources be invested in the most beneficial means possible. By having a thorough comprehensive and open tradeoff process, the public can review and be assured that its tax dollars are being used efficiently and wisely.

7. What are the barriers to developing a process for multimodal tradeoffs? How can these barriers be best overcome?

As noted above, the GAO recently completed a review of multimodal tradeoff analysis (GAO-04-744 and GAO-05-172). Among the barriers identified are: inflexibility in the use of some Federal and local funding; constraints on fiscal and human resource needed to conduct more detailed tradeoff analysis; difficulty in coordinating between private sector (e.g., freight railroads) and public sector (e.g., highway and transit) planning objectives; physical constraints that restrict the use of some modal options (e.g., limited land for additional port facilities); local political constraints; multijurisdictional coordination problems; and lack of data and analytical tools that can capture the full range of regional impacts of multimodal decisions.

8. Do you feel all state transportation agencies and MPOs would benefit from a multimodal tradeoff process? Do you feel that this may vary depending on individual transportation agency (e.g., population, percentage of urbanized areas)? If so, what characteristics create the need for multimodal analyses?

All state and local agencies would benefit from some degree of multimodal tradeoff analysis. The degree to which they would benefit, however, will vary depending on the complexity of their existing transportation system, the modal options realistically available to them, and the status of the other potential barriers described in the answer to Question 7.

9. What do you see as the future for multimodal tradeoff analyses in your agency? What is needed to further the multimodal tradeoff state-of-the-practice?

The FHWA will continue to provide more and improved tradeoff tools and guidance for use by states and MPOs. The actual application of these tools will continue to reside at the state and local level.

■ B.4 Federal Transit Administration (FTA), Regional Office

1. How would you or your agency define a multimodal tradeoff?

There is a broad range of activities that could be considered a multimodal tradeoff. Even seemingly single-mode decisions can result in a multimodal tradeoff.

2. Does your agency conduct a multimodal tradeoff analysis (to address both passenger and freight movement)? If so, please describe the process at each of these levels:

2a. Planning. 2b. Programming. 2c. Corridor. 2d. Project.

The FTA provides funding and technical support to facilitate planning, including multimodal tradeoff analysis for states, transit operators, and metropolitan planning organizations.

3. What tools are used to conduct or make tradeoff decision within modes (e.g., Highway Economic Requirements System for State Use - HERS-ST, National Bridge Investment Analysis System -NBIAS, Pavement Management Systems, travel demand forecasting models)?

FTA funding supports the use of many sketch planning and modeling tools.

4. Does your agency employ specific tools to conduct multimodal tradeoff analyses (between modes)?

FTA funding supports a very broad range of tools.

5. How are results from multimodal tradeoff analyses utilized and presented in your agency (e.g., Long-Range Plans, Strategic Corridor Plans)?

The whole concept of multimodal analysis appears to be very important in regional short-range and long-range planning. Everything from Congestion management planning to corridor planning, to maintenance planning benefits from a total look at the transportation network and needs.

6. What is your agency's most pressing motivation for having or wanting a formalized multimodal tradeoff process?

DOT strategic plan recognizes the value of a multimodal national transportation network.

7. What are the barriers to developing a process for multimodal tradeoffs? How can these barriers be best overcome?

Awareness of the possibilities is among the barriers that we have observed.

8. Do you feel all state transportation agencies and MPOs would benefit from a multimodal tradeoff process? Do you feel that this may vary depending on individual transportation agency (e.g., population, percentage of urbanized areas)? If so, what characteristics create the need for multimodal analyses?

Similar to the concept of Human Services Coordination, multimodal tradeoff analysis can come in many flavors. It does not need to be an "all or nothing" approach. Generally, we have observed that successful scenarios are built along win-win situations.

9. What do you see as the future for multimodal tradeoff analyses in your agency? What is needed to further the multimodal tradeoff state-of-the-practice?

Peer exchanges such as this one and the continuous sharing of successful practices. It is so important to remember that one size does not fit all. However, it is also true that good ideas should be shared and bits and pieces of techniques melded together with a little site-specific creativity can result in a local recipe for success.

■ B.5 Florida Department of Transportation (FDOT)

1. How would you or your agency define a multimodal tradeoff?

The process of choosing the combination of modal solutions that will best meet the policies, goals, objectives, and strategies established to guide the future development of a transportation system for moving both people and freight, which in Florida includes the following areas:

- Safety and Security;
- Quality of Life and Environmental Stewardship;
- Maintenance and Preservation;
- Mobility and Economic Competitiveness; and
- Sustainable Investments.

2. Does your agency conduct a multimodal tradeoff analysis (to address both passenger and freight movement)? If so, please describe the process at each of these levels:

Florida uses a dynamic, systematic multimodal tradeoff process that continuously evaluates and reports on progress in meeting established policies, goals, objectives, and strategies. The results of various analyses are used to adjust policies, goals, objectives, and strategies as needed and as desired. The various quantitative and qualitative components of this multimodal tradeoff process are also adjusted as needed or desired. Both quantitative and qualitative tools are being refined over time (i.e., we use the best tools available to support needed decisions when those decisions are needed).

2a. *Planning.*

Florida is dramatically changing how it plans for, provides, and manages its transportation system. FDOT and its partners are working together to:

- Redefine the State's primary role in transportation as focusing on international, interstate, and interregional travel of passengers and goods, with emphasis on a Strategic Intermodal System (SIS). At the same time, stronger regional partnerships will identify and invest in regionally significant transportation facilities, while local governments will have more flexibility to address purely local transportation needs.
- Advance a multimodal approach to planning to increase mobility for people and freight on complete end-to-end trips. Rather than focusing on individual modes and facilities, state funding will be used to improve connectivity among individual modes,

eliminate bottlenecks and unnecessary delay, improve travel time reliability, and expand the options available for interregional travel.

- Link the State’s transportation planning and investment decisions to statewide economic policies, with emphasis on Florida’s Strategic Plan for Economic Development. The SIS will support interregional, interstate, and international transportation services that support the diversification of Florida’s economy by reducing transportation and logistics costs, improving access to markets from urban and rural areas and supporting growth in trade and tourist flows.
- Shift from reactive to proactive planning of future transportation investments. In the past, transportation investments too often have responded to development instead of proactively advancing statewide goals related to economic growth, rural development, urban revitalization, and environmental preservation. The SIS will provide a foundation for managing growth in the future by focusing the State’s transportation investments.

