Final Report

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CMS Project Title: Needs Assessment of Land Use Modeling for FSUTMS, Phase 1

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from

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Disclaimer

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EXECUTIVE SUMMARY

In Florida, the transportation demand modeling process is done through the Cube software, following the statewide modeling system (The Florida Standard Urban Transportation Model Structure or FSUTMS). Other states and metropolitan planning organizations (MPOs) are exploring the use of land use models in this process. The University of Florida, at the request of Florida Department of Transportation (DOT) administered a survey regarding the needs of land use and transportation modeling. This research seeks to better understand current land use models, modeling practices and future needs in Florida.

The research was part of a greater project on Land Use Modeling with the University of Florida and Florida Department of Transportation (FDOT). An open-ended and multiple choice survey was administered online to current FDOT and MPO modelers. The responses were then analyzed and future needs examined.

Survey results show that 95 percent of surveyed Florida DOT and Metropolitan Planning Organization (MPO) modeling coordinators see the need of an integrated land use and transportation model in Florida and would like to see Florida DOT to take a lead to develop such models. The survey also indicated that most DOT and MPO coordinators are willing to participate in the development of such a model in land use modeling advisory committee or in a land use modeling pilot project. Furthermore, the survey participants further suggested what features should be included in the model such as sensitive to the interaction of land use and transportation, GIS-based, being able to estimate the impacts of transit oriented development (TOD) on land use, the impacts of land use on air quality and greenhouse gas emissions, and to forecast land use changes at the traffic analysis zone (TAZ) level, as well as user friendly interface and training programs.

The survey supports previous inquiries as to the state of modeling in Florida. The need to integrate a land use model into the current transportation model is a top priority among Florida modelers. The model coordinators prefer the future land use and transportation model to be

sensitive to land use and transportation interactions, and be compatible with GIS software and easy to operate. Other areas that may be considered in the model include how it relates to the environment and economic concerns, and the impacts of transit oriented development.

Future research must be done as to the exact kind of land use model to implement. This depends largely on what Florida modelers are willing to do and what information is available.

CHAPTER 1 INTRODUCTION AND LITERATURE REVIEW

To determine the work priority of Florida Model Task Force, Florida DOT asked the University of Florida to develop and administer a survey to better understand the modeling priority and the modeling needs, as well as others related to both land use and transportation modeling in the state of Florida. The aim of the survey is to understand the state of the practice of land use modeling as it relates to transportation planning, as well as identify more clearly Florida's land use modeling needs from the perspective of Florida DOT and MPO modeling coordinators. To better design a survey that captures the modeling needs, it is important to understand various land use models being applied.

1.1 Review of Integrated land use and transportation modeling

The integrated land use and transportation models are considered as a critical aspect of both land use and transportation planning. It is the key to understand the interaction between land use development and transportation system to achieve sustainable development (Quade and Douglas1998, Wachs 2010). In order to capture this interaction, a crucial step is to forecast future land use changes since land use change are the basis for socioeconomic activities and are the important inputs of transportation models (Waddell 2002). Therefore, the accuracy of land use modeling is an essential part of land use and transportation planning.

Land use changes can result in changes in other systems such as society, geology and ecology (Munroe 2007). They can cause loss of green spaces, traffic congestion, car dependency and related pollutions. The development of industrial and residential lands is responsible for many of land use changes. Transportation also contributes to a large part of land use changes. It transforms a large number of lands to roads and brings developments along the traffic lines (Ellis 2007). The interaction between land use development and transportation is complicated and inter-related. Therefore, understanding the relationship between land use and transportation is essential but also challenging for transportation modeling (Quade and Douglas1998, Miller et al. 1999, Waddell et al. 2003). Many efforts have been made to model the complicated relationship between land use and transportation. This paper first reviews some of the models in the literature and in practice.

TAZ-based and cell-based integrated model

Land use modeling involves dynamic process and a number of stakeholders, such as governments, households, employers. Many efforts have been made to capture land use dynamics, including Transportation Analysis and Simulation System (TRANSIMS), Lowry and Lowry-type models, and Production Exchange and Consumption Allocation system (PECAS) (Lowry 1964, Martnez 1996, Abraham and Hunt 1999, Kockelman et al. 2005, Zhou and Kockelman 2010). Traditional land use models allocate households and businesses to Traffic Analysis Zones (TAZs) according to zoning, accessibility, and land use policies.

However, the scale of TAZ is always very large covering several, in some cases, many large blocks. This makes the simulation results less useful since the TAZ-based models cannot provide sufficient data to support detailed decision making needs. Accordingly, cell-based land use models have potential to generate accurate outputs. However, cell-based models also have shortcomings. For instance, cell based models are sensitive to the size and shape of defined cells (Jenerette and Wu 2001, Moreno et al. 2008). While compared to TAZ-based land use models, cell-based models still stands out with higher simplicity and more detailed representation of land use dynamics (Iacono et al. 2007). Furthermore, cell-based land use models can integrate with raster dataset, such as aerial images, to allow more geospatial information embedded into models and also avoid subjective boundary definition when delineating TAZs.

