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Memorandum

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From: Michael Schmitt, AICP, PTP
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Date: December 12, 2011

Subject: Software Platform Matrix

In an effort to evaluate the current software platform options for macroscopic transportation modeling, Kimley-Horn researched the top four widely used products. These products were chosen based on the relative use and acceptance by jurisdictions. They include: Emme by INRO, Cube by Citilabs, TransCAD by Caliper, and VISUM by PTV America. All four software packages are readily available in the U.S. and can import/utilize existing model data from other platforms.

In response to this technical memorandum, El Dorado County staff provided several questions regarding TransCAD and Cube. Written responses to those questions are provided in the last section of this document.

Software Comparison

The initial step in the evaluation was to update a previous comparison of software packages prepared by *The Urban Transportation Monitor*. This monthly periodical published a comparison of seven software packages in late 2006 (September 15 and 29) which included the four selected above. While the periodical's information was useful at the time, all companies have indicated that the modeling software is continually updated and all have gone through significant changes since 2006. As such, Kimley-Horn contacted each company for updated information and reviewed company product information/documentation in an effort to update key information that was considered pertinent to this selection process. Staff contacted during the process include: Mike Florian (Emme), Colby Brown (Cube), Howard Slavin (TransCAD), and Kiel Ova (VISUM).

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The results of the updated comparison are provided in the attached **Software Platform Matrix**. It should be noted that several of the companies, in particular INRO (Emme), indicated that a direct comparison of the software platforms on paper is not as beneficial as an actual demonstration. INRO offered an on-site demonstration of their software so the end-user could get a sense of how it operates prior to purchase and other vendors offered similar online demonstrations.

Jurisdiction Experience

The second step in the evaluation was to conduct a limited review of readily available documentation of jurisdictional software reviews. Similar to the first step, Kimley-Horn utilized an internet search supplemented with as needed phone interviews. Agencies from differing geographical locations and with different focuses were selected to allow for a broader perspective. It should be noted that most of the agency selection processes were focused on a transition – moving data effectively from an existing platform to the newly selected platform. It should also be noted that some of the reviews identified are slightly dated and may not fully reflect existing conditions. However, they are valuable from the perspective of developing a longer term relationship with a software developer.

The University of Vermont Transportation Research Center evaluated software packages in 2010 in an effort to select the preferred platform for a Vermont Statewide travel demand model. The existing model was based on Cube/Voyager after a migration in 2007 from the original TRANPLAN model. The evaluation included comparisons of the existing Cube applications to TransCAD and VISUM. Overall, there was not a recommendation to switch software platforms – the report sites only user-preference or conformity with other models as the main differences.

The City of Irvine, in 2007, was utilizing TRANPLAN for model forecasting and needed to transition to a new software platform. Software evaluated included TransCAD, Emme, TRANPLAN, Cube, and others. The City narrowed the options to TransCAD and Cube prior to selecting both. Irvine decided to upgrade their TRANPLAN model using Cube in the short-term and reach consistency requirements of the region. Long-term, the conversion to TransCAD was preferred in order to fully integrate into the Orange County Transportation Authority (OCTA) network that was at the time being converted to TransCAD.

In Arizona, the two largest model users are Maricopa Association of Governments (MAG) and Pima Association of Governments (PAG). In 2004, MAG decided to switch their existing Emme model to a new platform. While documentation of the selection process was not available, staff indicated that vendors were invited to Phoenix to demonstrate the available packages and

propose services for the conversion. Ultimately TransCAD was selected over Cube and VISUM. Following the Phoenix direction, PAG switched their model (based in Cube) to TransCAD in 2007. According to staff, the primary reasons for the switch were not technical travel demand issues but rather user preference and GIS-compatibility. During the 2006/2007 timeframe, the current versions of Cube were not compatible with GIS platforms while TransCAD had the GIS functionality built-in. In addition, the modeling manager had previous experience with TransCAD which likely spurred the switch.