With the adoption of the 2025 Florida Transportation Plan by the end of the year, FDOT and its partners are redefining “success” as the measure of how well Florida:

- Makes coordinated investments to ensure an integrated system. Florida’s transportation assets must be planned and managed as a single, integrated transportation system, with each facility optimized to serve specific types of travel and transport, whether between regions, within regions, or within communities.
- Safeguards its existing transportation assets. The maintenance and preservation of Florida’s transportation assets should remain a high priority. Florida should also preserve capacity on its transportation system to ensure that each component of the system can function as intended. Capacity can be preserved through efficient operation and management of transportation facilities, effective use of technology and information, and closer coordination of transportation and land use decisions.
- Enhances mobility options. Investment in additional transportation capacity should be focused on critical needs including: expanding travel options and modal choices to provide greater use of public transportation; relieving physical and operational bottlenecks; providing more efficient transfers between facilities and modes; and developing new interregional corridors that address major gaps in connectivity and service, particularly in economically distressed areas of the State. These expansions of travel options and modal choices are needed for trips between regions, within regions, and within communities.
- Ensures a safer and more secure transportation system for residents, businesses, and visitors. Safety and security considerations should be integrated into all aspects of transportation planning and implementation, while ensuring passenger and freight mobility. Transportation providers must continue to help identify and deter threats, effectively manage the system during events requiring evacuation, and help minimize incident response times.

- Ensures that the transportation system supports community livability and is implemented in an environmentally responsible manner. The transportation system should encourage conservation of natural resources and sustainable development patterns. Transportation investments at the local level primarily should enhance the livability of Florida’s communities. Transportation investments at the statewide or interregional level typically will be oriented towards mobility and economic competitiveness needs and should rest lightly on the built and natural environments.
- Embraces new technology. Florida’s transportation partners should proactively develop, evaluate, and apply new technologies to improve the safety, security, and mobility of drivers, passengers, cargo, vehicles, and facilities. These may include new types of infrastructure, such as commercial spaceports and inland ports; new types of vehicles, such as high-speed rail systems or next-generation aircraft and space launch vehicles; new sources of transportation fuel; new ways of assisting drivers, such as in-vehicle navigational, informational, and diagnostic devices; and new ways of identifying and tracking vehicles, cargo, and other transportation assets.
- Coordinates among all partners. Coordination among the many partners involved in planning and implementing transportation investments must be strengthened. Particular attention should be given to more closely integrating transportation, land use, environmental, and economic development decisions and strengthening regional planning structures and processes.
- Invests to meet its future needs. Florida’s transportation partners should develop a variety of revenue sources that can be tailored to the specific needs of local and regional areas, collaborate to maximize available funding, jointly fund projects when feasible, and reduce capital and operating costs where possible. The long-term investment of these resources will be identified in state, metropolitan, and local government plans that will be adopted over the next few years. Revenues available to the FDOT will be invested to achieve FTP goals, meet state and metropolitan priorities, and support rural development strategies.

In redefining what needs to be accomplished Florida must, once again, adjust how it accomplishes “multimodal tradeoffs” (pursuant to Florida’s definition of multimodal tradeoffs).

2b. Programming.

In Florida, FDOT accomplishes multimodal tradeoffs in programming by first adopting an overall investment policy, and then reaching consensus among its program managers and decision-makers on the allocation of resources by program – both to accomplish the investment policy and to address incremental changes in funding levels based on analyses of what prior funding levels have accomplished. Currently FDOT’s investment policy is:

- Allocate 75 percent of discretionary capacity funds to the Strategic Intermodal System (SIS). “Discretionary” means that FDOT has some legal discretion on how and where funds can be expended. This policy affects state highway, aviation, rail, seaports, and

intermodal access programs, but does not apply to the State's transit programs because transit generally serves local and metropolitan travel. The policy also does not apply to the funds reserved by Federal law for urbanized areas with a population greater than 200,000. The application of 75 percent is after funds are reserved to meet safety and preservation objectives. To minimize disruption to projects already in the work program, FDOT plans a transition to this allocation by 2015. The investment policy has no impact on the requirement in Florida law that at least 15 percent of state revenues deposited in the State Transportation Trust Fund must be allocated to public transportation.

- Ensure a reasonable distribution of funds between the SIS and Emerging SIS and among economic regions. Although individual SIS and Emerging SIS projects will be selected based on need, project readiness and other prioritization factors, FDOT will ensure that there is a reasonable distribution of discretionary capacity funds between SIS and Emerging SIS facilities, and among economic regions.
- Increase the State's emphasis on regional travel and transport. For those facilities not on the SIS, FDOT will emphasize funding assistance for regionally significant facilities, including non-SIS facilities parallel to SIS facilities, with the remaining 25 percent of discretionary capacity funds. These regionally significant facilities may include other commercial service and major reliever airports, other deepwater and major special-generator seaports, other major freight terminals and distribution centers, regional passenger terminals, and highway, rail and waterway corridors serving major regional economic centers. FDOT also will continue to encourage metropolitan planning organizations (MPOs) and Rural Areas of Critical Economic Concern to work with their neighbors on issues of mutual concern and to identify regional transportation systems. Identification of these systems will help the state, MPOs and local governments make better decisions for those facilities that affect several MPOs and counties. Those transportation facilities not on the SIS and not regionally significant continue to be eligible for state funding, and may be funded if it is a good business decision for the state and affected local government.
- Continue the State's commitment to the safety and preservation of Florida's transportation system. The Florida Transportation Plan establishes that the State's highest transportation priorities are safe transportation for residents, visitors and commerce, and preservation and management of the existing system. Even as the programs for new capacity increasingly emphasize the SIS and regionally significant facilities, FDOT will continue to operate, maintain, and preserve a safe State Highway System. FDOT will continue to work with partners to emphasize the safety and preservation of the entire state transportation system.
- Address the State's support for non-highway modes. Non-highway programs often have specific restrictions on the collection and use of both public and private funding. In the past, FDOT has provided matching funds for many non-highway projects, including for general aviation and local transit. As the State increases its emphasis on the SIS and regionally significant facilities, it will need to develop appropriate new strategies to help ensure these programs are not adversely affected.

2c. Corridor.

Florida is also refining its approach to multimodal tradeoffs in corridor planning. Multimodal corridor plans can provide a way to group together multiple types of facilities and help identify transportation needs and proposed solutions from an interregional or statewide perspective. Multimodal corridor plans, including corridor plans in Rural Areas of Critical Economic Concern, are to be developed as required by changing transportation and economic needs of the State. These needs will be derived from analyses of regional and statewide priorities, and will be developed in the future within the framework of adopted goals and objectives.

FDOT and its partners will utilize the results of segment, project, or corridor analysis as one tool to support the identification and validation of interregional and regional transportation needs. Multimodal corridor plans in rural areas will focus on the three Rural Areas of Critical Economic Concern identified by the Governor, as well as other rural corridor needs as they arise. For multimodal corridor plans in rural areas, FDOT will work with its rural partners to identify transportation needs on the rural components of the SIS network. These multimodal corridor plans will facilitate coordination with economic development initiatives in the rural areas.

The contents of multimodal corridor plans will vary by corridor and may change over time. A multimodal corridor plan could simply include broad assessments of needs in the corridor and propose a wide range of potential multimodal solutions to address the needs. Or, the plan could be more detailed, and serve as an initial effort to determine how investments could be funded and which investments or combinations of investments in the corridor should be the highest priority for FDOT and its partners. FDOT will work with partners in each transportation corridor to determine how each plan should be developed.