1.2 Cellular Automata (CA) models

The concept of Cellular Automata (CA) was introduced by Ulam in 1940s when he suggested that the notion of a self-replicating machine would be amenable to capture system dynamics if it could be described in a geometrical grid which includes a number of cell-like small units (Ulam 1950). Since then, CA models have been employed to simulate complex spatial-temporal processes which are self-reproducible, especially to simulate the geo-spatial domain, and land use dynamics (White and Engelen 1993, Clarke and Gaydos 1998, Wolfram and Gad-el-Hak 2003, and Li and Yeh 2002).

CA models consider a continuous space as a combination of discrete but interdependent cells. The attributes of each cell can include such information as demographic, socioeconomic, and geographic characteristics. A set of transition rules is assigned to each cell so that they can evolve themselves according to the before-and-after condition over a sequence of time periods. The rules usually specify the attributes of each cell and its relation with its neighboring cells.

Although CA models can capture spatial and temporal dynamics, they have limited capability to reflect socioeconomic activities and decision making processes. This is the reason why agent model is integrated with CA model to flexibly represent decision making process and the interaction between various stakeholders. The integration between CA and agent models is believed to capture spatial drivers and human behaviors during land use changes (Torrens 2002). Recent advances in integration between CA and agent models enable more accurate and dynamic land use simulation (Clarke and Gaydos 1998).

1.3 Agent-based models

Agent-based models keep many characteristics of CA models. They are always applied in simulating the behaviors of mobile agents. The agents in agent-based models are considered as special automata in CA models. The major difference between agents in agent-based models and cell-like automata in CA models is mobility. Agents are mobile automata which can represent the external driving forces of land use changes, such as socioeconomic changes, and business relocation (Sudhira 2004). Generally speaking, agent-based models are mobile automata with transition rules. The development of agent-based models is a powerful complement to CA models in simulating dynamic land use changes (Clarke et al. 1996).

In recent years, agent-based models become more and more popular in land use modeling. This is because they can take into consideration of social interaction, adaptation and decision making process of decision makers such as governments, households and businesses (Matthews 2007).

One example of the application of agent-based models in land use modeling is UrbanSim. UrbanSim employs agents to represent the location choice behaviors of households, developers and government agencies and their interaction with land market (Waddell 2002). While UrbaSim focuses on land use at cell level, Zhou and Kockelman (2010) developed an agent-based approach at parcel level to simulate agents' (households, businesses, and developers) behaviors and the interactions among them.

Multi-agent system land use change (MAS/LUCC) modeling provides a step further from agent-based models. It combines two key parts into an integrated system (Clarke 1996, and Sudhira 2004). The first part is based on CA model which represents the landscape; the second part is an agent-based model which captures the decision making process and the behaviors of decision makers (Manson 2000). Therefore, MAS/LUCC fits the needs to represent complex spatial interactions for simulating decentralized, autonomous system.

1.4 Application of land use models in practice

During the last few decades, there have been great efforts in applying land use models in urban planning process in practice. These land use models are employed at different geographic and administrative scales, such as state level, metropolitan level and county/city level.

The Disaggregate Residential Allocation Model (DRAM) and Employment Allocation Model (EMPAL) were two most popular models in the early experiment in the United States. These two models were built upon Lowry model and to maximize its entropy formulation (Putman 1995, and Zhao 2006). DRAM estimates the number of households in different zones of a given area and prioritizes the zones with higher accessibility, more vacant lands and the right type of employment. EMPAL estimates the number of employments for the same zones defined in DRAM modeling. The modeling mechanism of EMPAL favors zones with better accessibility, more households and employers, and assigns more new employments to these zones accordingly. The DRAM/EMPAL model has been applied to more than 40 metropolitan areas, including Los Angeles, Orlando, Portland, Boston, Seattle, Austin, and Houston-Galveston metro areas (Krishnamurthy and Kockelman 2003, Zhao 2006).

Highway Land Use Forecasting Model is also a Lowry-based model (HLFM II+). It is similar to DRAM/EMPAL model mechanism but in a simplified version. This is because the model is developed for small MPOs which have limited resource to meet intense data requirement (Dowling et al. 2000). The model has been employed by Capital District Transportation Commission in Albany, NY, and India Nations Council of Governments in Oklahoma (Zhao 2006).