The most extensive of those identified was the selection processes by the Florida Department of Transportation during the 2002-2003 timeframe. The Statewide modeling software (FSUTMS) at the time was based on a TRANPLAN platform which was becoming outdated and losing vendor support. Software packages that were reviewed included: TransCAD, Cube, VISUM, and Emme. The options were shortlisted to TransCAD and Cube and the committee could not select a clear winner. Additional input was requested from 14 other jurisdictions that were using the two shortlisted software packages. The experiences and feedback provided did not indicate a significant difference between the two with agencies typically preferring their particular package over the other and vice versa. The committee deemed both software equally effective from a technical standpoint. The ultimate selection of TransCAD was made after a presentation of cost. The following year, after selecting TransCAD, Florida switched to Cube for non-technical reasons.

El Dorado County Staff Questions

1. *Does TransCAD integrate with Synchro?*

No - we are not aware of any major macro modeling software package that integrates with Synchro. Several of them (including TransCAD) can analyze intersections using the Intersection Capacity Utilization (ICU) methodology popularized by Synchro. Software developers are likely not motivated to create this integration given that signal timing is not a useful input into macro modeling.

TransModeler (TransCAD's micro model) and well as the other major micro models are capable of integration with Synchro.

2. *It would be helpful to have a presentation of some type to give staff a clearer understanding of the pros and cons of TransCad vs Cube.*

One way to accomplish this may be through a webinar. Kimley-Horn staff are available to help organize this based on interest and availability of El Dorado County staff.

3. *What platform do the smaller agencies use (i.e Placer County, San Joaquin County, Stanislaus County)?*

Both CUBE and TransCAD are utilized by numerous "small agencies" across the United States. The following representative list of local and/or more rural counties/agencies were identified based on our local knowledge and vendor input:

TransCAD	CUBE
▪ Tahoe Regional Planning Agency ▪ Calaveras COG ▪ Lake County ▪ Butte County (BCAG) ▪ Amador County (ACTC) ▪ Nevada County (NCTC)	▪ Sacramento Area Council of Governments (SACOG) ▪ San Joaquin Council of Governments ▪ Stanislaus Council of Governments ▪ City of West Sacramento ▪ Placer County

Both CUBE's website (www.citilabs.com) and TransCAD's website (www.caliper.com) include additional examples of jurisdictions that utilize their respective software.

4. *In the matrix TransCAD states that it supports detailed modeling of intersections, would we able to use this data to propose improvements.*

Possibly - depending on the level of detail desired regarding improvements. Macro models are typically more useful for determining planning level rather than operational improvements (i.e. the likely need for signalization vs the length of storage bays).

As with any detailed output from a macro model it is important to use sound technical judgment to determine the reasonableness of the output. The usability of intersection output is typically greatly enhanced through post processing techniques.