Multimodal tradeoffs in corridors will encompass the same philosophy as noted above: it's not about choosing between modes – it's about choosing the right mix of modes to move people and freight.

2d. Project.

Florida is also refining how projects are selected. Once again, a description of how projects are prioritized and selected demonstrates the broader nature of “multimodal tradeoffs” in Florida.

Each partner in the planning process will have its own ideas for which projects should be the highest priorities for investments. FDOT's goal is to build consensus among its partners regarding how the State's portion of funding should be spent. As part of this process, FDOT will provide feedback to its partners regarding how their own funding strategies and projects will affect state facilities and strive to achieve consensus regarding FDOT and partner investments.

The process for recommending investment priorities will be driven by policy and supported by data. Although individual modal plans may recommend individual priorities, and some sources of projects such as multimodal corridor plans may contain plan-specific recommended project priority lists, FDOT will determine its priorities among projects from a statewide, multimodal perspective, with an emphasis on interregional, interstate, and international travel and transport. Priorities also will be determined from a systemwide perspective, with emphasis on the most effective solution for the entire system rather than any individual mode or facility. Priorities will be determined for facilities in a unified manner rather than through separate processes.

The process for determining priorities is transparent, so that all stakeholders can understand how and why these priorities are recommended. Partners and stakeholders will have an opportunity to participate in this process by providing additional information regarding investment needs and impacts, adopting policies and resolutions demonstrating local support for a project or contributing funding to a project. Assessment tools will be developed over time to help partners gauge how their proposed projects address specific goals and objectives, and to help FDOT select projects.

The prioritization process incorporates flexibility to expedite projects that primarily provide benefits to Florida's economic competitiveness. To enable Florida to take advantage of an unanticipated economic opportunity, these types of projects often must be implemented on a shorter timeframe than mobility improvements, which can take up to 10 years to complete after a need is identified. FDOT and its partners are developing approaches for identifying transportation investments that are primarily intended for economic development early in the planning process so that they can be given special consideration in the project prioritization and project selection processes.

When determining how high of a priority each project should have, FDOT uses information from three sources to support its decision-making process:

1. A technical analysis helps determine how well the project meets goals and objectives;
2. Partner input indicates whether or not FDOT and its partners have reached consensus that the project should move forward; and
3. A financial analysis helps determine how much of the State's funding would be required to implement the project and how much of the project could be funded by partners.

Technical Analysis

FDOT and its partners already have developed goals. During implementation, FDOT and its partners determine what characteristics of a project should make it a higher priority for funding. For example, if one objective is to better integrate and connect different modes of transportation, a project that eliminates turning restrictions and reduces travel time between a hub and a corridor might have a high priority for funding, depending on how well it meets other goals and objectives. If another objective is to eliminate bottlenecks

and reduce unnecessary delay, a project that provides a separated entrance and dedicated lane for safe and secure trucks serving a seaport might be a high priority for funding.

The primary factors for influencing prioritization and project selection stem from mobility and operational goals and economic competitiveness and diversification goals. Extra weight is given to projects that provide secondary benefits by improving safety and security and by preserving existing infrastructure and services. Priority also is given to those projects that enrich the quality of life in Florida and reflect responsible environmental stewardship.

Providing seamless connections between modes of travel, eliminating bottlenecks, and reducing delay for passengers and freight allow more people and goods to travel more quickly between economic regions of the State and between Florida and other states and nations. Improving the reliability of travel time benefits manufacturers and retailers that use “just-in-time” deliveries to reduce warehousing costs and other logistics costs. Improved travel time reliability also can benefit Florida residents and visitors, making longer-distance trips to, from, and within Florida more convenient and appealing. Investments must anticipate growing demand for passenger and freight transportation in Florida. One way to accommodate this demand is to offer shippers and passengers a more reliable and reasonable choice of modes for interregional, interstate and international shipments and travel.

Strategic investments can benefit existing key industries as well as new and emerging industries, but these investments should benefit the entire State, not just one region. Investments that benefit only one region of the State could come at the expense of another region, rather than improving Florida’s overall competitiveness with other states and other countries. A reduction in transportation and logistics costs and improved access to worker, supplier, and customer markets can make Florida a cheaper and more attractive place to do business. Investments in facilities that serve Rural Areas of Critical Economic Concern can support economic development in rural areas and improve connectivity between rural areas and passenger and freight gateways in developed areas. Finally, investments should anticipate and support growth in trade between Florida and other states and nations, and investments should accommodate ever-growing numbers of tourists and businesspeople traveling to, from, and within Florida.

As FDOT reaches out to its partners for input on needs and works with them to establish funding priorities, there will be opportunities for investments in or funding partnerships for non-traditional projects. FDOT will explore the potential for a program to prioritize and provide funding for “proof of concept” projects that satisfy transportation needs in innovative ways, such as through use of new technologies or operational strategies – for example, variable pricing or dedicated lanes for preferred customers at cargo facilities. These projects often will enable FDOT to enter into joint participation agreements that spread the risks of projects over more than one entity.

Because the quality and availability of data varies across modes, in the near term FDOT is establishing a two-tiered prioritization process, where projects are first prioritized within each mode using the best information available. The modal priorities can then be compared to each other on the basis of qualitative prioritization factors. Each modal

prioritization process will be structured in such a way that in the future FDOT can migrate to a cross-modal prioritization process as additional data and analysis tools are developed over time to help partners gauge how proposed projects address the specific goals and prioritization factors.

Over time, FDOT will develop tools to provide the capability to make quantitative comparisons of the positive and negative impacts of projects across modes. Early emphasis will be given to economic measures, which may be more readily applicable for cross-modal project comparisons. The Florida Macroeconomic Analysis Model was an initial effort to estimate the full economic impacts of transportation investments in Florida. The methodology used in that study could be expanded to include non-highway modes and incorporated into a multimodal decision support tool.

Partner Input

All stakeholders have an opportunity to provide input to FDOT through its public and partner involvement process. FDOT also uses Florida's Efficient Transportation Decision-making (ETDM) process to build consensus around projects, obtain necessary environmental permits, and determine if the project's impacts will outweigh its benefits before including a project in the Cost Feasible Plan. For projects that are not required to pass through the ETDM process, FDOT uses the principles of the ETDM process to evaluate the positive and negative impacts of projects in collaboration with its partners. In cases where partners have raised major objections, FDOT attempts to resolve those issues through techniques such as a dispute resolution process involving all stakeholders.

Jurisdictions in which a project is located may indicate their support by adopting resolutions in favor of a project. FDOT's local and regional partners also may indicate their support by making proactive changes to local comprehensive plans to ensure that land use and development patterns near state facilities will support the State's transportation and economic development goals. Finally, partners may indicate their support by committing funding toward a portion of the project.

For highway and transit projects subject to Federal guidelines for use of Federal funds in areas under MPO jurisdiction, FDOT works with MPOs to build consensus that a project should be included in the Cost Feasible Plan. For projects not subject to these guidelines, including projects from non-highway and non-transit modes, FDOT seeks input from MPOs and other partners to gauge whether there is consensus on the viability and financial feasibility of the project.