Another widely used model at MPO level is METROSIM model. It is based on discrete choice models which consider the characteristics of a given set of choices and predict the choice accordingly. METROSIM employs an economic approach to simulate the interaction between land use and transportation systems. It estimates travel flows, employment changes, congestion, and land use changes and aims to reach market equilibrium in estimation. The markets taken into consideration include land market, labor market, and commercial floor space (Anas, Arnott and Small 1998). The metro areas applied this model include Houston, New York City, Pittsburgh and San Diego (Zhao 2006).

UrbanSim is another popular land use model that is widely used in practice. It is an agent-based model that is based on discrete choices, since it employs agents to represent the location choice behaviors of households, developers and government agencies and their interaction with land market (Waddell 2002). It treats dynamic urban development process as the results of the interaction between market behavior and governmental actions. UrbanSim has been adopted in Salt Lake City, Eugene-Springfeild, Honolulu and Puget Sound.

Based on the modeling mechanism of Cellular Automata (CA), the Slope, Land Use, Exclusion, Urban, Transportation, Hill Shading (SLEUTH) is used in county-level land use modeling, such as Chester County, PA and Orange County, CA. SLEUTH is also known as the Clarke Cellular Automata Urban Growth Model (CCAUGM). The model simulates the transition from non-urban land uses, such as green and open spaces, to urban lands. It defines a grid of cells to understand urban sprawl (Clarke et al 1996).

TRANUS model is an integrated land use and transportation model applied in the State of Oregon (Hunt et al. 2001). TRANUS modeling package integrates land use and transportation systems by feeding the effects of transportation policies back to land market. Another characteristic is the exchange between economic flows and travel demand. TRANUS converts economic flows to daily travel demand in corresponding sectors. For instance, the economic flow from household to employment is converted to commute flows (de la Barra 1998).

TRANUS was then adopted in a new modeling framework called PECAS, which stands for Production, Exchange and Consumption Allocation System (Hunt and Abraham 2003). PECAS has two core modules: one is the space development module which captures the behaviors of land developers; the other module is activity allocation module, which represents the behaviors of other players and tries to simulate how activities locate within a space defined by developers. The model is currently being applied to develop state-wide land use and transportation models for the State of Ohio and Oregon, and some MPOs.

It can be seen from the above reviews that there are different approaches in land use modeling, each is based on different assumptions and requires different data sets. There are also many states, MPOs and local governments that have experimented with applying land use modeling in their land use and transportation planning process.

For the state of Florida, the state department of transportation and the transportation modeling community have long been interested in developing a land use model as part of the FSUTMS. Therefore, this project is to conduct a survey to the Florida transportation modeling community to find out the needs, desire and preference of developing land use models in the state of Florida.

CHAPTER 2 METHODS

The University of Florida administered a survey to MPO & Florida DOT model coordinators, investigating their state of modeling practice and perceived needs. The University of Florida worked with FDOT to identify model coordinators and obtain their contact information. The original survey request was sent via email, including a link to the online survey. Additional emails were sent and follow up phone calls were made. Surveys were sent to ten Florida DOT and 26 MPO model coordinators.

The Land Use Model survey consisted of both multiple choice and open ended questions. It was designed to take about 20 minutes. Questions were divided into sections related to their intent, including background data, current practices, upcoming needs, constraints and priorities. The questions were designed so that the University of Florida and Florida DOT could better understand how modelers currently obtain information, how they use this information, if they themselves use it and what the model coordinators would like to see in future practice. The intent behind asking these questions is to better understand the modeling practice at the MPO and DOT level, so that new models will better reflect modeling needs, including ease of use.

CHAPTER 3 RESULTS

Of the 36 survey invitations sent, there were 23 responses; 8 from Florida DOT and 15 from MPOs. Of the 23, 19 responses are included in the results. The four additional surveys were started, but information beyond the individual's personal data was not included; therefore, the surveys were not counted as valid. Not all survey respondents answered all questions, so not all questions have 19 responses.

After collecting basic background information, the survey inquired after current modeling practices and approaches. This including questions on how land use data are currently obtained, modeling human resources in terms of Full Time Equivalency information, and the use of consultants and staff experience with modeling. The most commonly reported source of data was Local Member Planning Agencies, with Site Plans, Plats, DRI Reports etc. being the second most common option. Survey results indicate that very few MPOs or DOT districts have a staff member with an FTE greater than one devoted to either land use or transportation modeling as indicated in Table 3-1.

Table 3-1 Human Resources Devoted To Land Use And Transportation Modeling

FTE	0	0-0.5	0.5-1.0	1.0- 1.5	1.5- 2.0	2.0- 3.0	3.0- 4.0	Over 4
Land Use	8	4	4	1	1	0	1	0
Transportation	2	2	6	6	1	0	1	0

In fact, many have no staff member at all working on modeling. Both MPOs and DOT districts rely heavily on consultants as shown in Figure 3-1. Staff members generally have very little modeling experience.

