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INTRODUCTION

Modeling training is required to provide adequate knowledge and understanding to public agency modeling staff in the areas of model development and application and to model output users in the areas of basic modeling theory and proper use of model output. This training program was developed to help ensure:

- That the training is tailored to the level of understanding and needs of the modeler and model output user;
- Integration between training areas, so that there is a logical progression of training; and
- Consistency of content and format between training areas.

The training program is organized into the four main training areas of model development, model application, model data, and modeling education. Within each training area, various topics related to current and expected training needs are identified. The training elements included for each topic describe how these needs will be addressed.

With the exception of one element, all of the training will be provided in a course format. The training program presents the following specific information for each element:

- General description of training;
- Target audience;
- Objectives;
- Relationship to other training topics/elements;
- Prerequisites;
- When to be held;
- Sources of potential trainers; and
- Content outline.

TRAINING AREA 1: Model Development

Description: Model development is the process used for developing or adjusting models. It includes the definition of model requirements, model specification, model estimation, model calibration, model validation, and model adjustment. The Model Development training area covers a wide range of topics related to maintaining state-of-the-practice models that address state and federal planning requirements.

Target Audience: Modeling practitioners involved in model development and maintenance.

Objectives: To provide the necessary training so that models are developed in accordance with the *Oregon Modeling Protocol* and the model development standards embodied within the *ODOT Travel Demand Model Development and Application Guidelines* and the *ODOT Travel Demand Model Development Procedures Manual*. The training must be:

- Thorough and comprehensive;
- Conducted by recognized experts;
- Presented in a manner that will allow modelers to obtain a working knowledge of the topic;
- Offered continuously; and
- Regularly updated to reflect recent advances and additional topics.

Consistent with the objectives of the *Model Development and Application Guidelines*, the training must present state-of-the-practice model development methods. At the same time, these methods must build upon or be integrated, to the maximum extent possible, with existing modeling tools and capabilities.

Relationship to Other Training Areas: Consistency must be maintained between training for related topics in the Model Development and Model Application training areas. Provision of training for a particular model development topic may result in the need for training for a related model application topic.

Topics:

1.1 Activity-Based Model Development
1.2 Choice-Based Models (Destination Choice and Mode Choice Models)
1.3 Modeling of Land Use – Transport Relationships
1.4 Alternative Mode and TDM Modeling
1.5 Advanced Traffic Assignment Techniques
1.6 Statewide Model – MPO/Local Model Integration
1.7 Commercial Vehicle Trip Modeling

TOPIC 1.1 Activity-Based Model Development

Description: Activity-based modeling approaches recognize that travel demand is derived from the need to pursue activities that are dispersed in time and space. These approaches also recognize the inter-dependence among decisions for a series of trips made by an individual. They also recognize the interactions among various members of the household that arise when household members allocate resources (e.g., vehicles), assign and share tasks, and jointly participate in activities. Thus, it has been argued that activity-based approaches provide a theoretically and conceptually stronger framework within which travel demand forecasting may be performed than the traditional four-step model.

Because activity-based modeling is a relatively new approach, there is a lack of knowledge among many modeling practitioners about the various forms of activity-based models and the specific techniques that may be used for model development, including survey methods and model estimation, calibration, and validation. In addition, because this approach is still evolving, up-to-date information is needed as improvements are made to these techniques.

Training Elements:

1.1.1 Activity-Based Models
1.1.2 Survey Methods for Activity-Based Model Development
1.1.3 Estimation and Calibration of Activity-Based Models

TRAINING ELEMENT 1.1.1 Activity-Based Models

Description: A one-day training course that will provide an overview of activity-based modeling. The course will be taught at a level that assumes no prior knowledge of activity-based modeling. The major areas to be covered will include the rationale for activity-based travel forecasting, activity-based modeling theory, alternative modeling approaches, and examples of models.

Target Audience: Modeling practitioners involved in model development and maintenance. Because activity-based models are typically developed for larger metropolitan areas, most of the trainees will likely be staff members of state DOTs, MPOs, and larger cities.

Objectives: To provide trainees with a conceptual understanding of activity-based modeling and the current approaches available. The course will be oriented toward preparing trainees for subsequent courses in activity-based model development and application. It will include an objective discussion of the strengths and weaknesses of activity-based models vs. trip –based models, as well as a description of the circumstances in which activity-based models are particularly beneficial. The training must be consistent with the *Model Development and Application Guidelines* and *Model Development Procedures Manual.*

Relationship to Other Training Topics/Elements: This course will be a prerequisite to Training Elements 1.1.2 - Survey Methods for Activity-Based Model Development, 1.1.3 – Estimation and Calibration of Activity-Based Models, and 2.3 – Activity-Based Model Application.

Prerequisites: Model development experience

When to be Held: Bi-annually

Sources of Potential Trainers: Academia

Content Outline:

I. Rationale for Activity-Based Travel Forecasting

II. Activity-Based Modeling Theory

   A. Activity and travel decision framework
   B. Characteristics of activity and travel demand
   C. Choice theory

III. Alternative Modeling Approaches

   A. Model system requirements
   B. Similarities among approaches
   C. Differences among approaches

IV. Examples of Activity-Based Models

TRAINING ELEMENT 1.1.2 Survey Methods for Activity-Based Model Development

Description: A three-day training course providing basic information on the collection of survey data needed to develop activity-based models. The primary topics to be covered will include a review of different survey types, survey design, and survey administration.

Target Audience: Modeling practitioners involved in model development and maintenance. Because activity-based models are typically developed for larger metropolitan areas, most of the trainees will likely be staff members of state DOTs, MPOs, and larger cities.

Objectives: To provide trainees with a practical knowledge of the preparation and administration of travel surveys for activity-based model estimation. Emphasis will be placed on how to determine and prepare the appropriate type of survey for the model to be developed. The survey methods must have reasonable resource requirements to allow activity-based model development at the local level. The training must be consistent with the *Model Development and Application Guidelines* and *Model Development Procedures Manual.*

Relationship to Other Training Topics/Elements: This course will be a prerequisite to Training Element 1.1.3 – Estimation and Calibration of Activity-Based Models. Topic/Training Element 2.3 – Activity-Based Model Application is also related.

Prerequisites: Model development experience

When to be Held: One time only

Sources of Potential Trainers: Academia

Content Outline:

I. Sources of Survey Data

   A. Cross-sectional surveys of household activities and time use
   B. Stated response surveys
   C. Longitudinal panel surveys
   D. Advantages, disadvantages, and uses of each survey type

II. Survey Design

   A. Identification of required survey data
   B. Design of survey instrument
   C. Sample size estimation
   D. Sample selection procedures

III. Survey Administration

   A. Alternative methods

B. Survey control

TRAINING ELEMENT 1.1.3 Estimation and Calibration of Activity-Based Models

Description: A three-day course covering model estimation and calibration techniques for typical components of activity-based models. Model estimation is the process used to identify and estimate coefficients for explanatory variables within the model using activity survey data. Model calibration is the process used to adjust the coefficients so that the model more closely reflects observed behavior. Because most of the trainees will likely have a background in trip-based model development, similarities and differences between the activity-based and trip-based model estimation and calibration processes will be identified.

Target Audience: Modeling practitioners involved in model development and maintenance. Because activity-based models are typically developed for larger metropolitan areas, most of the trainees will likely be staff members of state DOTs, MPOs, and larger cities.