Software Platform Matrix

NAME OF SOFTWARE PROGRAM		EMME	CUBE (TP+, TRANPLAN, TRIPS, MINUTP)	TransCAD	VISUM
PRICE, PRICE OPTIONS		Prices start at $9,000 and vary by network size. Multiple license and academic discounts are available.	The price varies by module, varying between $1,500 to $12,500. The software can be installed on individual PCs or on a server. Annual subscriptions to Cube Cloud Services range in cost from $500/month to $5,000/month plus overage charges depending upon user resource consumption. Multi-seat and research discounts are available. The software is free to universities for teaching purposes.	$12,000 for a single license. Multiple license and academic discounts are available.	$6,000 - $30,000 depending on network size. Multiple license and academic discounts are available.
IS YOUR PACKAGE SOLD AS A SINGLE ENTITY, OR ON SOME FORM OF MODULAR BASIS?		EMME is sold as a single entity. There is no additional charge for utilities and macros.	Cube is a modular software system. The core of the system is Cube Base, the system interface, which provides the GIS, application and scenario managers, and report functions. Additional modules are available for specific functions - passenger forecasting, commodity flow forecasting, microsimulation, statistical estimation, dynamic equilibrium traffic assignment, land value and use forecasting, or to create tables and charts.	TransCAD is a single integrated package with a full suite of procedures for passenger and freight demand forecasting. No other modules must be purchased, and there are no model size limitations.	The standard VISUM package contains all features necessary for basic MPO-type planning and modeling and for dynamic time-of-day assignments, transit planning etc. additional modules are available for transit operations planning (fleet planning, line costing etc.), transit survey processing, .
OPERATING SYSTEMS ACCOMMODATED		Windows XP, Vista, Windows 7, major Linux distributions	Windows 95/98/2000/XP/NT/Vista/7. Dynasim runs under Windows and Linux. Recommended: Windows 7; 32 or 64-bit; Professional, Enterprise, or Ultimate	Windows 7, XP Professional, Vista, 2003 Server and 2008 Server. Recommend 64-bit versions of OS for future compatibility. Windows NT no longer supported.	Windows 2000/XP. Supports 64-bit versions of OS.
MINIMUM / RECOMMENDED HARDWARE REQUIREMENTS	CPU	Intel i5 dual-core preferred	Minimum: Intel Pentium 4, AMD Athlon Recommended: Intel Core 2, i5, i7; Intel Xeon; AMD Phenom, II; AMD Athlon II	Recommend 4-core and 6-core single and dual processors. Hyperthreading can also speed up processes. Do not recommend single CPU computers with only one core or any of the Intel NetBurst Pentiums (though it will still work).	266 MHz/ 1 GHz
	RAM	256 MB/1GB (projectsize- and graphics-dependent)	1 GB minimum, 4 GB or higher recommended With Cluster: 2GB per core recommended	Minimum requirement for small models is 1GB. Large models, recommend 4GB RAM. Dual processor, 4-core CPU should have 6-8GB. Future 64-bit TransCAD will recommend at least 12GB of RAM.	128 MB/512 MB
	Hard disk storage space	100 MB for software, data additional	Minimum: ATAPI IDE; 5,400 rpm Recommended: SATA 3 Gb/s or SATA 6 Gb/s; 7,200-10,000 rpm Storage: 10 GB for the application as well as supporting applications and data (like GIS) 100+ GB for output files	200GB or more for data. Write speed is most important feature. The 7200rpm SATA drives are inexpensive. Two SAS 15,000rpm drives with RAID 0 controller in software or hardware is faster.	1 GB/75 GB
	Monitor	1024x 768/1280x 1024, 1600x900 recommended	Screen Resolution: Minimum: 1024 x 768 higher at Normal size (96dpi);	Recommmend 1280x1024 (20" monitor)	1024 x 768 / 1600 x1200
	Other	USB port,network connection or parallel port	Cube Cluster can distribute model run processes across multiple computers/processors.	Video cards are essential to graphics. Recommend 512MB video memory. Examples are the ATI Tadeon HD5800 and nVidia GeForce GTX200.	CD Drive, any Windows compatible printer
SIZE LIMITATIONS a–no. of zones b–no. of links c–no. of nodes d–no. of transit lines		a = 8,000 b = 256,000 c = 80,000 d = 32,000	a = 32,000 (arbitrary) b = 999,999 c = 999,999 d = unlimited	a = unlimited b = unlimited c = unlimited d = unlimited	a = 5,000 b = 750,000 c = 3,000,000 d = 40,000 (larger network sizes are also avaialble for special cases)