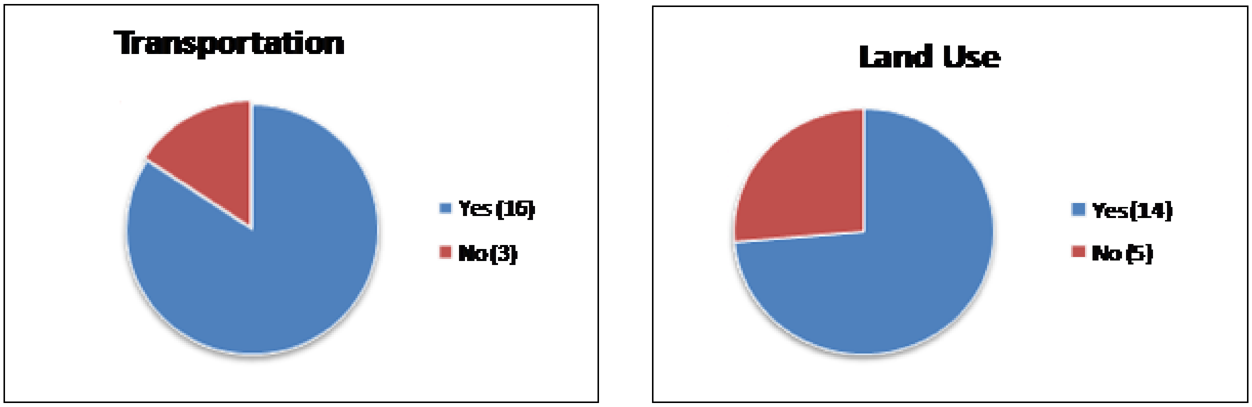


Figure 3-1 Use of Consultant Resources

Model Coordinators were asked to indicate their top three future needs. The results confirm the integration between transportation and land use as the top priority. Other areas of concern included environmental and economic impacts of land use relations. Figure 3-2 shows perceived modeling needs by number of votes each received.

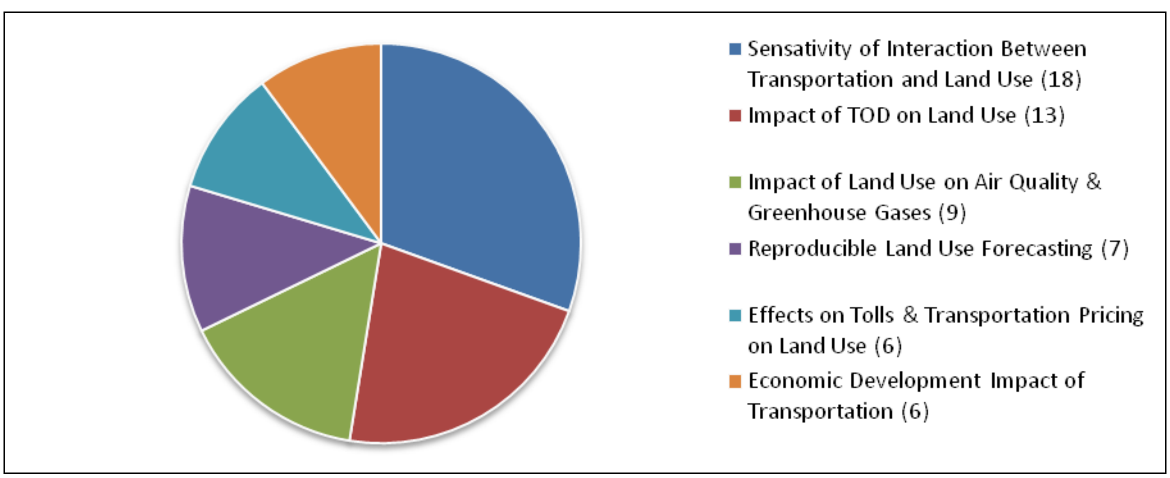
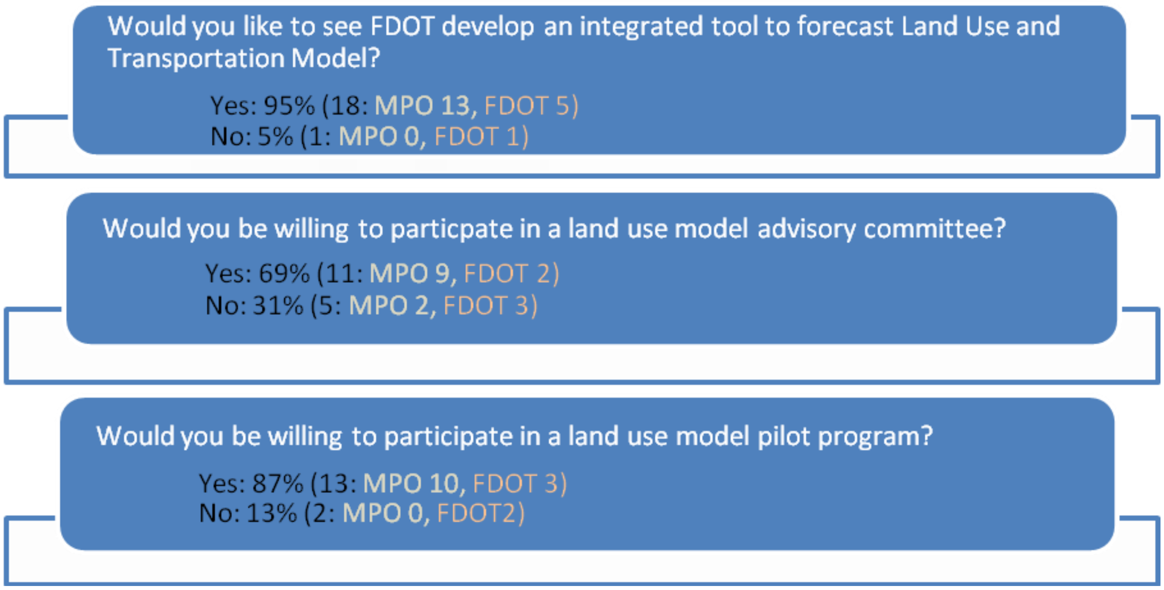