Objectives: To provide trainees with a procedural knowledge of activity-based model estimation and calibration. The training should be closely coordinated and scheduled with Training Element 1.1.2 – Survey Methods for Activity-Based Models. It must be consistent with the *Model Development and Application Guidelines* and *Model Development Procedures Manual.*

Relationship to Other Training Topics/Elements: This course will follow Training Element 1.1.2 – Survey Methods for Activity-Based Model Development. Topic/Training Element 2.3 – Activity-Based Model Application is also related.

Prerequisites: Model development experience

When to be Held: One time only

Sources of Potential Trainers: Academia

Content Outline:

I. Preparation of Model Estimation Data Files

   A. Logic checking/editing of survey data
   B. Level of service and accessibility data

II. Model Estimation

   A. Estimation strategy
   B. Estimation procedure
   C. Statistical tests
   D. Reasonableness checks

III. Model Calibration/Validation

   A. Calibration data files

B. Calibration procedures
C. Validation tests

TOPIC/TRAINING ELEMENT 1.2 Choice-Based Models

Description: A two-day course that will provide trainees with a background in discrete choice analysis together with instruction on the development of two forms of discrete choice models - destination choice and mode choice models.

Target Audience: Modeling practitioners involved in model development and maintenance.

Objectives: A portion of the training will provide a theoretical understanding of discrete choice models, however, its focus will be on practical issues involved with the development of choice-based models. A specific area of interest to be covered will be in how to determine the most appropriate form of model for a given urban area or for a specific set of planning questions to be addressed (e.g., when and how to apply nested-logit mode choice models). The training must be consistent with the *Model Development and Application Guidelines* and *Model Development Procedures Manual*.

Relationship to Other Training Topics/Elements: Possible connection to mode choice topics within Training Elements 1.3.1 – Integration of Urban Design Variables in Travel Demand Models, 1.4.1 – Bicycle and Pedestrian Modeling, and 1.4.2 - TDM Modeling.

Prerequisites: Model development experience

When to be Held: One time only

Sources of Potential Trainers: Academia

Content Outline:

I. Discrete Choice Analysis

- A. Theories of individual choice behavior
- B. Binary and multinomial choice models
- C. Models of multi-dimensional choice and nested logit models
- D. Tests and practical issues in developing discrete choice models

II. Destination Choice Models

- A. Theory and structure
- B. Model development
  1. Data requirements
  2. Model estimation and calibration methods

III. Mode Choice Models

- A. Alternative model forms (multinomial logit, hierarchical logit, nested logit)
- B. Market segmentation
- C. Model development

1. Data requirements
2. Model estimation and calibration methods

TOPIC 1.3 Modeling of Land Use – Transport Relationships

Description: There has been considerable interest in Oregon over the past several years in better representing the relationships between land use and transport within travel demand forecasting models. This interest has been driven in part by statutory requirements, such as the Transportation Planning Rule which emphasizes alternative land use forms as a means of reducing reliance on single-occupant vehicle (SOV) travel, as well as the theoretical strength of reflecting land use and transportation as a dynamic two-way relationship rather than separately as in the traditional approach.

Training will be provided in modeling land use – transport relationships at both the microscopic and macroscopic levels. At the microscopic level, the training will cover the integration of urban design variables, such as mixed-use development and development design features that encourage the use of alternative modes, so that models are more sensitive the effects of these variables on travel demand. At the macroscopic level, training will be provided in modeling of the two-way relationship between land use and transport at the metropolitan or areawide scale. This integrated approach has been followed within the current ODOT statewide model, but with the exception of Metro, the interaction between these two elements in the MPO models is mechanical in nature.

Training Elements:

1.3.1 Integration of Urban Design Variables in Travel Demand Models
1.3.2 Integrated Land Use – Transport Modeling at Metro Level

TRAINING ELEMENT 1.3.1 Integration of Urban Design Variables in Travel Demand Models

Description: A two-day training course that will describe the relationships between urban design features and travel demand and how these relationships may be represented within travel demand forecasting models. It is anticipated that most of the course material will be a product of the research to be undertaken by OMSC members into this topic.

Target Audience: Modeling practitioners involved in model development and maintenance.

Objectives: To provide modeling practitioners with adequate information to incorporate urban design variables into existing or new travel demand models in an acceptable manner and to encourage further research in this area. The training must be consistent with the *Model Development and Application Guidelines* and *Model Development Procedures Manual.*

Relationship to Other Training Topics/Elements: Possible connection to Topic/Training Element 1.2 – Choice-Based Models and mode choice topics within Training Element 1.4.1 – Bicycle and Pedestrian Modeling.

Prerequisites: Model development experience

When to be Held: Bi-annually

Sources of Potential Trainers: OMSC members

Content Outline:

I. Relationship of Urban Design Features to Travel Demand

   A. Mixed-use development patterns
   B. Design features facilitating alternative mode use (e.g., transit-oriented development)
   C. Other

II. Incorporation of Urban Design Variables in Travel Demand Models

   A. Relevant model components
   B. Consistent representation of urban design variables between model components

III. Model Estimation with Urban Design Variables

   A. Definition of variables
   B. Measurement of variables
   C. Model estimation procedures

TRAINING ELEMENT 1.3.2 Integrated Land Use – Transport Modeling at Metro Level

Description: A three-day course providing trainees with a basic background in the methods for integrating land use and transport models. At the metropolitan level, only Metro has a fully functional model for allocating future land use estimates to individual TAZs. Within the other MPOs, non-modeling approaches are currently used. As land use modeling capabilities are developed within these other MPOs, it will be important to integrate the models with the regional transport models.

Target Audience: Modeling practitioners involved in model development and maintenance.

Objectives: To provide a thorough understanding of the issues and methods involved in integrating land use and transport models. The training will not provide enough background for trainees to develop integrated land use –transport modeling systems themselves, but will encourage the initiation of development efforts within their organizations. The training must be consistent with the *Model Development and Application Guidelines* and *Model Development Procedures Manual.*

Relationship to Other Training Topics/Elements: Land use allocation models will be discussed as a part of Topic/Training Element 2.2 – Land Use Allocation Methods.

Prerequisites: Model development experience

When to be Held: Bi-annually

Sources of Potential Trainers: OMSC members and/or consultant services

Content Outline:

(To be developed by course trainer.)

TOPIC 1.4 Alternative Mode and TDM Modeling

Description: In Oregon, state, regional and local policies look to reduce reliance on SOV travel. Measures that have been promoted for achieving this goal are the development of land use patterns and transportation infrastructure that facilitate non-motorized travel. Thus, it will be important to develop mode choice models that explicitly represent walking and bicycling in the choice set. At the present time, if they are represented at all, walking and bicycling are typically combined, and the most common non-motorized variables are simply trip distance and travel time. Yet, there is some evidence that pedestrian travel and bicycle use may be influenced by a host of other factors. Therefore, training will be provided on how to represent these factors within mode choice models so that the effects of land use measures and transportation facility improvements on bicycle and pedestrian travel may be more accurately predicted.

Another approach that has received considerable attention for reducing SOV travel and the need for roadway capacity improvements is the implementation of TDM measures. In most cases, the effects of TDM measures on travel demand are estimated using stand-alone models. It would be more efficient and potentially more accurate to estimate these effects directly within the standard local model set. Training in this area will focus on the most promising TDM modeling techniques available and the methods for incorporating them into existing local models without compromising their integrity.

