Toward A “Knowledge Base”
For MPOs

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Outline

Define “Knowledge Base”

Examples Of What It Might Include

Considerations For Administration/Funding
What Does “Knowledge Base” Mean?

Web-Based Sharing Of Information

Systematic Investigation/Reporting Of “Truths”
  What Is And Isn’t Known / Is And Isn’t Working
  Why Different Tools Are Being Used (Resources/Decisions)
  Find Practicality In Completed Research
  Encourage Better Direction Of New Research
  Strategies To Move Forward

Standards/Requirements?  No
Frequently Updated Guidelines?  Maybe
  NCHRP 365 Update Serves As Good Example
Big Issue: Trip-Based Versus Activity-Based Framework

Are Further Improvements To Trip-Based Generation, Distribution, And Mode Choice Steps Warranted?

Many Researchers Note Putting More “Bells And Whistles” In Four-Step Models Is A Dead-End That Slows Down Real Progress

My Current Best Guess:

Systematic Investigation/Documentation Of Trip-Based Models (Which Will Still Be Around For Many Years) May Help “Raise The Bar” For Alternative Approaches

Many Modeling Issues Are Common Across Approaches (e.g., Preparation Of Roadway/Transit Skims And Assignments)
Activity Models

Updates On Who Is Doing What
  Software Environment
  Comparisons Of Different Implementations (Researchers Have Not Really Settled On A Common Framework)
  Costs For Implementation, Update, And Application

Forum For Reporting Results
  Base Year, Backcast, And Forward Cast Validation Checks
  What Is And Isn’t Really Working
  Sensitivity Tests (Note: A Policy-Sensitive Model Sounds Great, But Needs Reasonability Of Magnitude/Direction)
Demographic Questions

Creation Of Base Year Data
  Sources For Jobs Estimates
  Desired Breakdowns For Households And Jobs
  Use Of Population Synthesizers (And How They Differ)

Forecasting Process
  Establishment Of Regional Control Totals
  Representation Of Accessibility (Mode Choice Logsums Or Simpler Auto/Transit Composites)
  Land Use Models—So Where Do Things Really Stand In Terms Of Costs And Readiness Of The More Advanced Procedures
Zones And Networks

Number Of Zones
  Frequency Distribution Of Sizes (And Relation To Network Detail)
  Frequency Distribution Of Current/Future Households, Jobs, And Trip Ends By Zone
  Process For Choosing Centroid Connectors

Creation Of Future-Year Networks
  Financially Constrained 25-Year Plan Versus Longer-Term Vision
  Interim-Year Staging
Roadway Networks

Calculation Of Hourly Capacities
- Representation Of Time Period Capacities For Assignment
- Simple Link-Based Capacities, Or Use Of Intersection Details

Calculation Of Speeds
- Uncongested (Free) Speeds
- Congested Speeds By Time Period (Straight From Assignment, Or Post-Process Of Assignment Volumes)
Traffic Assignment

Volume-Delay Equations
And How Very High V/C Ratios Are Handled

Level Of User Equilibrium Convergence

Use Of Dynamic Traffic Assignment Or Microsimulation Approaches
Transit Networks And Assignment

Creation Of Walk-And Drive-to-Transit Connectors
Use Of Special Walk Access Calculations

Transit Skimming
“Path Combining” Assumptions
Maximum Allowed Walk And Drive Times
Alternatives To “Half the Headway” Wait Time Calculations

Capacities
For Transit Vehicles
For Park-and-Ride Lots
Trip (Or Activity) Purposes

What Purposes Are Used, And Why
- Variables Used To Calculate Trip Ends
- How Are Time-of-Day Issues Handled

Process For Trip Distribution
- Gravity Model Versus Other
- Singly Constrained Versus Doubly Constrained

Process For Mode Choice
- Market Segments
- Nesting Structures
- Coefficients And Constants
Trucks/Freight

Commodity Flow Rates Versus Direct Truck Trip Rates
  What Variables For Generation, And For What Vehicle Types

Process For Distribution
  Any Tour-Based Modeling?