Figure 3-2 Modeling Feature Priorities

Next, the survey asked questions related to modeling constraints and opportunities. When asked about future modeling opportunities, 95% of coordinators indicated that they would like to see an integrated land use and transportation model, as seen in Figure 3-3. In this section, model coordinators were also asked to explain what they see as the most important benefits of having a land use model. Answers ranged from included for predictability purposes and improved forecasting to making wise investments and notice patterns. When asked about the biggest challenges to modeling, the coordinators listed responses involving model comprehensibility, building consensus within departments, changing comprehensive plans, maintenance of the model and FDOT/MPO conflict. Overall, there is a strong MPO response towards creating and participating on a land use model advisory committee and/or a land use model pilot program. Some hesitation over the use of committees, particularly when concerning cost and quality of work, was raised by an FDOT participant.

Figure 3-3 Willingness To Explore Future Models



The final questions related to characteristics of the land use model that are most important. Coordinators were asked to assign values to each feature in the land use model, one being the lowest and ten being the highest. The results were averaged and ranked according to highest value. Features considered to be most important are GIS-based software, land use forecasting at the TAZ level, user-friendly software interface and available training programs. This is demonstrated in Table 3-3. These features could be classified as model features, implementation features, and institutional features. Regarding model features, land use forecasting at TAZ level has been selected as the top priority. Among implementation features, GIS based software has been rated as the most important thing. For institutional features, training program for land use modeling staff is the most important feature. In addition, model accuracy has also been mentioned as other model priority features.

Table 3-3 Future Model and Training Features, As Defined By Priority

Modeling and Training Priorities Features	
Model Features	
Land Use Forecasting at TAZ (Traffic Analysis Zone) level	8.89
Land use impacts of transportation system investments	8.58
Transit Oriented Development (TOD) Assessment	8.11
DRI Assessment	7.61
Forecasting of Economic Impact	6.61
Implementation Features	
GIS based software	9.05
User-Friendly Software Interface	8.84
Quick Land Use Model Run Times	6.94
Institutional Features	
Training Program for Land Use Modeling Staff	8.84
Consistent Modeling Platform across Urban Areas	8.50

CHAPTER 4 TRANSPORTATION LAND USE MODELING SURVEY ANALYSIS

<u>Part A:</u> Current Practices & Approach

1. For transportation planning purposes, how do you obtain future-year land use and socio-demographic information at the city/county level?

Collect Forecasts from Local Member Planning Agencies (11 agencies)

Collect Forecasts from BEBR or Other State Agencies (11 agencies)

Expert Opinion/Consensus/Delphi (5 agencies)

Site Plan, Plats, DRI Reports, etc. (8 agencies)

Mathematical Land Use Model (4 agencies)

Economic Forecasting Model (2 agencies)

Other (BEBR, Woods & Poole, InfoUSA, White Sands Publishing Report, GIS Databases, US Census Bureau of Economic Activity)

All of the agencies have multiple data sources. Forecasts from local member planning agencies and forecasts from BEBR and other state agencies are the most common data sources to obtain future-year land use and socio-demographic information at the city/county level. Other data sources include Woods & Poole, InfoUSA, White Sands Publishing Report, GIS databases, and US Census Bureau of Economic Activity.