Training Elements:

1.4.1. Bicycle and Pedestrian Modeling
1.4.2. TDM Modeling

TRAINING ELEMENT 1.4.1 Bicycle and Pedestrian Modeling

Description: A two-day training course on methods for incorporating bicycle and pedestrian demand forecasting capabilities within existing or new travel demand forecasting models. Typically, this is done within the mode choice model component, where the bicycle and pedestrian modes are explicitly represented as separate modes in the same way as the auto and transit modes. Emphasis will be placed on special issues involved with bicycle and pedestrian modeling, such as variable definition and measurement and the increased level of network and zone system detail required for these models.

Target Audience: Modeling practitioners involved in model development and maintenance.

Objectives: To provide information on how improved bicycle and pedestrian mode choice capabilities may be practically and efficiently implemented within existing or new travel forecasting models. These models must incorporate specific socioeconomic and network variables that directly influence bicycle and pedestrian mode choice rather than using time and distance variables only or composite index variables intended to represent the attractiveness of bicycling or walking. The training must be consistent with the *Model Development and Application Guidelines* and *Model Development Procedures Manual.*

Relationship to Other Training Topics/Elements: Related to general topics on mode choice modeling covered in Topic/Training Element 1.2 - Choice-Based Models and information regarding mode choice presented in Training Element 1.3.1 - Integration of Urban Design Variables in Travel Demand Models.

Prerequisites: Model development experience

When to be Held: Bi-annually

Sources of Potential Trainers: OMSC members

Content Outline:

I. Overview of Bicycle and Pedestrian Modeling

- A. Modeling issues
- B. Current methods

II. Model Estimation

- A. Potential variables
- B. Required data
  1. Socioeconomic data
  2. Network data
- C. Zone system and network definition
- D. Model estimation procedures

III. Model Calibration/Validation

A. Required data
B. Validation tests

TRAINING ELEMENT 1.4.2 TDM Modeling

Description: A two-day training course primarily covering how transportation demand management (TDM) modeling may be integrated into standard regional or local urban area travel forecasting models. This approach represents an improvement over the conventional methodology in which TDM forecasting is performed within a stand-alone model. It is important to remember that TDM does not represent a single strategy, but is a collection of different measures aimed at managing and distributing travel demand. Likewise, TDM modeling is comprised of a set of different techniques. Other topics to be covered will include the theoretical limitations of TDM modeling within trip-based models and the advantages of activity-based models for this purpose.

Target Audience: Modeling practitioners involved in model development and maintenance.

Objectives: To provide training on methods for modeling of TDM measures within standard travel forecasting models rather than outside of these models. Most of the methods will be related to mode choice models, but other model components may also included such as trip generation, destination choice, time-of-day, and trip assignment models. Information will also be presented on the longer-range improvements that may be achieved through activity-based modeling. The training must be consistent with the *Model Development and Application Guidelines* and *Model Development Procedures Manual.*

Relationship to Other Training Topics/Elements: Related information will be presented in Training Elements 1.1.1 – Activity-Based Models, 1.2 – Choice-Based Models, and 1.5.2 – Road Pricing and Peak Spreading.

Prerequisites: Model development experience

When to be Held: Bi-annually

Sources of Potential Trainers: OMSC members

Content Outline:

I. Background

   A. Review of TDM measures
   B. Conventional modeling approaches

II. TDM Modeling Within Trip-Based Models

   A. Theoretical limitations
   B. Integration of TDM modeling within standard models

      1. Applicable TDM measures
      2. Alternative modeling approaches
      3. Integration methods

III. TDM Modeling Within Activity-Based Models

A. Theoretical advantages
B. Overview of modeling approaches
C. Application results

TOPIC 1.5 Advanced Traffic Assignment Techniques

Description: For a variety of reasons, traffic assignment models are considered by many as the weakest link in the travel demand modeling chain. One problem is that the static assignment approach used within conventional models is not effective in measuring the queuing effects that develop at traffic flow bottlenecks, so that the only delay accrued is at the bottleneck link. Another problem is that small-scale facility improvements such as turning lanes, signal optimization, and access management measures are only crudely represented within traffic assignment models, if at all. New traffic simulation programs have been developed, however, that address these shortcomings. These programs simulate individual vehicle movements at a micro-level with a "second by second" view of traffic progression. This allows the effects of vehicle queuing to be reflected throughout the network, as well as the influence of localized roadway improvements on travel time and traffic operations.

Other weaknesses of many assignment models are their inability to accurately represent the occurrence of peak spreading and the effects on traffic assignment of innovative policies such road pricing. Current modeling practice assumes that the percentage of all-day travel occurring in the peak period today will remain constant through distant horizon years. Unfortunately, this technique is flawed. It is not uncommon for travel forecasts within a corridor to exceed capacity. In reality, however, this is not possible. Rather, high levels of congestion would likely lead to an extension of the peak period as travelers that could avoid excessive delays would do so.

Training Elements:

1.5.1 Traffic Simulation Models
1.5.2 Road Pricing and Peak Spreading

TRAINING ELEMENT 1.5.1 Traffic Simulation Models

Description: A two-day course that will provide training on the basic features and operation of the VISSIM traffic simulation program, integration of VISSIM with travel demand models, and appropriate application of VISSIM within the context of areawide travel demand forecasting. Although there are several traffic simulation programs of this type available, VISSIM will be used for demonstration purposes because it has been more widely applied within Oregon than the other programs and because it is one of the more powerful tools available.

Target Audience: Modeling practitioners involved in model development and/or model application.

Objectives: To provide trainees with an understanding of the basic features and use of traffic simulation software in connection with travel demand forecasting. Hands-on exercises and examples of program application will be featured throughout the training.

Relationship to Other Training Topics/Elements: No direct relationship to other training topics/elements.

Prerequisites: Model development or model application experience

When to be Held: Bi-annually

Sources of Potential Trainers: Consultant services

Content Outline:

I. Background

- A. Rationale for use of traffic simulation models
- B. Available software packages

II. Basic Features and Use of VISSIM

- A. Overview of features
- B. Program operation
- C. Highway and transit networks
- D. Program parameters
- E. Results and evaluation types
- F. Dynamic assignment

III. Integration of VISSIM with EMME/2

- A. Data structures and data exchange
- B. Default data
- C. Integration steps
    1. Import of network and demand data to VISUM

2. Calibration and validation on large scale level
3. Extraction of simulation network
4. Refinement and calibration of simulation network
5. Export to VISSIM
6. Network editing and simulation in VISSIM

IV. VISSIM Application for Travel Demand Modeling

TRAINING ELEMENT 1.5.2 Road Pricing and Peak Spreading

Description: A two-day course on road pricing and peak spreading modeling techniques that may be implemented within existing models. The model produced by ODOT and Metro in the joint model estimation program is structured to permit the analysis of road pricing scenarios. Training will be provided that explains the derivation and implementation of the road pricing feature of the model. Training in the area of peak spreading will examine the conceptual basis for various peak spreading modeling techniques and the appropriate methods for applying them.

Target Audience: Modeling practitioners involved in model development and maintenance.

Objectives: To provide trainees with the necessary information to implement road pricing and peak spreading capabilities within existing models with a moderate level of effort. This will include guidance on the suitability of these techniques for specific applications. The training must be consistent with the *Model Development and Application Guidelines* and *Model Development Procedures Manual.*

Relationship to Other Training Topics/Elements: Information on TDM modeling techniques for road pricing measures will be presented in Training Element 1.4.2 – TDM Modeling.