Financial Analysis

Both the project's total cost and the amount of funding being contributed to the project by FDOT and its partners is used to determine whether the project is financially feasible. The financial analysis helps FDOT and its partners determine which projects are cost feasible using reasonable expectations of state funding from all sources. The revenue estimate builds on the standard practice FDOT has used to project future levels of Federal and state funding for transportation capacity enhancements, but also considers the future availability of funding from partners such as other Federal and state agencies, regional

and local entities, and private owner and operators. The levels of funding available from these sources typically vary from year to year.

State projects may be entirely funded by FDOT, entirely funded by partners, or funded in partnerships such as those established in joint participation agreements. Participatory funding from partners is encouraged to help leverage available funding sources. In many cases, if projects included in the Cost Feasible Plan are funded wholly or in part by one of FDOT's partners, the funds come from a revenue-generating entity such as an airport, seaport, or private sector owner of a facility.

FDOT selects projects from the prioritized Cost Feasible Plan for state funding based on various factors, including:

- The extent to which the project meets the goals and objectives of the SIS;
- The “readiness” of the project, as measured by whether partners have agreed for the project to advance to the next phase of the project planning and delivery process (planning, design, right-of-way purchase, construction or operation) and how far along the project is in that process;
- The project's cost and availability of partner financial contributions;
- A balance of quick fix, operational improvements and longer-term capacity investments;
- A reasonable distribution of investments between SIS and Emerging SIS facilities and among economic regions of the State; and
- Whether the public benefits exceed public investment where the facility is owned by the private sector.

FDOT is taking an incremental approach to expanding the eligibility for future state funding. Capacity and operational improvements to corridors and connectors will be eligible for FDOT's share of funding, with emphasis directed toward reducing bottlenecks and improving access to hubs. Projects may include such things as traditional capacity expansion such as new general-purpose highway lanes or double-tracking a rail corridor; special-use lanes; spot improvements to intersections and access points; reconfiguration of existing facilities to provide for grade separation between modes or separation of freight and passenger traffic; Intelligent Transportation Systems deployments; and other operational strategies such as incident management.

3. What tools are used to conduct or make tradeoff decision within modes (e.g., Highway Economic Requirements System for State Use - HERS-ST, National Bridge Investment Analysis System -NBIAS, Pavement Management Systems, travel demand forecasting models)?

The only tool that is used is transit alternative analysis for the transit mode – and it is used primarily to capture Federal funding rather than for true tradeoff analysis. Similar analysis is performed in the highway mode when there is a desire to assess the viability of transit as an alternative to additional highway lanes for the automobile. Other tools, such as the ones listed in the question, are used to provide data to support decisions on prioritizing and selecting projects for funding within each modal program.

4. Does your agency employ specific tools to conduct multimodal tradeoff analyses (between modes)?

Not yet. We are first developing a set of common performance measures for all modes, which could then be used to provide additional comparative data to decision-makers. These measures include the four dimensions of mobility (quantity, quality, accessibility, and utilization), and two dimensions of economic measurement (economic efficiency, which deals with benefit-cost and cost effectiveness; and economic impact, which deals with business activity and employment-related items). However, the use of these measures for multimodal tradeoffs will still be within the dynamic, systematic multimodal tradeoff process that Florida uses to continuously evaluate and report on progress in meeting established policies, goals, objectives, and strategies.

5. How are results from multimodal tradeoff analyses utilized and presented in your agency (e.g., Long-Range Plans, Strategic Corridor Plans)?

Through documentation of performance measures, the Department and its partners can see how well we are achieving established policies, goals, objectives, and strategies. Performance is published in a variety of documents, including the Florida Transportation Commission's annual Performance and Production Review of the Department; the Department's Annual Performance Report. Short-Range Component, Program and Resource Plan, Long-Range Program Plan, and Business Model; the Office of Policy Planning's macroeconomic analysis initiative, the Mobility Performance Measures Program, the ITS Performance Measures initiative, and modal performance measures initiatives such as the highway, transit and multimodal level of service programs.

6. What is your agency's most pressing motivation for having or wanting a formalized multimodal tradeoff process?

To better determine the outcomes and impacts of implementing projects so better decisions can be made.

7. What are the barriers to developing a process for multimodal tradeoffs? How can these barriers be best overcome?

There are two primary barriers: 1) normalization across the modes to allow an apples-to-apples comparison; and 2) data availability, which is especially problematic in the non-highway modes where data is not under the control of the Department and is often proprietary. The best way to overcome these barriers is to select a limited set of variables that can be used in each mode, and devote enough resources to gather and analyze the data.

8. Do you feel all state transportation agencies and MPOs would benefit from a multimodal tradeoff process? Do you feel that this may vary depending on individual transportation agency (e.g., population, percentage of urbanized areas)? If so, what characteristics create the need for multimodal analyses?

All transportation agencies could benefit from a standardized process. But that process needs to be flexible enough to allow for major differences in the type/size of the entity doing the evaluation and making decisions.

9. What do you see as the future for multimodal tradeoff analyses in your agency? What is needed to further the multimodal tradeoff state-of-the-practice?

FDOT and its partners will continue to improve their working relationships, their understanding of the contributions of each mode of transportation in various scenarios, and their ability to agree on the best package of multimodal solutions and choices for travel and transport. This can best be accomplished by ensuring that all transportation, environment, land use, and economic partners work together to achieve their respective policies, goals, objectives, and strategies.

■ B.6 Houston-Galveston Area Council (H-GAC)

1. How would you or your agency define a multimodal tradeoff?

The tradeoff would be among highway, transit, and bicycle/pedestrian alternatives.

2. Does your agency conduct a multimodal tradeoff analysis (to address both passenger and freight movement)? If so, please describe the process at each of these levels:

2a. Planning. 2b. Programming. 2c. Corridor. 2d. Project.

No.

3. What tools are used to conduct or make tradeoff decision within modes (e.g., Highway Economic Requirements System for State Use – HERS-ST, National Bridge Investment Analysis System –NBIAS, Pavement Management Systems, travel demand forecasting models)?

Not applicable.

4. Does your agency employ specific tools to conduct multimodal tradeoff analyses (between modes)?

If we mean among freight and passenger then this is not applicable. Among passenger modes, we employ a travel demand forecasting methodology along with the experience(s) of local governments' staff members and local elected official decision-makers.

5. How are results from multimodal tradeoff analyses utilized and presented in your agency (e.g., Long-Range Plans, Strategic Corridor Plans)?

Not applicable.

6. What is your agency's most pressing motivation for having or wanting a formalized multimodal tradeoff process?

To provide better information to regional transportation decision-makers.

7. What are the barriers to developing a process for multimodal tradeoffs? How can these barriers be best overcome?

Data and modeling software capability.

8. Do you feel all state transportation agencies and MPOs would benefit from a multimodal tradeoff process? Do you feel that this may vary depending on individual transportation agency (e.g., population, percentage of urbanized areas)? If so, what characteristics create the need for multimodal analyses?