Software Platform Matrix

	NAME OF SOFTWARE PROGRAM	EMME	CUBE (TP+, TRANPLAN, TRIPS, MINUTP)	TransCAD	VISUM
SOFTWARE CAPABILITIES	INTEGRATION WITH TRUE GIS PACKAGES	Emme has Shapefile input/output utilities that allow networks and attributes to be transferred between GIS and modeling environments. GIS data can be displayed alongside Emme data for network editing or map display purposes, and dBASE data can be joined to Emme data for map display and graphical analysis. An ESRI ArcGIS plug-in provides common toolsets.	Fully embedded GIS functions through ESRI's ArcGIS Engine.	TransCAD is a fully integrated travel demand modeling and GIS package, displaying GIS data and information natively in addition to the modeling data. TransCAD can also import/export to ArcGIS, ArcView, MapInfo, and MAPTITUDE. All GIS functionality is available without having to export to GIS and then re-import data.	Fully embedded GIS functions through ESRI's ArcGIS Engine.
	COMPATIBILITY WITH LAND USE ALLOCATION MODELS	Interface with land use methods have been done with UrbanSim, Dram/Empal and MEPLAN. Interface can be achieved via Python scripts with Emme Modeller.	The Cube Land module provides a library of programs for forecasting land use. Fully integrated into Cube Base. User-defined scenarios can be evaluated for supply and demand under different conditions. Cube Voyager has also been integrated with other (third-party) land use forecasting systems.	TransCAD is compatible with virtually all land use models and can be linked to them through GIS files. TransCAD can host the inputs and maintain the outputs of land use models, display and color code parcel and land use data directly, and can transform data between disparate zone systems and networks. TransCAD has been intergrated with UrbanSim and Uplan in the past. A TransCAD version of the legacy DRAM-EMPAL system is also available.	VISUM has a COM interface that can be used for integration with most land use models. Users can define custom attributes for zones, areas/territories, etc and communicate land use model inputs and outputs through these attributes. In addition, zoning/parcel layers can be displayed and visualized. VISUM has been integrated with MetroScope and various other land use models around the world.
	EMISSIONS ESTIMATION	Performed using the network calculator. MOBILE , MOVES and other emissions models have been implemented. Results can be displayed on links, nodes, or gridcells.	Post-process scripts developed by users are available for determining impacts to air quality/emissions. Citilabs has helped several users connect Cube Voyager models to the latest MOVES software provided by EPA.	Prediction of air quality factors (cold starts); VMT by link type, speed class, vehicle type, and by time of day. Built-in two-way interface to Mobile6 and soon to support MOVES. Mobile6 output can be stored and visualized in TransCAD.	Emission models included for NOx, CO2, particles, HC and noise based on vehicle speeds after assignment, this is the European emission model. MOVES post-processor will be available soon.
	TIME OF DAY HIGHWAY ASSIGNMENT PROCEDURES	Flexibility for time-of-day results can be accomplished through multiple scenarios in a project, which permits common model data to be shared across a project and time-of-day assignments to be automated in a consistent manner.	Standard diurnal factoring and static equilibrium highway assignment procedures are available using built-in Cube Voyager functions, along with more advanced tour-based model templates which simulate entire activity day-patterns. Additionally, Cube Avenue is an extension to Cube Voyager that enables dynamic traffic assignment with mesoscopic simulation. This allows the user to build true time-dependent shortest paths across a time-varying network and load different trip tables for each time segment within a model period (such as hours within a day).	Yes. Separate networks and assignments can be run for multiple time periods. P-A to O-D conversions include user-defined and default time-of-day directional splits. Any set of time periods can be specified. Dynamic assignment over short time intervals is an advanced alternative.	An analytical dynamic assignment with time-dependent OD is available, this is a wave based assignment method. All attributes and assignment results are stored as time-dependent variables. VISUM also allows time-dynamic travel path decisions that take into account capacity constraints and metering/spill-back. Time varying assignments can be displayed with an animation tool and with strip/column charts showing variations by time period.
	TRIP TABLE ESTIMATION PROCEDURES	Can automatically adjust the demand matrix to better reflect observed link counts for each mode. Open, flexible implementation permits customizability for local use,eg. weighting, simultaneous class adjustment, etc.	The Cube Analyst module estimates existing trip tables using base year count data. The methodology is based on maximum likelihood statistical techniques with user-defined data quality weights. Cube Analyst 2.0, currently in Beta testing, supports distributed processing for large problem sizes, as well as a proprietary algorithm developed by Citilabs for dynamic origin-destination matrix estimation, which can be used to prepare inputs for Cube Avenue.	A trip table estimation routine is provided that can update or generate an origin-destination matrix based upon traffic counts and iterative runs of a user-selected traffic assignment. The counts can be link counts, turning movements, or a combination thereof. Weights and limits can be set on changes in trip table values. Support is provided for simultaneous estimation of trip tables for multiple vehicle classes. Transit trip table estimation is also provided.	VISUM can develop trip matrices using current traffic count data and a module called TFlowFuzzy. The updated matrices affect only the demand matrix and always referes to total volumes. The TFlowFuzzy is available for highway and transit assignments. In addition it is also possible to estimate gravity model parameters based on observed trip length distributions