Prerequisites: Model development experience

When to be Held: One time only

Sources of Potential Trainers: Metro

Content Outline:

I. Road Pricing

- A. Alternative road pricing schemes (e.g., fixed toll, variable toll by time-of-day and/or vehicle occupancy)
- B. Representation of tolls within models
  1. Unit of measurement
  2. Consistency of toll representation between model components
  3. Network coding techniques
- C. Application procedure

II. Peak Spreading

- A. Overview of conventional time-of-day modeling approaches
- B. Alternative approaches
  1. Theoretical basis
  2. Applicability
  3. Data requirements

4. Limitations and advantages
5. Application procedure

TOPIC/TRAINING ELEMENT 1.6 Statewide Model – MPO/ Local Model Integration

Description: With the recent completion of the second generation of the ODOT statewide land use-transport model, it will be important that use of the statewide model and MPO models is coordinated. This will be necessary not only to ensure consistency between the internal structure (zone systems and networks) and output of the models, but also to maximize the use of statewide model output within the MPO models. Examples of statewide model output that may be used include estimates of external flows through MPO areas, areawide population and employment control totals, and freight movement estimates.

A one-day training course will be held to provide MPO modeling staff with a basic knowledge of how the statewide model functions. This will be essential if MPO staff are to understand how the statewide model and MPO models should "fit" when performing various model development and application tasks. Information will also be provided on the types of data that should shared between the models and how to best utilize the input and output data available from the statewide model.

Target Audience: Modeling staff from Oregon MPOs involved in model development and maintenance.

Objectives: To familiarize MPO staff with the underlying theory and uses of the ODOT statewide model. This will facilitate future coordination between the statewide and MPO models and allow the MPOs to utilize statewide model data to the maximum extent possible. Training on actual model operation will not be provided since at this point it is not anticipated that MPO staff will be involved in this activity. The training must be consistent with the *Model Development and Application Guidelines, Model Development Procedures Manual,* and the *Oregon Modeling Protocol.*

Relationship to Other Training Topics/Elements: No direct relationship to other training topics/elements.

Prerequisites: Model development experience

When to be Held: Bi-annually

Sources of Potential Trainers: Consultant services

Content Outline:

I. Overview of Statewide Model

   A. Development history and current model status
   B. Model structure
   C. Model uses
   D. Generation 3 model

II. Economic, Land Use, and Transport Models

   A. Theoretical basis

B. Model components
C. Model input and output data

III. Data Sharing Between Statewide Model and MPO/Local Models

IV. Use of Statewide Model Output Data

TOPIC/TRAINING ELEMENT 1.7 Commercial Vehicle Trip Modeling

Description: Commercial vehicle flows are those trips made by service vehicles. Most travel demand models are very weak in estimating these types of trips. In general practice, the non-home-based (NHB) vehicle trip matrix estimated by the model is used as the basis for developing a commercial trip matrix in which a simple proportion of the NHB matrix is taken to represent commercial trips. This practice does not accurately reflect the true origins and destinations of these trips, however. Commercial vehicle trips should be estimated using a separate model consisting of trip generation, destination choice, time-of-day factoring and trip assignment components. It should be developed using data from sources such as the Commodity Flow Survey and data collected on commercial vehicle trips from employer and roadside surveys.

A one-and-a-half day training course will be offered covering the most appropriate approaches for commercial vehicle trip modeling in Oregon. These approaches must reflect the availability of freight movement data from the ODOT statewide model, which will be particularly useful in estimating internal-external, external-internal, and external-external commercial vehicle flows through metropolitan areas.

Target Audience: Modeling practitioners involved in model development and maintenance.

Objectives: To provide trainees with an overview of the issues and current approaches for commercial vehicle trip modeling, as well as an understanding of the primary components of a "best practice" commercial vehicle trip model. The training must be consistent with the *Model Development and Application Guidelines* and *Model Development Procedures Manual.*

Relationship to Other Training Topics/Elements: No direct relationship to other training topics/elements.

Prerequisites: Model development experience

When to be Held: One time only

Sources of Potential Trainers: Metro

Content Outline:

I. Background

   A. Modeling issues
   B. Overview of current approaches

II. Trip Generation/Destination Choice

   A. Heavy commercial vehicle trips
   B. Light commercial vehicle trips

III. Mode Choice Analysis

IV. Route Choice

A. Network modifications
B. Trip assignment
C. Time period factors

TRAINING AREA 2: Model Application

Description: Model application refers to the use of models to produce estimates of existing or future travel and transportation system characteristics. Training in this area will cover topics related to basic EMME/2 application, preparation of model input and output data, activity-based model application, and methods for several special-purpose model applications.

Target Audience: Modeling or transportation planning practitioners involved in model application.

Objectives: General objectives are to improve the accuracy and efficiency of model input data preparation, maximize the range of available model applications, and improve the analysis and presentation of model output. The training should:

- Be focused on the specific needs and level of understanding of the trainees;
- Maximize the utility of models through better understanding of their full capabilities;
- Emphasize "hands-on" exercises; and
- Be continuously updated and re-offered to reflect significant model changes.

Relationship to Other Training Areas: Model application training must be kept current and consistent with the training provided for the development of new modeling tools.

Topics:

2.1 Basic EMME/2 Applications
2.2 Land Use Allocation Methods
2.3 Activity-Based Model Application
2.4 GIS Use in Model Application
2.5 Special-Purpose Model Applications

TOPIC/TRAINING ELEMENT 2.1 Basic EMME/2 Applications

Description: Although there are only a few agencies in Oregon involved in true model development, there are many that have an interest in applying local models that have already been developed for a variety of purposes. It is important that the agency staff responsible for this function have an adequate understanding of the appropriate model application procedures, because even the best models are of little value if they are incorrectly applied. To increase the level of understanding, a two-day training course will be held to provide a basic background on the EMME/2 modeling environment and frequently-used application procedures, such as traffic assignment. The training will include hands-on exercises by attendees using specially prepared EMME/2 databanks.

Target Audience: Transportation planning practitioners with limited or no model application experience.

Objectives: To increase the value of models and model output data to local agencies by educating agency staff in proper model application procedures.

Relationship to Other Training Topics/Elements: The general information on typical model structure, model components and how they work, and the use of model data to be provided in Training Element 3.1 – Basic Use of Model Data will be a useful background for participants in this course. The information to be presented in this course will serve as an introduction to more specific topics covered in other model application training elements.

Prerequisites: General knowledge of transportation system planning

When to be Held: Bi-annually

Sources of Potential Trainers: OMSC members or consultant services

Content Outline:

I. Overview of EMME/2 Environment

   A. Databank structure
   B. User interface

II. Traffic/Trip Assignment

III. Areas of Application

   A. Network alternative testing
   B. Land use alternative testing
   C. Special applications (e.g., focus modeling, select link analysis, VMT and emissions calculation)

III. Application Exercises

IV. Macros

   A. Overview
   B. Automated runs using macros and other software

V. Model Output and Post-Processing

TOPIC/TRAINING ELEMENT 2.2 Land Use Allocation Methods

Description: Land use allocation is the process of distributing regional land use and socioeconomic data control totals to individual TAZs. This may be done using non-modeling approaches based upon TAZ characteristics such as zoning, the availability of buildable land, and assumptions about future development trends or using sophisticated models that simulate local real estate markets. Currently, only Metro has a fully functional model for performing land use allocation. Within the other MPOs, non-modeling methods are used which may not be systematic and may involve greater degrees of subjective judgement. It would be desirable to improve this process to reduce the amount of bias in the estimation of TAZ land use and socioeconomic data. Therefore, a one-day training course will be held to provide MPO modeling staff with information on the implementation of land use allocation models as well as enhanced non-modeling allocation methods.