2. For transportation planning purposes, how do you obtain future-year land use and socio-demographic information at the TAZ level?

Collect Forecasts from Local Member Planning Agencies (12 agencies)

Expert Opinion/Consensus/Delphi (5 agencies)

Site Plan, Plats, DRI Reports, etc. (9 agencies)

Mathematical Land Use Allocation Model that allocates data at the city/county level to individual TAZs, (5 agencies)

Integrated Transportation and Land Use models such as UrbanSim, PECAS, MEPLAN or other software programs, (3 agencies)

Other (FLUAM, LUCIS, land use subcommittees, custom designed software (excel spreadsheet) that allocates county-wide data to TAZs)

All of the agencies have multiple data sources. Forecasts from local member planning agencies and site plan, plats, DRI reports, etc. are the most common data sources to obtain future-year land use and socio-demographic information at the TAZ level. Other data sources include FLUAM, LUCIS, local land use subcommittees, and custom designed software output)

3. How many full-time equivalent staff positions do you have devoted to:

a. Land Use Forecasting: ________________________

b. Travel/Transportation Forecasting: ________________________

FTE	**0**	**0-0.5**	**0.5-1.0**	**1.0- 1.5**	**1.5- 2.0**	**2.0- 3.0**	**3.0- 4.0**	**Over 4**
Land Use	8	4	4	1	1	0	1	0
Transportation	2	2	6	6	1	0	1	0

Almost half of the agencies do not have stuff specifically devoted to land use forecasting. Very few MPOs or DOT districts have a staff member with an FTE greater than one devoted to either land use or transportation modeling.

4. Please provide the contact information if appropriate:

Most people provided their name and contact information. But to protect the privacy, these contact information is not shown here.

5. Do you use consultant resources to develop land use forecasts?

○ Yes ○ No

Yes: (14 agencies)

No: (5 agencies)

Most of the agencies use consultant resources to develop land use forecasts. Currently, both MPOs and DOT districts rely heavily on consultants for land use forecasts.

6. Do you use consultant resources to develop transportation forecasts?

○ Yes ○ No

Yes: (16 agencies)

No: (3 agencies)

Most of the agencies use consultant resources to develop transportation forecasts.

<u>Part B:</u> Upcoming Needs

7. Please choose the top 3 items that will be important to your land use forecasting/study needs in the coming year(s) (please check 3 boxes):

   ☐ Reproducible Land Use Forecasting Process/Methodology

   ☐ Sensitivity of Land Use Forecasts to Transportation System Investments

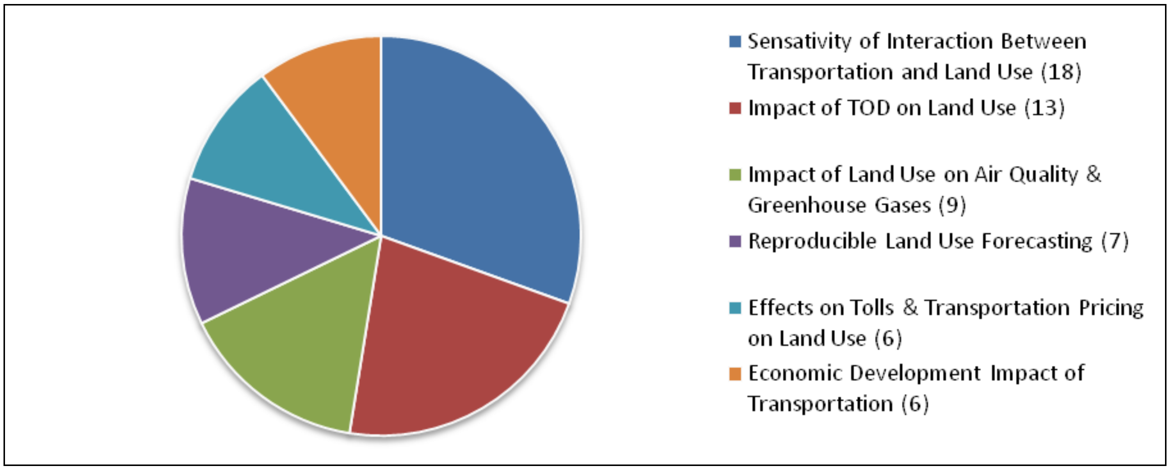
   ☐ Sensitivity of Land Use Impacts of Transportation System Investments

   ☐ Effects of Tolls and Transportation Pricing on Land Use Forecasts

   ☐ Impact of Transit-Oriented Development on Transportation Demand

   ☐ Impact of Land Use on Air Quality and Greenhouse Gases

   ☐ Economic Development Impact of Transportation Investments



The top three items that will be important to your land use forecasting/study needs in the coming year are sensitivity of interaction between transportation and land use, impact of TOD on land use, impact of land use on air quality and greenhouse gases.