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NAME OF SOFTWARE PROGRAM		EMME	CUBE (TP+, TRANPLAN, TRIPS, MINUTP)	TransCAD	VISUM
	INTERSECTION MODELING CAPABILITIES	Any turn penalty function formulation can be specified on turning movements.	Within Cube Voyager static highway assignment it is possible to model all traffic control and geometrics for intersections (importing signal data from Synchro is an option). This procedure takes intersection capacity/delays into account during pathbuilding, skimming, and assignment. When used with Cube Avenue, this feature provides the capability to estimate up stream queues due to intersection failure (spillback).	TransCAD supports detailed modeling of intersections and provides flexibility with respect to treatment of delay for each specific movement. Volume dependent HCM queuing models are used to calculate intersection delays in traffic assignments taking traffic signal settings into account. More detailed modeling of intersections of all types with very high geographic accuracy is performed in the TransModeler traffic simulator.	Intersection modeling can be applied during the assignment process via several approaches. One method utilizes capacity constraints based on turn movement types with volume delay functions. A second uses a node delay function in addition to turn capacities in order to better model the differences in delay at two way stop controlled intersections as well as signalized v/s stop controlled intersections, it has also been used for modeling ramp merges. The third approach uses specific signal timing and geometry with an HCM calculation running in the loop with the assignment to update capacities.
SOFTWARE CAPABILITIES	INTERSECTION CAPACITY ANALYSIS TOOLS	Map worksheets can be customized to display HCM results. HCM analysis can be performed using EMME analysis tools and assignment results.	Cube provides intersection LOS using the Intersection Capacity Utilization (ICU) method popularized by SYNCHRO as well as the Highway Capacity Manual (HCM) and European methods.	TransCAD provides intersection LOS using the Intersection Capacity Utilization (ICU) method popularized by SYNCHRO as well as the Highway Capacity Manual (HCM).	VISUM provides intersection LOS using the Intersection Capacity Utilization (ICU) method popularized by SYNCHRO as well as the Highway Capacity Manual (HCM). Capacity analysis can be run within assignment or after assignment.
	SIMULATION CAPABILITIES	Provided by complementary software - Dynameq. Traffic phenomena that trigger congestion are modeled explicitly, including signals,conflicting movements at intersections, lane permissions for turning movements and vehicle classes, and weaving. Each vehicle travels along a particular lane, performs lane changes where appropriate, and crosses signalized and unsignalized intersections. Congestion builds as queues spill across lanes and spill back through upstream intersections. Dynameq's event-based supply-side simulator provides order-of-magnitude performance improvements over traditional time-step traffic microsimulation, with congested networks exhibiting even greater speed-ups.	Cube Avenue includes simulation of the movement of vehicle-trips through the network as they encounter capacity bottlenecks and generate queues that propogate from link to link. This meso-scopic simulation produces two-dimensional animations that can be overlaid on ArcGIS maps without requiring as much detail as a microscopic model. Microsimulation of individual vehicles is available in 3D as well as 2D using Cube Dynasim. Users can import 3D backgrounds using 3DS formats.	TransModeler is a companion package that provides advanced multimodal traffic simulation capabilities in 2D and 3D. TransCAD and TransModeler are integrated and make it straightforward to simulate large networks in great detail.	VISUM network data and travel demand output can be exported to VISSIM for microsimulation. VISSIM is a separate program available within the PTV Vision Suite and provides graphic 2D and 3D microsimulation. In addition, the detailed data and results of VISSIM can be imported into VISUM for additional network analysis.