It should be noted that as work in this area progresses and land use models are developed within the MPOs, it will be important to integrate these models with the regional transport models. At that point, training will be provided on integrated land use-transport modeling, as described in Topic 1.3.

Target Audience: MPO modeling staff involved in model application.

Objectives: To provide MPO staff with techniques that may be used to improve the accuracy and consistency of TAZ land use and socioeconomic data estimates within MPO modeling areas. The training must be consistent with the *Model Development and Application Guidelines* and *Model Application Procedures Manual.*

Relationship to Other Training Topics/Elements: Integration of land use and transport models will be discussed in Training Element 1.3.2 – Integrated Land Use – Transport Modeling at Metro Level.

Prerequisites: Regional travel demand model application experience

When to be Held: One time only

Sources of Potential Trainers: Metro or Texas Transportation Institute/TMIP

Content Outline:

(To be developed by course trainer.)

TOPIC/TRAINING ELEMENT 2.3 Activity-Based Model Application

Description: Along with the development of activity-based models (Topic 1.1), training will also be required on the application of these models. A one-and-a-half day training course will be offered that will include a review of the underlying theory, structure, and components of activity-based models, their range of application, and typical application procedures, including data requirements.

Target Audience: Modeling practitioners involved in model application. Because activity-based models are typically developed for larger metropolitan areas, it is anticipated that most of trainees will be staff members of state DOTs, MPOs, and larger cities.

Objectives: To provide trainees with a basic knowledge of various activity-based model applications, including those not typically available with trip-based models (e.g., TDM modeling), as well as the general steps required for model use. This will facilitate both proper and full utilization of the models. The training must be consistent with the *Model Development and Application Guidelines* and *Model Application Procedures Manual.*

Relationship to Other Training Topics/Elements: Training Element 1.1.1 – Activity-Based Models will be a prerequisite to this course. Training Elements 1.1.2 – Survey Methods for Activity-Based Model Development and 1.1.3 – Estimation and Calibration of Activity-Based Models are also related.

Prerequisites: Model application experience

When to be Held: One time only

Sources of Potential Trainers: OMSC members or consultant services

Content Outline:

I. Review of Activity-Based Models

   A. Theory
   B. Overall structure and individual components

II. Areas of Application

   A. Dynamic micro-simulation of travel behavior
   B. Policy analysis, including TDM measures
   C. Activity engagement and time-use modeling
   D. Air quality analysis

III. Example Applications

IV. Typical Application Procedure

A. Data requirements
B. General processing steps

TOPIC/TRAINING ELEMENT 2.4. GIS Use in Model Application

Description: Geographic Information Systems (GIS) have proven to be powerful tools in the travel demand model application process. Use of GIS tools has significantly increased the efficiency and accuracy of preparing model input data, such as zonal data and transportation networks. GIS tools may be applied for variety of purposes, ranging from the initial assembly and aggregation of model input data to final verification of the data's accuracy prior to its input to the model. Similarly, these tools are extremely useful for the manipulation and display of model output data. Once the data has been output from the model, it can be transformed or combined with data from other sources to allow better understanding and interpretation of the results. This capability has eliminated many of the previous problems associated with analyzing and presenting model output data, in which the model user was limited to the output features of the particular modeling software being used.

Because of the flexibility of GIS tools, a large number of innovative approaches have been developed in this area. A one-day training course will cover as many of these approaches as possible, using one of the more popular GIS software packages, such as ArcView, in combination with EMME/2. It will be assumed that the trainees are already proficient in the use of GIS software, so that instruction on use of the software itself will not be a part of the training.

Target Audience: Modeling practitioners involved in model application.

Objectives: To increase the knowledge of trainees in the use of GIS tools to more efficiently and effectively process, analyze, and present model input and output data. The key to the training will be to present as many examples of GIS application as possible, with trainees participating in exercises to generate data using GIS tools. The training must be consistent with the *Model Development and Application Guidelines* and *Model Application Procedures Manual.*

Relationship to Other Training Topics/Elements: Related information will be presented in Topic/Training Element 3.2 – Graphic Presentation of Model Data.

Prerequisites: Model application experience

When to be Held: Bi-annually

Sources of Potential Trainers: OMSC members

Content Outline:

I. GIS – EMME/2 Interface

   A. Geographic scale
   B. Data structure

II. GIS Applications for Model Input Data Preparation

   A. Zonal data
   B. Networks

C. Data verification

III. GIS Applications for Model Output Analysis and Presentation

A. Network data
B. Zonal and matrix data
C. Combination of model output with non-model data

1. Sources of related non-model data
2. Methods

IV. Other (non-ArcView) GIS Tools

TOPIC 2.5. Special-Purpose Model Applications

Description: Training is required in several areas of special-purpose model application. Most of the applications are related to legislative mandates. These are summarized below:

- *Measurement of environmental justice.* Environmental justice has emerged as an issue that must be addressed in project analysis to ensure that transportation programs, services, facilities and projects effectively meet the needs of all persons equally and equitably. The Phase 1 joint estimation model will provide a tool to produce measures that can be used in environmental justice analysis.
- *Air quality conformity analysis.* There is a need to standardize both the modeling approach and model documentation for air quality conformity analysis. Uniformity in the modeling approach will lead to common software and more consistent results throughout the state. An important benefit of this will be less review effort by the DEQ and FHWA to assess conformity analysis.
- *Assessment of TPR compliance.* The TPR requires that MPOs and local jurisdictions demonstrate reduced reliance on SOV travel within 20 years of the date of adoption of their local transportation system plans. This, in turn, requires the estimation of future VMT per capita and the effects of various VMT-reduction measures, such as bicycle- and pedestrian-friendly environments and mixed-use development patterns. Model-based and off-model methods are typically used to develop these estimates.
- *Emergency response planning.* Local jurisdictions may be responsible for the development of evacuation plans for their communities in the event of disasters. An integral element in the development of these plans is the identification of evacuation routes and the estimation of evacuation times. Travel demand models and traffic simulation models are well-suited for this purpose.

In addition to these uses, another special-purpose model application is subarea modeling. This involves refinement of the model's zone system and network within a subarea of the region together with possible adjustments to the model itself to better reflect travel characteristics within the subarea. Subarea modeling may be used in the development of subarea transportation plans, testing of alternative transportation improvements, and evaluating the impacts of development proposals.

Training Elements:

2.5.1 Modeling Methods for Measuring Environmental Justice
2.5.2 Modeling Methods for Air Quality Conformity Analysis
2.5.3 Model-Based and Off-Model Approaches for Assessing TPR Compliance
2.5.4 Modeling Methods for Emergency Response Planning
2.5.5 Subarea Modeling

TRAINING ELEMENT 2.5.1 Modeling Methods for Measuring Environmental Justice

Description: A one-day training course that will discuss model application methods for measuring environmental justice in transportation planning projects. The methods will be tailored specifically to the Phase 1 joint estimation model, which has been developed to support this purpose. The course will cover model-based performance measures, data sources on low-income/minority populations, model application procedures, and interpretation and display of performance measure data.