It varies by MPO and state DOT. It also varies with relative size and complexity, the presence of major freight facilities (e.g., ports, railyards).

9. What do you see as the future for multimodal tradeoff analyses in your agency? What is needed to further the multimodal tradeoff state-of-the-practice?

We need a basic understanding of the state-of-the-practice and the benefits and shortfalls of the current approaches.

■ B.7 Michigan Department of Transportation (MDOT)

1. How would you or your agency define a multimodal tradeoff?

We would define a “multimodal tradeoff” as the costs or consequences of one set of investment choices over another, which implies winners and losers. Our preferred wording would be “integrated investment strategy” – an approach that finds the best investment strategy to achieve the identified transportation vision.

2. Does your agency conduct a multimodal tradeoff analysis (to address both passenger and freight movement)? If so, please describe the process at each of these levels:

2a. *Planning.*

Our focus is on completing systems, not competing systems. For example, non-motorized plans and context sensitive solutions indicate that we design the highway system for all its users: autos, trucks, buses (local and intercity), pedestrians, bicyclists, and vanpools/carpools. We are providing designers with the context information and training they need to incorporate multiple modes.

2b. *Programming.*

Funding at state and Federal levels is protected or “compartmentalized,” and programming necessarily follows the Federal and state programs defined in law.

2c. *Corridor.*

This will be one of the products of our State Long-Range Plan.

2d. *Project.*

Yes, it is required in the NEPA process.

3. What tools are used to conduct or make tradeoff decision within modes (e.g., Highway Economic Requirements System for State Use – HERS-ST, National Bridge Investment Analysis System –NBIAS, Pavement Management Systems, travel demand forecasting models)?

We have prioritization models for pavement – our Road Quality Forecasting model (RQFS) and mapscore, for capacity projects we utilize a benefit/cost prioritization model.

We use statewide passenger and truck model, MPO models, small city models. We do economic benefit analysis on the highway element of our five-year program, and have used HERS-ST to assess needs. With the SLRP, we will be looking at the economic impacts of alternative investment scenarios.

4. Does your agency employ specific tools to conduct multimodal tradeoff analyses (between modes)?

No, we hope to develop an integrated transportation investment strategy as part of the State Long-Range Plan.

5. How are results from multimodal tradeoff analyses utilized and presented in your agency (e.g., Long-Range Plans, Strategic Corridor Plans)?

The MDOT five-year Transportation Program is an integrated multimodal transportation investment document, but does not contain tradeoff analyses. New State Long-Range Plan will contain integrated transportation investment strategy.

6. What is your agency's most pressing motivation for having or wanting a formalized multimodal tradeoff process?

To provide Michigan with an integrated multimodal transportation system makes sense in a time of limited financial resources and increasing and diverse customer expectations.

7. What are the barriers to developing a process for multimodal tradeoffs? How can these barriers be best overcome?

The most significant barrier is the legislatively mandated funding availability issue.

The best approach would bring parity, based upon an overall needs assessment to the funding distribution process.

8. Do you feel all state transportation agencies and MPOs would benefit from a multimodal tradeoff process? Do you feel that this may vary depending on individual transportation agency (e.g., population, percentage of urbanized areas)? If so, what characteristics create the need for multimodal analyses?

Yes.

Yes.

Limited financial resources to address: 1) a more diverse customer base; and 2) expanding customer expectations.

9. What do you see as the future for multimodal tradeoff analyses in your agency? What is needed to further the multimodal tradeoff state-of-the-practice?

MDOT will continue to lead the effort to develop and implement an integrated transportation investment strategy. In addition we need an economic benefits model for all modes and continue to involve stakeholders/customers in development of performance measures.

■ B.8 Minnesota Department of Transportation (Mn/DOT)

1. How would you or your agency define a multimodal tradeoff?

Mn/DOT does not formally define the concept of “multimodal tradeoffs” in any of its policies, programs, or procedures. However, one could argue the multimodal tradeoff concept is implied in the vision that drives Mn/DOT. That vision is to establish a coordinated transportation network that meets the needs of Minnesota’s citizens and businesses for safe, timely, and predictable travel. Fundamental to that vision is the need to preserve and maintain the State’s physical transportation assets – including highways, bridges, airports, water ports, freight, bus, rail, intermodal facilities, and bikeways.

2. Does your agency conduct a multimodal tradeoff analysis (to address both passenger and freight movement)? If so, please describe the process at each of these levels:

2a. Planning. 2b. Programming. 2c. Corridor. 2d. Project.

Mn/DOT does not have a formal multimodal or modal choice/tradeoff methodology or a set of developed multimodal tradeoff tools. To the extent Mn/DOT has addressed or considered the implications of modal (multimodal) tradeoffs, the agency has relied on Mn/DOT policies and programs. Factors that shape the development of Mn/DOT policies and programs include safety, the integration of transportation modes, service and investment preservation, customer focus, economic development, technology, environment partnerships, and Federal actions.

It is important to note that while Mn/DOT is the principal agency in the State for development, implementation, administration, consolidation, and coordination of state transportation policies, plans, and programs – those policies, plans, and programs are developed in cooperation with a variety of transportation partners. These include the public, the Twin Cities Metropolitan Council, the six Metropolitan Planning Organizations (MPOs) established in areas with populations exceeding 50,000, the nine Regional Development Commissions (RDCs), and county, city, and Indian tribal governments throughout the State. So any (informal) multimodal tradeoff analysis that is being done involves these partners as well as Mn/DOT.

3. What tools are used to conduct or make tradeoff decision within modes (e.g., Highway Economic Requirements System for State Use – HERS-ST, National Bridge Investment Analysis System –NBIAS, Pavement Management Systems, travel demand forecasting models)?

(No response provided.)

4. Does your agency employ specific tools to conduct multimodal tradeoff analyses (between modes)?

Because Mn/DOT has not conducted formal multimodal tradeoff analysis, it has not applied any specific tools or developed new ones to make tradeoff decisions. Rather, Minnesota's transportation process for investment decisions is driven by a declaration of state goals and objectives and those transportation strategies/directions described in state and national legislation. System and corridor improvements required to achieve and maintain established mobility performance targets are identified in Mn/DOT's transportation system and improvement plans. Those plans reflect Federal, state, and regional policy and performance direction; projected funding availability; and priorities identified in consultation with Mn/DOT, the Metropolitan Council, and other Mn/Dot transportation stakeholders. Tools used to frame those plans include:

- Pavement Serviceability Rating;
- Pavement Management System;
- National Bridge Inventory Scale; and
- Metropolitan Council's Regional Model.

It is within this context that multimodal tradeoffs informally manifest themselves – as evidenced in documents like the State Transportation Improvement Program (STIP) for 2004-2006 (see Table 1).