	WEB PUBLISHING/SERVICES	Emme 3 supports graphical export to the SVG XML-based format. Maps and graphics(.svg) can easily be published online.Many web browsers offer native .svg support, and other 3rd party plug-ins are commonly available.	Cube Cloud Services is a web-based platform for sharing access to model runs in a high-performance grid computing environment. Users can launch multiple runs in parallel or use Cube Cluster in the Cloud to distribute model computations across a processing grid without consuming any local resources. A streamlined web-based interface provides access to upload model inputs and download outputs, or the user can create their own web-based maps and reports from existing data.	TransCAD for the Web provides access to all of TransCAD's functionality on the web. Templates are provided for development free creation of web applications such as viewing planning data and networks, activity diary surveys, intersection level of service forecasting, transit customer information systems, etc.	Web publishing is available via VISUM Information Server (IS). VISUM IS enables users to share model data and evaluations over an Intranet or the Internet. The user only needs a browser. Different access rights can be configured.
TOOLS AND FUNCTIONALITY PROVIDED FOR DEALING WITH PROJECT AND SCENARIO MANAGEMENT		An Emme project is a single entity that permits central management of related EMME databases, associated media(eg. images, GIS data) and customized worksheets. The EMME database provides a consistent, structured and flexible way of working with network data, demand data, and macros for model automation across transportation planning scenarios. Each database stores multiple scenarios, which the software can access simultaneously. The macro language permits completely automated builds (and re-builds) of the entire EMME database, so users are free to integrate with project management systems and/or version control systems of their own choosing.	Cube Base includes a Scenario Manager that allows users to define, edit, and run scenarios. Reviewing input data and output results by scenario is done within a graphical user interface. Cube Cloud Services implements essentially the same interface within a web-based framework.	TransCAD includes powerful Model and Scenario Managers. The Model Manager allows users to create, manage, and edit models based on a flowchart interface. It allows you to specify the order of the modeling steps, select input and output files, and edit paramters. The Manager includes tools for visualizing inputs and outputs. Macro source code is provided for the scenario manager and the standard user interface so that they can be customized by consultants and other users.	Scenarios can be stored in a single database in VISUM. This binary file allows the user to store all data inputs and outputs, as well as all paths of one assignment or multistage model run. For more complex trip chaining models, a GUI manager for scenarios but also for different model runs inside of a scenario helps to handle inputs and outputs of the model.