Validation
Odds And Ends

Airports And Other Special Generators

Treatment Of Pedestrians And Bicycles

Treatment Of Road And Transit Reliability

Uncertainty Analysis
  Note: Already Being Done For Most Toll Revenue Investment Grade Studies

Validation Procedures
Surveys And Other Data Collection

Survey Comparisons
Core Survey Questions Used For Model Estimation And Calibration
Specifics On How The Questions Are Asked
Treatment Of Non-Response
Costs For Implementation
Multi-Region Combination Of Datasets/Transferability Issues

Travel Time Data Collection Methods
Floating Car Versus Detectors

Trip Table Verifications
License Plate Surveys, Use Of Toll Tag Data, etc.
Performance Measures/Reports

What Model Output Summaries Have People Found Useful For Discussing Alternatives With Decision Makers

Post-Process Adjustments To Raw Model Outputs

Use Of Model Outputs To Address Supply/Demand Imbalances

Environmental Justice Measures And Procedures
Role Of The MPO In Transportation Decision Making

Consultants, Researchers

Technical Guidance

Citizens, Agencies

Application Guidelines

MPO

Recommendations

Local and State Decision Makers

Implementation

Congress, U.S. DOT, State DOT

Policy Guidance and Funding

Partnerships:

- TRANSIMS
- MPOs/Private
- Single State-MPOs
- Peer Review
- TMIP Listserv

Feedback
Role Of Modeling In The Implementation Process

Information System

Input-Output Model

Land Use Model  Travel Model

Evaluation/Recommendations

Implementation
Different Scales For Forecasting Tools (And The Need For Consistency)

U.S./Statewide Planning
Example: Statewide Models Used For Urban Model Externals And Freight Flows

Urban Models (MPO Regions)

Major Corridor Studies

Detailed Operational Studies
Controversial: Software

A Consumer Reports Type Of Investigation Of Software Performance Under Controlled Conditions

When Confronted With The Same Inputs And Desired Modeling Assumptions, How And Why Do The Outputs Differ?

Note: This Would Be All Softwares, Not Just Commercial Implementations

Model Run Times

Identification/Evaluation Of Additional Features In Each Software
Controversial: Consultants

Identification Of Work Done (Or Being Done)

Client Contacts (And Not Just The Consultants’ Set Of References)

What Was Done, For What Cost And Purpose

A Report Card On Client’s Level Of Satisfaction
Controversial: Researchers

Identification Of Work Done (Or Being Done)

What Was Done, For Whom, And For What Cost And Purpose

A Report Card On Achievements With Applied And Basic Research Projects (But Who Provides The Grades?)
Review Of Key Knowledge Base Concepts

MPO Summaries
  Up-To-Date Inventories Of What Is Being Done

Research Summaries
  Assessment Of Usefulness Of Academic Research, Consultant Projects, And Conferences To MPO Practitioners

Idea Summaries
  Example—Organization Of TMIP Listserv Emails

Critical Reviews Of Available Tools
Adminstration/Funding (1)

FTA
Staff Are Already Working Towards General Knowledge Base Concept
In Transit New Starts Activities
But Current Objectives Focus On “Level Playing Field” Issues And
Correction Of Poor Modeling Assumptions

SHRP II “Capacity” Multi-Million Dollar Research Over
Six Years
Framework For Collaborative Decision Making
Performance Measures For Effective Decision Making
Better Behavioral Modeling Of Impacts Of Congestion And Pricing
Land Use And Economic Impacts Of New Road Capacity
Adminstration/Funding (2)

FHWA—TMIP
Not Much Additional Funding From STEP Program Is Anticipated
Fred Ducca Notes An Interest In Pooled Funding Approach, via Provision Of Technical Support

NCTCOG
Could Provide Support Via Contribution Of NCTCOG Staff Time

But Even Without A Major Program, MPOs Must Still Conduct Their Own Independent Investigations
Maybe AMPO And This Work Group Have A Critical Role To Play?
Possible Deal-Breakers For Pooled MPO Funding

Do Just Some MPOs Contribute, While All Benefit?

Many MPOs Don’t Really Want To Point Out Problems With Their Existing Tools
  Provides Easy Ammunition For Shooting Down Any Project
  Can MPOs Really Be Objective And Self-Critical About The Tools They Currently Use Or Plan To Use?

The “Report Card” Idea Might Appear Too Adversarial