Target Audience: Modeling and transportation planning practitioners involved in model application and/or the use of model data.

Objectives: To communicate information from the joint estimation model project regarding the measurement of environmental justice, so that MPOs and local jurisdictions may fully utilize their travel demand forecasting models for this purpose. The training must be consistent with the *Model Development and Application Guidelines* and *Model Application Procedures Manual.*

Relationship to Other Training Topics/Elements: The general topic of model application for the development of performance measure data will be covered in Training Element 3.4 – Model-Based Performance Measures.

Prerequisites: None

When to be Held: One time only

Sources of Potential Trainers: Metro or ODOT TPAU

Content Outline:

I. Model-Based Performance Measures for Environmental Justice

II. Development of Performance Measure Data

- A. Data sources on low-income and minority populations
- B. Incorporation of data on low-income/minority populations with travel forecasting data
- C. Model application procedures

III. Interpretation and Display of Performance Measure Data

TRAINING ELEMENT 2.5.2 Modeling Methods for Air Quality Conformity Analysis

Description: A one-day training course that will provide information on standard modeling methods to be developed for air quality conformity analysis in Oregon. The training will also discuss documentation requirements and a standard template that may be used for documenting model application in air quality conformity analysis.

Target Audience: MPO modeling staff.

Objectives: To educate MPO modelers on a standardized modeling approach and documentation format for model application in air quality conformity analysis. Standardization will facilitate more efficient model application and reduced level of effort in reviewing modeling results for air quality plan conformity determinations. The training must be consistent with the *Model Development and Application Guidelines* and *Model Application Procedures Manual.*

Relationship to Other Training Topics/Elements: No direct relationship to other training topics/elements.

Prerequisites: Experience in model application for air quality conformity analysis.

When to be Held: One time only

Sources of Potential Trainers: Metro

Content Outline:

I. Background

   A. Conformity assessment requirements
   B. Modeling issues related to conformity assessment

II. Modeling Methods for Air Quality Conformity Analysis

   A. Regional Transportation Plan conformity
   B. TIP conformity
   C. Project-level conformity

III. Transportation Control Measure (TCM) Assessment

III. Documentation

   A. Requirements
   B. Documentation template

TRAINING ELEMENT 2.5.3 Model-Based and Off-Model Approaches for Assessing TPR Compliance

Description: A one-day training course covering available model-based and off-model approaches for developing information needed to assess TPR compliance. These methods are primarily related to determining the effectiveness of transportation control measures (TCMs) in reducing VMT/capita and reliance on the auto. Model enhancements needed for improved assessment of TCMs will also be discussed.

Target Audience: Modeling practitioners involved in model development.

Objectives: To provide trainees with a better understanding of the range of model-based and off-model tools available for assessing TPR compliance. Approaches for achieving improved modeling capabilities in this area will be described. The training must be consistent with the *Model Development and Application Guidelines* and *Model Application Procedures Manual.*

Relationship to Other Training Topics/Elements: Related information will be presented in Training Elements 1.3.1 – Integration of Urban Design Variables in Travel Demand Models, 1.4.1 – Bicycle and Pedestrian Modeling, 1.4.2 – TDM Modeling, 1.5.2 – Road Pricing and Peak Spreading, and 2.5.2 – Modeling Methods for Air Quality Conformity Analysis.

Prerequisites: Model development experience

When to be Held: Bi-annually

Sources of Potential Trainers: OMSC members or consultant services

Content Outline:

I. Background

   A. Requirements for TPR compliance
   B. Modeling issues related to assessment of TPR compliance

II. Assessment of TCM Measures

   A. Transit and highway infrastructure improvements (e.g., expanded transit service or HOV lanes)
   B. Transportation services and operations improvements (e.g., HOV/ridesharing service programs)
   C. Programs instituted at the workplace (e.g., transportation management programs)
   D. Programs implemented or mandated by local governments (e.g., trip reduction ordinances)
   E. Bicycle and pedestrian facilities and programs; auto-restricted zones
   F. Pricing measures (e.g., fares, tolls, parking prices)
   G. Land use and development patterns (e.g., development density, mix-used development patterns, urban design features)

III. Model Enhancements for Improved TCM Assessment

TRAINING ELEMENT 2.5.4 Modeling Methods for Emergency Response Planning

Description: A one-day training course presenting information on modeling methods for emergency response planning.

Two key elements that must be identified by local jurisdictions in the preparation of evacuation plans are evacuation routes and evacuation time estimates. Several different modeling approaches are available to accomplish this. These will be described, together with the basic model development and application steps common to all of the approaches.

Target Audience: Modeling practitioners involved in model application.

Objectives: To familiarize trainees with evacuation planning requirements and the modeling tools and methods that may be used to help meet these requirements. Special issues that must be considered for this type of model application will be discussed. The training must be consistent with the *Model Development and Application Guidelines* and *Model Application Procedures Manual.*

Relationship to Other Training Topics/Elements: Related information will be presented in Training Element 1.5.1 - Traffic Simulation Models.

Prerequisites: Model application experience

When to be Held: One time only

Sources of Potential Trainers: TPAU

Content Outline:

I. Background

- A. Evacuation planning requirements
- B. Modeling issues

II. Modeling Approaches

- A. Travel demand forecasting model
- B. Travel demand forecasting model + traffic simulation model (e.g., VISSIM)
- C. Traffic simulation model

III. Data requirements

IV. Model Development

- A. Network development
- B. Demand estimation
- C. Model validation

D. Special considerations

V. Forecasting

A. Identification of evacuation routes
B. Development of evacuation time estimates
C. Interpretation of results

TRAINING ELEMENT 2.5.5 Subarea Modeling

Description: One-day training course providing background on focus area modeling and model "windowing". The training will be organized around an all-day, step-by-step exercise to develop and apply a small subarea model. This will provide trainees with both a conceptual understanding of the process and knowledge of the specific modeling procedures required within EMME/2.

Target Audience: Modeling practitioners involved in model application.

Objectives: To provide trainees with sufficient "hands-on" knowledge to develop, validate, and apply subarea models for the appropriate purposes. The training must be consistent with the *Model Development and Application Guidelines* and *Model Application Procedures Manual.*

Relationship to Other Training Topics/Elements: No direct relationship to other training topics/elements.

Prerequisites: Model application experience.

When to be Held: One time only

Sources of Potential Trainers: OMSC members or consultant services

Content Outline:

I. Modeling Approaches

   A. Focus area modeling
   B. Model windowing

II. Subarea Definition

III. Model Development

   A. Subarea zone system
   B. Subarea network development
   C. Subarea trip matrix development

      1. Matrix expansion and rebalancing
      2. Creation of traversal matrix (model windowing only)

   D. Model validation
   E. Demand adjustment

IV. Development of forecasts

TRAINING AREA 3: Model Data

Description: Although often overlooked, training on model data use (model input and output data) is at least as important as model development and model application training. It is essential that model data users know what data is available and how to correctly interpret and use it. Models that have been properly developed and applied are of little benefit if the data is not put to full and appropriate use. In the past, misuse of data in model application projects, such as Transportation System Plan studies, has resulted in costly errors and the need for work to be redone.

Target Audience: See individual training topics.