Table 1. State Transportation Improvement Program Funding by Source and Year

Source	2004	2005	2006	Total*
<i>Transit Programs</i>				
Federal Transit Administration Funds	191	105	59	355
State and Local Match	79	50	48	178
<i>Subtotal*</i>	<i>271</i>	<i>155</i>	<i>107</i>	<i>533</i>
<i>Highway Program</i>				
Federal-aid Highway Funds	356	283	291	931
Federal AC Conversion	183	166	112	462
State Trunk Highway Funds	295	292	278	866
Other Funds	93	84	63	241
<i>Subtotal*</i>	<i>928</i>	<i>826</i>	<i>745</i>	<i>2,499</i>
Total*	1,199	981	852	3,032

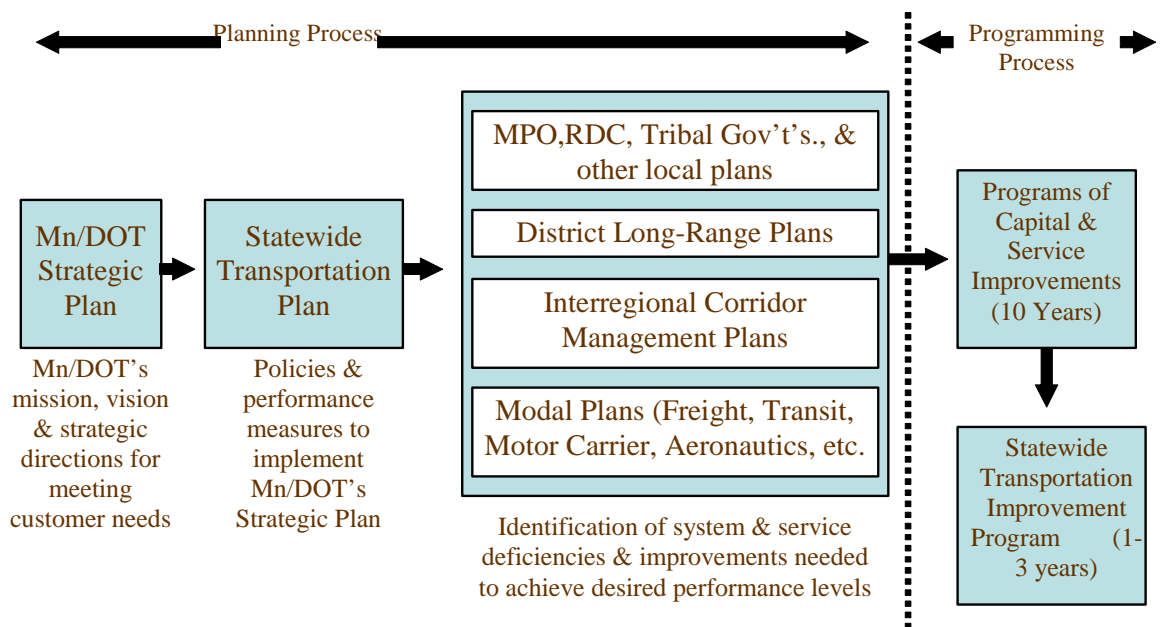
Notes: * May not total correctly due to rounding.

As one studies Table 1, it's important to remember that transit is substantially a local program. It's presumed that local MPOs also informally consider multimodal tradeoffs and funding constraints in their plans and deliberations.

5. How are results from multimodal tradeoff analyses utilized and presented in your agency (e.g., Long-Range Plans, Strategic Corridor Plans)?

As previously mentioned, Mn/DOT does not formally define the concept of “multimodal tradeoffs” in any of its policies, programs or procedures – therefore those tradeoffs aren't necessarily “called out” in any of the plans which inform (or are informed by) those same policies, programs, or procedures. However, as is also previously stated, one could argue the multimodal tradeoff concept is implied in the vision statement contained in what could arguably be called the foundation of Mn/DOT's Planning and Programming Process, i.e., Mn/DOT's Strategic Plan (see Figure 1). That plan lays out a vision that calls for a “coordinated” transportation network including highways, bridges, airports, water ports, freight, bus, rail, intermodal facilities, and bikeways.”

Figure 1. Mn/DOT Transportation Planning and Programming Process



6. What is your agency’s most pressing motivation for having or wanting a formalized multimodal tradeoff process?

“Mn/DOT’s Minnesota Statewide Transportation Plan includes performance measures and targets that are the basis for all districts’ investment decisions. A formalized multimodal tradeoff process could certainly contribute to the establishment of more refined scenario- and project-level analysis and investment decisions.

7. What are the barriers to developing a process for multimodal tradeoffs? How can these barriers be best overcome?

Such a process would need to be vetted through Mn/DOT organization for accuracy, veracity, robustness, etc., before we could move to the level of even considering the adoption of such a multimodal tradeoff policy guideline/process/set of tools. That said, I believe we would be very interested in learning how other states are approaching this issue and especially be interested in any that claim to have an official policy/approach to the question in place.

8. Do you feel all state transportation agencies and MPOs would benefit from a multimodal tradeoff process? Do you feel that this may vary depending on individual transportation agency (e.g., population, percentage of urbanized areas)? If so, what characteristics create the need for multimodal analyses?

Yes and yes. It’s likely that larger urban areas might benefit to a greater degree than smaller urban/rural areas. Characteristics that might create the need for a formal multimodal analysis include population, employment, land-use, and travel growth patterns, as well as existing and future transit service, defined linkages between highway and other intermodal facilities/modes.

9. What do you see as the future for multimodal tradeoff analyses in your agency? What is needed to further the multimodal tradeoff state-of-the-practice?

Mn/DOT is moving in that direction through the development of modal/intermodal measures as part of its long-range transportation system/improvement plans and programs.

■ B.9 Missouri Department of Transportation (MoDOT)

1. How would you or your agency define a multimodal tradeoff?

Maximizing transportation resources to have the greatest transportation benefit.

2. Does your agency conduct a multimodal tradeoff analysis (to address both passenger and freight movement)? If so, please describe the process at each of these levels:

2a. Planning. 2b. Programming. 2c. Corridor. 2d. Project.

There has been some limited analysis in urban area when considering highway corridor expansions. Public transportation alternatives and needs are considered and incorporated if possible. MoDOT recently completed statewide passenger and freight reports, but the focus was needs based and not on tradeoffs.

3. What tools are used to conduct or make tradeoff decision within modes (e.g., Highway Economic Requirements System for State Use - HERS-ST, National Bridge Investment Analysis System -NBIAS, Pavement Management Systems, travel demand forecasting models)?

MoDOT's Long-Range Direction, MoDOT TRACKER Performance Management System, and Missouri passenger and freight data.

4. Does your agency employ specific tools to conduct multimodal tradeoff analyses (between modes)?

No.

5. How are results from multimodal tradeoff analyses utilized and presented in your agency (e.g., Long-Range Plans, Strategic Corridor Plans)?

Most multimodal transportation programs administered by MoDOT are single mode dedicated funding programs that do not allow mixing of funding from one mode to another. Also, Missouri's Constitution prohibits use of road funds for anything other than road and bridge projects.

6. What is your agency's most pressing motivation for having or wanting a formalized multimodal tradeoff process?

To insure we are maximizing transportation benefit with limited resources.