<u>Part C:</u> Constraint & Opportunities

8. Would you like to see FDOT develop an integrated tool to forecast land use and transportation interactions?

   ○ Yes ○ No

Yes: (18 agencies)

No: (1 agencies)

Most of the agencies would like FDOT to develop an integrated tool to forecast land use and transportation interactions.

9. Does your agency have staff with experience on land use models?

○ Yes ○ No

Yes: (4 agencies)

No: (8 agencies)

No response: (7 agencies)

Only one-third of the agencies have staff with experience on land use models. The land use models that they use are Urban Land Use Allocation Model, FLUAM, REMI, and accessibility based model.

10. Does your agency use parcel-based GIS data?

○ Yes ○ No

Yes: (4 agencies)

No: (8 agencies)

No response: (7 agencies)

Two-thirds of the agencies do not use parcel-based GIS data.

11. Would you be willing to participate in a land use model advisory committee?

○ Yes ○ No

Yes: 11 agencies

No: 5 agencies

Two-thirds of the agencies are willing to participate in a land use model advisory committee.

12. Would your agency be willing to participate in a land use model pilot project?

○ Yes ○ No

Yes: 13 agencies

No: 2 agencies

Most of the agencies are willing to participate in a land use model pilot project.

13. What do you see as the most important benefit of having a land use model?

9 agencies think that having a land use model has the following important benefits:

1) to evaluate the relationship between transportation investments and land use changes; provide interaction between transportation congestion and future land use patterns;
2) increase quality of information available for long range transportation plan development;
3) get accurate projections;
4) Make wise transportation investments based upon the corresponding land use forecasts. In addition, this is essentially a requirement these days because of FHWA certification;
5) The ability to forecast potential transit needs the fit future land use patterns;
6) Freedom from dependence on MPO schedules and ability to generate interim year forecasts; Ability to develop Socio-economic data easily and with repeatable results;

14. What do you see as the biggest challenge to developing a land use forecasting model?

The challenges to develop a land use forecast model could be summarized as:

1) lack of historical data for model validation;
2) coordination of local agencies;
3) Changing directions and comprehensive plans;
4) the amount of parcel/GIS data required;
5) Having the model be sensitive to various land uses and zonings and have it sensitive enough for exclusions and inclusions as necessary;
6) Creating a regionally consistent method for forecasting and maintenance of databases to prevent model obsolescence. Most FDOT Districts will have conflict with MPO future land use process and results.
7) Consideration of large approved projects such as DRIs.
8) Ease of forecasting alternative scenarios.

<u>Part D:</u> Prioritizing Work Efforts

15. Please place the importance of the following characteristics of a land use model and FDOT's efforts to support one (on a scale of 1 to 10 with 1 being unimportant to 10 being critical for your agency.):

The results were averaged and ranked according to highest value. Features considered to be most important are GIS-based software, land use forecasting at the TAZ level, user-friendly software interface and available training programs.

Model Priorities Features	
GIS based software	9.05
Land Use Forecasting at TAZ (Traffic Analysis Zone) level	8.89
User-Friendly Software Interface	8.84
Training Program for Land Use Modeling Staff	8.84
Land use impacts of transportation system investments	8.58
Consistent Modeling Platform across Urban Areas	8.50
Transit Oriented Development (TOD) Assessment	8.11
DRI Assessment	7.61
Quick Land Use Model Run Times	6.94
Economic Impact Forecasting	6.61

These features could be classified as model features, implementation features, and institutional features. Regarding model features, land use forecasting at TAZ level has been selected as the top priority. Among implementation features, GIS based software has been rated as the most important thing. For institutional features, training program for land use modeling staff is the most important feature. In addition, model accuracy has also been mentioned as other model priority features.

Model Priorities Features	
Model Features	
Land Use Forecasting at TAZ (Traffic Analysis Zone) level	8.89
Land use impacts of transportation system investments	8.58
Transit Oriented Development (TOD) Assessment	8.11
DRI Assessment	7.61
Economic Impact Forecasting	6.61
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Institutional Features	
Training Program for Land Use Modeling Staff	8.84
Consistent Modeling Platform across Urban Areas	8.50

16. Are there other important considerations not listed above? If so, please list them below.

Other important considerations include

1) Avoid FDOT inclination to make land use (or any other) model serve multiple purposes developed through committee design. These activities sound good at first but they add penalties to the cost, time and complexity of the resulting model (if it even becomes operational at all).
2) The importance of quality data and maintenance of datasets after development should be emphasized. Costs of survey data are high but they are essential to model quality.