Objectives:

1. Ensure that model data is used in accordance with the *Oregon Modeling Protocol*.
2. Maximize the utility of model data by providing users with a knowledge of: 1) the modeling resources and model data that are available; 2) the range of project applications that model data may be used for; and 3) improved methods for communicating model data to the public and decision-makers.
3. Minimize the misuse of model data by providing users with the knowledge of how to correctly interpret and apply it. An important part of this is having a basic understanding of how models work.
4. Improve communication between model data users and modeling practitioners by ensuring that data users know how to correctly identify the type of data appropriate for their needs and how to request it.
5. Continuously update and re-offer training to reflect new types of model data that is available.

Relationship to Other Training Areas: Consistency must be maintained between the information presented in Model Application and Model Data training areas regarding the types of model data available and how it is produced.

Topics:

3.1 Basic Use of Model Data
3.2 Graphic Presentation of Model Output
3.3 Model Output Post-Processing Techniques
3.4 Model-Based Performance Measures

TOPIC/TRAINING ELEMENT 3.1 Basic Use of Model Data

Description: There is a need to provide continuing training to a wide group of model data users on the basic aspects of model data use. This training will help ensure that modeling resources are used as efficiently and effectively as possible. Areas to be covered will include:

- Overall structure of typical model;
- Individual model components and how they work;
- Available model data (input and output) and how to interpret it;
- Determination of appropriate model data for specific uses; and
- Examples of various project applications for model data.

Target Audience: Existing and potential model data users. This group may include staff from state agencies (e.g., DEQ), staff from local jurisdictions who use data from their own models or MPO models, and consultants who use model data in transportation planning and engineering studies.

Objectives: To provide trainees with an adequate understanding of models and model data so that it is used for the appropriate purposes. A secondary objective is to make trainees aware of the wide range of project applications and analyses for which model data may be used.

Relationship to Other Training Topics/Elements: Additional information on proper use of model output will be provided in Topic/Training Element 3.3 – Model Output Post-Processing Techniques.

Prerequisites: None

When to be Held: Annually

Sources of Potential Trainers: OMSC members

Content Outline:

I. Introduction

   A. General modeling theory
   B. Model structure
   C. Overview of model data uses

II. Model Components

   A. Function
   B. Underlying theory
   C. Input, output data
   D. Interpretation of data

III. Appropriate Use of Model Data

   A. Clear identification of intended use

B. Matching of data with intended use
C. Limits of use related to data accuracy

IV. Examples of Project Applications/Analyses Using Model Data

(To be decided by course trainer based upon make-up of training group.)

TOPIC/TRAINING ELEMENT 3.2 Graphic Presentation of Model Data

Description: The benefits of travel demand models can be fully realized only if the information they produce can be clearly interpreted to help answer questions about future transportation and land use issues. Lack of effective communication about model data to planners, policy-makers, public decision-makers, and the general public has been and continues to be a major problem. Since models were first developed, this problem has contributed significantly to their "black box" image and mistrust by the public.

In the past, part of this difficulty was due to the limited or non-existent graphic display capabilities of modeling software packages. However, with the improved display features of these packages and the availability of GIS tools such as ArcView, this is no longer a constraint. To take advantage of these capabilities and to improve the overall quality of model output graphics, a one-day training course will be provided in the areas of:

- Guidelines for display of model output (do's and don'ts);
- Graphic model output examples; and
- Graphic output tools (EMME/2 modules, ArcView, other) and application techniques.

Target Audience: Modeling or transportation planning practitioners involved in model application.

Objectives: To improve the knowledge and skills of the trainees in the preparation of graphical model output displays. The focus will be on presenting as many examples of graphic displays as possible and performing "hands-on" training exercises to produce displays using several different tools and techniques.

Relationship to Other Training Topics/Elements: Related information will be provided in Topic/Training Element 2.4 – GIS Use in Model Application.

Prerequisites: Model application experience and, preferably, experience in the use of GIS software such as ArcView.

When to be Held: One time only

Sources of Potential Trainers: OMSC members or consultant services

Content Outline:

I. Common Problems with Interpretation of Model Output (from non-modeler's perspective)

II. Guidelines for Output Display

   A. Content
   B. Format

III. Graphic Output Examples

A. Zonal data
B. Network data
C. Matrix data
D. Model data + non-model data

IV. Tools and Application Techniques

A. EMME/2 modules
B. GIS software
C. Other

TOPIC/TRAINING ELEMENT 3.3 Model Output Post-Processing Techniques

Description: Frequently, there is a need to adjust model output prior to its use in project analyses to more realistically reflect local travel characteristics. An example of this is the adjustment of traffic volumes produced by traffic assignment models. A one-day training course will be offered on accepted post-processing methods, including data requirements, application procedures, and appropriate uses of post-processed data. Situations in which one method may be more suitable than others will also be described.

Target Audience: Existing and potential model data users.

Objectives: To provide trainees with an exposure to the range of post-processing techniques that are available. Trainees will have an understanding of how to select and apply the appropriate techniques, reasonableness checks for post-processed data, and acceptable uses of the data. Case study exercises in applying the techniques will be used to reinforce this understanding.

Relationship to Other Training Topics/Elements: Introductory material on this topic will be presented in Topic/Training Element 3.1 – Basic Use of Model Data.

Prerequisites: None

When to be Held: One time only

Sources of Potential Trainers: OMSC members or consultant services

Content Outline:

I. Post-Processing Needs

II. Post-Processing Methods

- A. Methods for traffic volume adjustment
- B. Methods for vehicle speed adjustment
- C. Selection of appropriate method
- D. Application procedures
- E. Reasonableness checks for post-processed data
- F. Acceptable uses of post-processed data

III. Case Study Exercises

- A. Traffic volume post-processing
- B. Vehicle speed post-processing

IV. Automation Tools (e.g., STEAM)

TOPIC/TRAINING ELEMENT 3.4 Model-Based Performance Measures

Description: Performance measures allow future transportation conditions under a given transportation system/land use scenario to be quantifiably assessed. Typically, they are related to evaluation criteria that have been established to characterize specific aspects of the transportation system or travel conditions. An example of an evaluation criterion is the quality of traffic flow. A performance measure commonly used to quantify the quality of traffic flow is level of service.

Travel demand forecasting models can be used to apply performance measures for a variety of purposes in transportation planning, such as the comparison of network or improvement alternatives or the comparison of existing conditions to future conditions. A one-day training course will be held to provide information on the various types of model-based performance measures, application procedures to produce the measures, and the use of performance measure data.

Target Audience: Modeling or transportation planning practitioners involved in model application.

Objectives: To provide trainees with an understanding of how to properly select and apply model-based performance measures in order to quantifiably assess transportation network or facility improvement alternatives. A wide range of measures will be presented and discussed.

Relationship to Other Training Topics/Elements: Additional information on model data presentation in general will be provided in Training Element 3.2 – Graphic Presentation of Model Data.

Prerequisites: Model application experience and, preferably, experience in the use of GIS software such as ArcView..

When to be Held: One time only

Sources of Potential Trainers: OMSC members or consultant services

Content Outline:

I. Consistency Between Performance Measures and Evaluation Criteria

II. Overview/Sample of Model-Based Performance Measures

   A. System-level
   B. Facility-level
   C. System or facility level

III. Application of Performance Measures Within or Outside of EMME/2

   A. Application procedures
   B. Required data and model capabilities
   C. Level of effort

IV. Use of Performance Measure Data

A. Interpretation of data
B. Effective presentation of data

TRAINING AREA 4: Modeling Education

Description: This training area provides information on modeling topics not covered in the other training areas. The training is "information-oriented" rather that "use-oriented", i.e., it is intended to provide trainees with a general background in a topic that may or may not have an immediate application.