7. What are the barriers to developing a process for multimodal tradeoffs? How can these barriers be best overcome?

General public and political movement have been to direct as much funding as possible toward maintenance/improvement of road and bridge system. Any redirection of traditional highway and bridge funding to other modes is seen as a take away. These barriers can best be overcome through education.

8. Do you feel all state transportation agencies and MPOs would benefit from a multimodal tradeoff process? Do you feel that this may vary depending on individual transportation agency (e.g., population, percentage of urbanized areas)? If so, what characteristics create the need for multimodal analyses?

I think we would benefit from a formal process, but it will be difficult to develop a process that will work for all states.

9. What do you see as the future for multimodal tradeoff analyses in your agency? What is needed to further the multimodal tradeoff state-of-the-practice?

I see MoDOT implementing some type of process in the future, especially if high fuel prices continue and the resulting increase in demand for alternative transportation options.

■ B.10 Puget Sound Regional Council (PSRC)

1. How would you or your agency define a multimodal tradeoff?

A multimodal tradeoff involves either a choice between various transportation modes to solve a particular transportation problem (project-level tradeoff) or a programmatic investment decision that chooses a funding level for various modal transportation programs (programmatic-level tradeoff).

2. Does your agency conduct a multimodal tradeoff analysis (to address both passenger and freight movement)? If so, please describe the process at each of these levels:

2a. *Planning.*

We are just now developing a framework to better prioritize transportation investments within our metropolitan transportation plan. We are developing this framework to meet state requirements for “least-cost planning.” The framework will define multimodal measurements and use a weighted cost-benefit analysis approach. Our policy boards will identify priority issues to be addressed and assign weights to various objectives and goals that the plan is trying to achieve. The intent is not a ranked list, but investments divided into high, medium, and low priorities.

2b. *Programming.*

We carry out a project selection process for Federal funding using STP, CMAQ, and FTA dollars. This project selection process is driven by policy goals shaped by our transportation plan and weighted by our policy boards. Projects are ranked qualitatively based on how well they achieve the policy goal(s).

2c. *Corridor.*

We participate in corridor planning studies which are aimed at making a basic project-level multimodal tradeoff – selecting the right mode, or mix of modal investments, to meet the needs in a corridor. Evaluation criteria are created at the beginning of the corridor analysis process that guides the choice of investments to address the identified deficiencies.

2d. *Project.*

See corridor above.

3. What tools are used to conduct or make tradeoff decision within modes (e.g., Highway Economic Requirements System for State Use - HERS-ST, National Bridge Investment Analysis System -NBIAS, Pavement Management Systems, travel demand forecasting models)?

In the past, the region has used STEAM to calculate benefits on a corridor project. Washington State DOT has sophisticated bridge and pavement management systems that they use to make investment decisions in these asset classes. PSRC has a travel demand forecasting model that is used by all agencies within the region to evaluate travel growth and patterns to analyze projects and programs of projects.

4. Does your agency employ specific tools to conduct multimodal tradeoff analyses (between modes)?

A least-cost planning methodology is being further developed to help prioritize system expansion projects within the metropolitan transportation plan. This will use a cost-benefit analysis framework, with weights for goal attainment. This methodology is intended to be embedded into our regional travel demand forecasting model as a post-processor to better automate the benefits calculation output.

5. How are results from multimodal tradeoff analyses utilized and presented in your agency (e.g., Long-Range Plans, Strategic Corridor Plans)?

The analysis from corridor plans is used to amend the metropolitan transportation plan with the “conceptual solution” to an identified deficiency. The congestion management process and least-cost planning approach with the metropolitan transportation plan is used to establish priorities for investment within identified plan conceptual solutions. Our project selection process is aimed at picking the highest priority investment to move forward for implementation.

6. What is your agency’s most pressing motivation for having or wanting a formalized multimodal tradeoff process?

On the project or corridor level, to make sure the conceptual solution best meets the corridor travel need. On the planning level, to better set priorities among competing investments to meet overall system needs. On the programming level, to better select the highest priority transportation projects for implementation with limited funding.

7. What are the barriers to developing a process for multimodal tradeoffs? How can these barriers be best overcome?

One of the biggest barriers is finding performance measures/evaluation criteria that overcome differences among modes so that the analysis is conducted in an “apples to apples” way. Also, how to best incorporate varying and often conflicting goals and policies along with more quantitative benefit-cost information in the decision process. We are trying to overcome these barriers by using a benefit-cost analysis framework to try to make the analysis as consistent as possible, but also to use a methodology to weight goals so that non-quantitative factors can be included in the analysis. This is not an easy or trivial solution to the barriers.

8. Do you feel all state transportation agencies and MPOs would benefit from a multimodal tradeoff process? Do you feel that this may vary depending on individual transportation agency (e.g., population, percentage of urbanized areas)? If so, what characteristics create the need for multimodal analyses?

All state transportation agencies and MPOs make investment decisions, and therefore would benefit from a multimodal tradeoff process. Smaller urban areas and rural areas may need much simpler tools than larger urbanized areas, but a way of comparing across investments is needed in all areas.

9. What do you see as the future for multimodal tradeoff analyses in your agency? What is needed to further the multimodal tradeoff state-of-the-practice?

Furthering multimodal tradeoff analysis requires both improved tools and improved understanding of the core concepts on the part of decision-makers. Travel demand models require improvements to ensure their structures and choice models are consistent with economic theory, and that they are specified from quality data reflecting consumer choice. Benefit-cost calculating software must be developed that “gets the math right.” And most importantly, decision-makers must be comfortable with their understanding of the basic concepts so that they are less inclined to undermine the results of analysis through skepticism about the tools. Agreement on the basic decision criteria embedded in a benefit-cost analysis is also critical as well.

■ B.11 Tri-County Metropolitan Transportation District of Oregon (TriMet)

1. How would you or your agency define a multimodal tradeoff?

As a transit agency, we do not deal with this concept directly. We work closely with the MPO, Metro in all corridor studies, which are always multimodal in scope and, in fact, the Region 2040 Framework Plan and the 20-Year RTP requires a multimodal (alternative mode) balance in the development of corridor projects. The emphasis shift dramatically to alternative modes (transit, bike, pedestrian) when project pass through Regional and Town Centers and Station Areas as defined in the 2040 Framework Plan. Managing vehicular traffic and expediting efficient freight movement is always a priority, it is always approached with balance and a view that some congestion may not be a bad thing and chasing congestion may not be the best long-term approach to smart regional growth.

2. Does your agency conduct a multimodal tradeoff analysis (to address both passenger and freight movement)? If so, please describe the process at each of these levels:

2a. *Planning.*

Again, as a transit agency, we rarely deal with freight issues except to the extent we move people efficiently, road capacity is freed up for truck movements.

2b. *Programming.*

No, not really, but this does happen at a regional level with Metro, the Port of Portland, Oregon DOT and road jurisdictions being key players. More focus is also now going to freight rail.

2c. *Corridor.*

As above.

2d. *Project.*

As above.