CHAPTER 5 CONCLUSIONS

The survey results are consistent with an early survey conducted by the Florida DOT.[1] Florida model coordinators supported Florida DOT's earlier findings that integrated transportation and land use models is the number one priority for Florida model task force. Though modeling was typically done by consultants, the model coordinators are aware of modeling needs and expectations, and are very supportive of developing an integrated land use and transportation modeling approach at the state of Florida. MPO modelers are particularly willing to participate on the land use modeling advisory committees and in pilot programs to work towards accomplishing this goal. The model coordinators prefer the future land use and transportation model to be sensitive to land use and transportation interactions, and be compatible with GIS software and easy to operate. Other areas that may be considered in the model include how it relates to the environment and economic concerns, and the impacts of transit oriented development.

As part of the next step, in order to obtain more information about modeling needs and concerns, the survey was sent to additional modelers, as recommended by those who already completed the survey. These results are not yet in; but will be factoring into the results and conclusions in future analysis. The survey process is ongoing, as to obtain the best results about land use modeling needs and wants by the Florida modeling community.

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[1] FSUTMS: The Florida Standard Urban Transportation Model Structure. (October 2009). Florida Transportation Modeling Newsletter.

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APPENDIX:

Land Use Modeling Survey

The following is a copy of the questions asked in the Land Use Modeling Needs Survey. The survey is administered through Surveymonkey.com, an online survey service, through the College of Design, Construction, and Planning Publications. The questions are asked in related clusters, as seen below. For questions that are not open-ended, the answer choices are shown in parenthesis. Any choice "other" is accompanied with a space for responses.

I. Establish understanding

1. Please confirm that you have read the consent information.
2. Please type your full name.

II. Questionnaire

1. Agency name (fill in blank)
2. Agency type (City Planning Department, MPO/TPO, DCA, County Planning Department, FDOT District, Other)

III. Part A: Current Practices and Approach

1. For transportation planning purposes, how do you obtain future-year land use and socio-demographic information at the city/county level? (Please select all that apply)

   Collect Forecasts from Local Member Planning Agencies, Collect Forecasts from BEBR or Other State Agencies, Expert Opinion/Consensus/Delphi, Site Plan, Plats, DRI Reports, etc., Mathematical Land Use Model, Economic Forecasting Model, Other

2. For transportation planning purposes, how do you obtain future-year land use and socio-demographic information at the TAZ level? (Please select all that apply.)

   Collect Forecasts from Local Member Planning Agencies, Expert Opinion/Consensus/Delphi, Site Plan, Plats, DRI Reports, etc., Mathematical Land Use

Allocation Model that allocates data at the city/county level to individual TAZs, Integrated Transportation and Land Use models such as UrbanSim, PECAS, MEPLAN or other software programs, Other

3. How many full-time equivalent staff positions do you have devoted to:
Land Use Forecasting?
Travel/ Transportation Forecasting?

4. Please provide the contact information if appropriate:

Land Use Contact Name, Email, Phone; Transportation Contact Name, Email, Phone

5. Do you use consultant resources to develop land use forecasts? (Yes/No)

6. Do you use consultant resources to develop transportation forecasts? (Yes/ No)

IV. Part B: Upcoming Needs

1. Please choose the top 3 items that will be important to your land use forecasting/study needs in the coming year(s) (please check 3 boxes):

Reproducible Land Use Forecasting Process/Methodology; Sensitivity of Interaction between Transportation System Investments and Land Use Forecasts; Effects of Tolls and Transportation Pricing on Land Use Forecasts; Impact of Transit-Oriented Development on Transportation Demand; Impact of Land Use on Air Quality and Greenhouse Gases; Economic Development Impact of Transportation Investments

V. Part C: Constraint & Opportunities

1. Would you like to see FDOT develop an integrated tool to forecast land use and transportation interactions? (Yes/No)

2. Does your agency have staff with experience on land use models? (Yes/No)

3. If yes, which land use model(s)? Please specify.

4. Does your agency use parcel-based GIS data? (Yes/No)

5. Would you be willing to participate in a land use model advisory committee? (Yes/No)

6. Would your agency be willing to participate in a land use model pilot project? (Yes/No)

7. What do you see as the most important benefit of having a land use model?

8. What do you see as the biggest challenge to developing a land use forecasting model?

VI. Part D: Prioritizing Work Efforts

1. Please place the importance of the following characteristics of a land use model and FDOT's efforts to support one (on a scale of 1 to 10, with 1 being unimportant to 10 being critical for your agency):

GIS Based Software, User-Friendly Software Interface, Land Use Forecasting at TAZ (Traffic Analysis Zone) level, Economic Impact Forecasting, DRI Assessment, Transit Oriented Development (TOD) Assessment, Land use impacts of transportation system investments, Training Program for Land Use Modeling Staff, Consistent Modeling Platform across Urban Areas, Quick Land Use Model Run Times, Other

2. Are there other important considerations not listed above? If so, please list them below.