Software Platform Matrix

NAME OF SOFTWARE PROGRAM	EMME	CUBE (TP+, TRANPLAN, TRIPS, MINUTP)	TransCAD	VISUM
TOOLS AND FUNCTIONALITY PROVIDED FOR DEALING WITH SCENARIO DATA MANAGEMENT	In Emme, data validation is built directly into the data model to ensure model integrity. Emme requires no network or transit 'build' processes to complicate model troubleshooting. Emme provides a host of scenario management utilities to lock/protect scenarios, check status, and perform other administration. A central log book can be used to track user modifications to all scenario data, audit model runs and validate model correctness. Emme Modeller provides avriety of tools for scenario data mangement.	Data is managed within a "catalog" format which allows variations to individual inputs. In addition, Citilabs has developed a Data Manager graphical user interface which allows the user to import data and build networks from common GIS formats, as well as linking models to file, personal, and enterprise ArcGIS geodatabases.	The Scenario Manager lets users choose the input files associated with any "sub" scenario and specify the output filenames and their location. New sub-scenarios can be created with the click of a button and will initially inherit all the model settings from its parent scenario. Parameters can then be modified interactively through dialog boxes or by editing batch scrips. The built-in relational database facilitates all forms of data management and maintenance.	Scenarios are stored in VISUMs database format, which is like a geodatabase. This provides a rhobust data management environment for scenario management. Scenarios can also be managed in applications that include standard databases like MS Access. Python or VB applications can be built to handle the data from multiple scenarios. Usually a master network is defined and scenario networks are derived from the master by simple attribute changes.
TOOLS AND FUNCTIONALITY PROVIDED FOR DEALING WITH SCENARIO COMPARISON	EMME provides both comprehensive command-line and highly-customizable graphical tools for scenario comparison. Exhaustive textual comparison reports can be generated for scenarios to showcase any/all differences. Alternatively, EMME worksheets provide a flexible way to call out network and/or results differences on maps that incorporate data from multiple scenarios. A powerful expression engine allows users to plot maps of network 'diffs' in order to validate editing modifications, or for use indecision analysis. Emme Modeller provides avriety of tools for scenario comparisons and evaluation.	Cube provides easy to use tools for creating comparison charts, tables and maps highlighting differences between scenarios.	The Scenario Manager allows the user to make multiple runs simultaneously and provides user friendly tools for output comparison. The comparison tools provide reports, as well as informative map graphics. A preprogrammed procedure provides detailed statistics on differences between two assignments.	Automated difference network analysis allows comparison of assignment results for all network objects in the model.
TOOLS AND FUNCTIONALITY PROVIDED FOR DEALING WITH CROSS SCENARIO SIMULTANEOUS DATA EDITING	Network edits can be applied directly to other scenarios in an automated, repeatable fashion using editing transcripts. After applying edits to one scenario, users can easily save complete transcripts of their editing session for application of cross-scenario data editing. The state of Undo/Redo operations are also reflected in the editing transcript.	Data files may be used for individual or shared across multiple scenarios, allowing for clear and efficient data editing for multiple scenarios. Edit log files may be stored and "re-played" across multiple scenario networks to enable transactional database workflows. Transit networks can be "synchronized" to highway networks with the same geodatabase to automatically detect and correct topological inconsistencies. Concurrent users can edit network detail, including shape vertices, and automatically merge/reconcile changes.	The Scenario Manager enables cross-scenario editing since scenarios can be defined in such a way that they share common datasets. This allows users to specify master networks that can be used in one form or another by different scenarios. Using the unique capability to enable and disable links, multiple scenarios can be run from the same network.	Editing data across scenarios can be done in multiple ways. Data from one scenario can be applied to another. Scenarios can be setup as a combination of input files, which can be shared among scenarios. In addition, the multi-user extension allows for groups of users in different agencies/locations to have different access rights to work on a common network database.
NUMBER OF YEARS SOFTWARE HAS BEEN USED IN THE U.S.	25+	25+	25+	10+
NO. OF ORGANIZATIONS USING SOFTWARE INSIDE U.S.	200-299	400+	400+	400+
NO. OF ORGANIZATIONS USING SOFTWARE OUTSIDE U.S.	1000+	400+	1000+	1000+
OPTIONS PROVIDED FOR SUPPORT AND TRAINING	Software maintenance, individual training, group training, on-screen tutorials, online help, user groups, telephone support, newsletter. INRO lists on-line discussion forums facilitate communications among Emme users.	Software maintenance, individual training, group training, web-based training, self-study tutorials, online help, user groups, newsletter, telephone and e-mail support. Also annual international user conference.	Software maintenance, individual training, group training, on-screen tutorials, online help, user groups, newsletter, telephone support, computer-assisted remote training and support.	Software maintenance, individual training, group training, on-screen tutorials, online help, user groups, newsletter, telephone support, e-mail hotline service; usergroup meetings.
ANNUAL COST OF SUPPORT FOR SOFTWARE	12% of purchase price.	Typical annual maintenance contract cost is 15% of the initial software purchase price.	$1,200 to $2,000 depending on NAVTEQ data	15% of the purchase price ($600 min)

Source: The Urban Transportation Monitor (September 15 and 29, 2006). Fully updated by Kimley-Horn in November 2011.