3. What tools are used to conduct or make tradeoff decision within modes (e.g., Highway Economic Requirements System for State Use - HERS-ST, National Bridge Investment Analysis System -NBIAS, Pavement Management Systems, travel demand forecasting models)?

This is pretty foreign for me as a transit guy. The region tries to optimize the effectiveness and flexibility in how these funds are used.

4. Does your agency employ specific tools to conduct multimodal tradeoff analyses (between modes)?

TriMet does so only within transit modes - generally through corridor studies and associated Alternatives Analysis and demand forecasting. At the more macro level, the balance between transit and highway investments is grounded in the RTP - a process administered by the MPO with close TriMet participation. That process considers alternative levels of transportation system investments by mode and optimizes based on land use plan support (2040 Framework Plan), system efficiencies and level of investment.

5. How are results from multimodal tradeoff analyses utilized and presented in your agency (e.g., Long-Range Plans, Strategic Corridor Plans)?

In the 20-year RTP (produced by the MPO) and in TriMet's own five-year Transit Investment Plan (TIP). The TIP is essentially the five-year element of the RTP, just as jurisdictions produce their Transportation Systems Plans and the State produces its STIP. All of these are coordinated regionally by the MPO and related committees.

6. What is your agency's most pressing motivation for having or wanting a formalized multimodal tradeoff process?

Support for the 2040 Framework Plan - because in the long run, transportation problems are best addressed through land use planning. The challenge, of course, is preparing a financially feasible transportation plan that keeps pace with regional growth. Related is assurance of freight mobility, which in turn promotes regional economic development. Congestion relief is important, but not of paramount consideration.

7. What are the barriers to developing a process for multimodal tradeoffs? How can these barriers be best overcome?

Resources at both the Federal and local levels. Both magnitude of resources, stability of resources and flexibility in their use. This is quickly leading to more entrepreneurial approaches, including public/private partnerships (tolling) and closer coordination with private transportation providers (railroads).

8. Do you feel all state transportation agencies and MPOs would benefit from a multimodal tradeoff process? Do you feel that this may vary depending on individual transportation agency (e.g., population, percentage of urbanized areas)? If so, what characteristics create the need for multimodal analyses?

I'm not sophisticated or hands on enough to answer this right now. Probably yes, through I think this has not been an issue for Portland and the state DOT.

9. What do you see as the future for multimodal tradeoff analyses in your agency? What is needed to further the multimodal tradeoff state-of-the-practice?

To the extent it is tied to the 2040 Framework Plan and the balanced development of modes, it is a cornerstone for transportation planning in the Portland region. I'm not yet sure how to answer the second question, as I think this is being pretty well addressed at present.

■ B.12 Utah Transit Authority (UTA)

1. How would you or your agency define a multimodal tradeoff?

A multimodal tradeoff would be a situation where different modal investments could achieve specific objectives. The tradeoff would address how effective and cost effective each would be at meeting objectives.

2. Does your agency conduct a multimodal tradeoff analysis (to address both passenger and freight movement)? If so, please describe the process at each of these levels:

2a. *Planning.*

At a planning level a tradeoff analysis would use planning-level costs to assess the range of modal investments that should be examined more thoroughly to meet a defined need.

2b. *Programming.*

(No response provided.)

2c. *Corridor.*

At a corridor level an alternatives analysis would be performed that describes specific alternatives and evaluates each against objectives and criteria.

2d. *Project.*

During the environmental phase specific tradeoffs against detail cost, effectiveness and impacts should be made. In most cases, the project is pretty well defined at this point.

3. What tools are used to conduct or make tradeoff decision within modes (e.g., Highway Economic Requirements System for State Use - HERS-ST, National Bridge Investment Analysis System -NBIAS, Pavement Management Systems, travel demand forecasting models)?

Cost models, travel demand models and comparison matrices.

4. Does your agency employ specific tools to conduct multimodal tradeoff analyses (between modes)?

Not really.

5. How are results from multimodal tradeoff analyses utilized and presented in your agency (e.g., Long-Range Plans, Strategic Corridor Plans)?

Most of our experience has been with corridor studies and has used tables with cost, performance, and impacts.

6. What is your agency's most pressing motivation for having or wanting a formalized multimodal tradeoff process?

We are engaged in several multimodal studies.

7. What are the barriers to developing a process for multimodal tradeoffs? How can these barriers be best overcome?

(No response provided.)

8. Do you feel all state transportation agencies and MPOs would benefit from a multimodal tradeoff process? Do you feel that this may vary depending on individual transportation agency (e.g., population, percentage of urbanized areas)? If so, what characteristics create the need for multimodal analyses?

I don't know if all agencies would, but I know that ours would.

9. What do you see as the future for multimodal tradeoff analyses in your agency? What is needed to further the multimodal tradeoff state-of-the-practice?

What we need are some test cases.

■ B.13 Virginia Department of Transportation (VDOT)

1. How would you or your agency define a multimodal tradeoff?

Comparing investments in two modes and determining the better overall investment.

2. Does your agency conduct a multimodal tradeoff analysis (to address both passenger and freight movement)? If so, please describe the process at each of these levels:

2a. *Planning.*

We are in the process of developing a multimodal tradeoff method.

2b. *Programming.*

Ditto.

2c. *Corridor.*

We do diversion analyses and mode choice modeling.

2d. *Project.*

Ditto.

3. What tools are used to conduct or make tradeoff decision within modes (e.g., Highway Economic Requirements System for State Use - HERS-ST, National Bridge Investment Analysis System -NBIAS, Pavement Management Systems, travel demand forecasting models)?

We have a model that uses performance measures to evaluate highway projects; we have bridge model and pavement management system; we also use travel demand models. We have developed performance measures to evaluate (and tradeoff) freight versus passenger rail projects for our new Rail Enhancement Fund.

4. Does your agency employ specific tools to conduct multimodal tradeoff analyses (between modes)?

Except for passenger versus rail freight, No. Currently all transit funding is by formula.

5. How are results from multimodal tradeoff analyses utilized and presented in your agency (e.g., Long-Range Plans, Strategic Corridor Plans)?

That is still on the horizon for us.

6. What is your agency's most pressing motivation for having or wanting a formalized multimodal tradeoff process?

Making investments across modes.

7. What are the barriers to developing a process for multimodal tradeoffs? How can these barriers be best overcome?

The major barrier is that transit funds are provided by formula – even nine percent of STP money that is flexed to transit-so there is little incentive to identify multimodal performance measures. But, politically (and professionally), there is an interest in doing so.

8. Do you feel all state transportation agencies and MPOs would benefit from a multimodal tradeoff process? Do you feel that this may vary depending on individual transportation agency (e.g., population, percentage of urbanized areas)? If so, what characteristics create the need for multimodal analyses?

I believe a multimodal tradeoff method can provide data to inform decision-makers and its time has come.

9. What do you see as the future for multimodal tradeoff analyses in your agency? What is needed to further the multimodal tradeoff state-of-the-practice?

We are in the process of developing it and what is needed is better methods.