Target Audience: See individual training topics.

Objectives:

1. Provide public decision-makers and public agency management staff with a basic understanding of how models work and how they may be used to support their work; and
2. Provide model developers with information on current modeling topics that have potential relevance to future model development.

Relationship to Other Training Areas: The content for training related to how models work and their basic uses may be drawn, in a simplified form, from similar topics to be covered in the Model Data training area.

Topics:

4.1 Models and Model Uses
4.2 Alternative Modeling Paradigms

TOPIC/TRAINING ELEMENT 4.1. Models and Model Uses

Description: Training in this area will be similar to that described for Topic 3.1 - Basic Use of Model Data, but will be oriented to public decision-makers and public agency management staff who will not likely use model output directly. The training will consist of two-hour presentation/demonstrations to be given on-site at the target agency's office. It will be organized around a discussion of the types of scenarios that modeling would be beneficial for their agency. The example scenarios should be as similar as possible to those that the audience members deal with in their own day-to-day work. Explanations of how models work should be brief and provided only as needed to present the information described above or to answer questions raised by the audience.

Information will also be presented about where to obtain modeling services, including the agencies that perform modeling services, the type of services they provide, and the areas for which the services are provided (e.g., ODOT provides statewide and local urban area modeling services, MPOs provide regional modeling services).

Target Audience: Public decision-makers and public agency management staff.

Objectives: The primary objective will be to inform public-decision makers and public agency management staff about the benefits of models and how model data may be used to support their work. The training may also be viewed as way for modelers to "sell" their product to the end user.

Relationship to Other Training Topics/Elements: The material to be covered will be similar to that presented in Topic/Training Element 3.1 – Basic Use of Model Data, but in a simplified and condensed form.

Prerequisites: None

When to be Held: On an on-going basis as opportunities are identified.

Sources of Potential Trainers: OMSC members

Content Outline:

I. Description of Example Model Application Scenarios

(These will be specific to agency that presentation will be given to.)

II. Potential Modeling Benefits for Example Scenarios

Several generic benefits are:

A. Ability to do "what-if" testing
B. Consistency of results (i.e., fixed analysis procedure is defined within model)
C. Linkages with other analysis tools

(Other benefits related to specific scenarios to be discussed should be added.)

III. Case Studies for Similar Model Application Scenarios

   A. Description of scenarios
   B. Actual benefits
   C. Outcome

IV. Range of Model Information Available for Other Uses

V. Where to Obtain Modeling Services

TOPIC 4.2. Alternative Modeling Paradigms

Description: In Oregon, strong emphasis is placed on the development and application of "best practice" models that reflect the latest advances in modeling theory and methods. Examples of this are ODOT's statewide integrated land use – transport model, the activity-based models developed by Metro and the Mid-Willamette Valley COG, and use of the UrbanSim software package by the Lane COG to link land use and transport models at the metropolitan level. To maintain this philosophy, modelers in Oregon must be able to continually update their knowledge of new, alternative model forms that are developed within the profession. Therefore, educational opportunities in this area will continue to be offered through seminars, workshops, symposiums, MPO Coordination Committee meetings, and EMME/2 Users' Group meetings.

Training Elements:

4.2.1. Disequilibrium Modeling

TRAINING ELEMENT 4.2.1 Disequilibrium Modeling

Description: Conventional land use and travel demand forecasting models attempt to represent equilibrium conditions in the markets and systems that they simulate. The assumption that these markets and systems operate at near-equilibrium conditions in the real world, however, may be incorrect in some cases. Within the field of economics, the use of dynamic disequilibrium modeling to more closely replicate actual macro and microeconomic behavior is well-established. A one-day training course will be held to examine the potential application of disequilibrium modeling for land use and travel demand forecasting.

Target Audience: Modeling practitioners involved in model development.

Objectives: To provide trainees with a basic understanding of the general concept of disequilibrium modeling, examples of its actual use within land use and travel demand modeling, and potential future applications. The training will be offered for information purposes only, so that modelers will be aware of this approach and may consider it for future use, if appropriate.

Relationship to Other Training Topics/Elements: No direct relationship to other training topics/elements.

Prerequisites: Model development experience.

When to be Held: One time only

Sources of Potential Trainers: OMSC members or academia

Content Outline:

(To be developed by course trainer.)

TRAINING PROGRAM IMPLEMENTATION

Because of resource limitations and the time constraints of training participants, all elements of the training program cannot be implemented at once. Rather, the program will be implemented in stages based on the relative importance of each element. The table on the following page shows the current priority of the various elements. Elements with a higher priority will likely be implemented sooner than those with a lower priority.

Training Element	Priority		
	Higher	Medium	Lower
Training Area 1: Model Development			
Topic 1.1 Activity-Based Model Development			
Training Element 1.1.1 Activity-Based Models	●		
Training Element 1.1.2 Survey Methods for Activity-Based Model Development	●		
Training Element 1.1.3 Estimation and Calibration of Activity-Based Models	●		
Topic/Training Element 1.2 Choice-Based Models (Destination Choice and Mode Choice Models)		●	
Topic 1.3 Modeling of Land-Use - Transport Relationships			
Training Element 1.3.1 Integration of Urban Design Variables in Travel Demand Models	●		
Training Element 1.3.2 Integrated Land Use - Transport Modeling at Metro Level		●	
Topic 1.4 Alternative Mode and TDM Modeling			
Training Element 1.4.1 Bicycle, Pedestrian Modeling		●	
Training Element 1.4.2 TDM Modeling		●	
Topic 1.5 Advanced Traffic Assignment Techniques			
Training Element 1.5.1 Traffic Simulation Models		●	
Training Element 1.5.2 Road Pricing and Peak Spreading		●	
Topic/Training Element 1.6 Statewide Model - MPO/Local Model Integration	●		
Topic/Training Element 1.7 Commercial Vehicle Trip Modeling		●	
Training Area 2: Model Application			
Topic/Training Element 2.1 Basic EMME/2 Applications		●	
Topic/Training Element 2.2 Land Use Allocation Methods	●		
Topic/Training Element 2.3 Activity-Based Model Application			●
Topic/Training Element 2.4 GIS Use in Model Application			●
Topic 2.5 Special-Purpose Model Applications			
Training Element 2.5.1 Modeling Methods for Measuring Environmental Justice			●
Training Element 2.5.2 Modeling Methods for Air Quality Conformity Analysis		●	
Training Element 2.5.3 Model-Based and Off-Model Approaches for Assessing TPR Compliance		●	
Training Element 2.5.4 Modeling Methods for Emergency Response Modeling			●
Training Element 2.5.5 Subarea Modeling			●
Training Area 3: Model Data			
Topic/Training Element 3.1 Basic Use of Model Data	●		
Topic/Training Element 3.2 Graphic Presentation of Model Data			●
Topic/Training Element 3.3 Model Output Post-Processing Techniques			●
Topic/Training Element 3.4 Model-Based Performance Measures			●
Training Area 4: Modeling Education			
Topic/Training Element 4.1 Models and Model Uses*	●		
Topic 4.2 Alternative Modeling Paradigms			
Training Element 4.2.1 Disequilibrium Modeling			●

* Presentations/demonstrations will be given on an on-going basis as opportunities are identified.