

A GUIDEBOOK FOR BEST PRACTICES ON INTEGRATED LAND USE AND TRAVEL DEMAND MODELLING

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Research Motivation

The rationale for preparing a guidebook on integrated land use transportation models is three fold.

- First, examine the feasibility of top-down or bottom-up approaches for a statewide or multi-region land use model. The top-down approach may work for very large areas such as statewide level, but it provides less details of land use characteristics. In contrast, bottom up approach provide larger details but computationally intensive and have limitations to work for larger areas.
- Second, evolution of land use variables (such as households by age, employment by industry sector, etc.) over interim time periods in contrast to simple forecasting. A major drawback of simple forecasting land use models is that they ignore land availability, congested speed and travel times from the travel demand model.
- Third, clear distinction of features of the land use and transportation model and combining them with a feedback such that outcomes of land use and transportation are interdependent.

Benefits to TDOT

- The research will be assistance to TDOT transportation planning to envision land use growth in the state and assess how best practices are adapted in other states in the country.
- The use of best practice guidebook is to explore type of options agencies have to go for macro versus macro, top-down versus bottom-up, rule based versus automated type of land use models. Further the need of land use models will change as per existing travel demand models.
- The guidebook will also suggest the type of feedback that can be established between land use and transportation models such that travel behavior and land use locations can be informative to each other.
- By using the best practices guidebook and the synthetic case study TDOT will have options to explore types of land use models different agencies can adapt and local, regional and statewide level.

Research Results

- State-of-the-art and best practices of integrated land use and transportation models
- A guidebook encompassing land use and transportation area features, spatial development, travel patterns, input data requirement and expected outputs
- A set of recommendations based on the lessons learned from local and state agencies
- A case study demonstration to show the benefits of an integrated land use and transportation model

Snapshot of Existing Models

First Generation of Land Use Models				Second Generation of Land Use Models			
1	Lowry Model	6	IRUPD	1	HUDS	8	METROSIM
2	Lowry-Garin Model	7	LILT	2	CATLAS	9	DELTA
3	TOMM	8	POLIS	3	TRANUS	10	NYMTC-LUM
4	PLUM	9	HLFM Model	4	RURBAN	11	IMREL
5	TOPAZ/TOPMET	10	METROPILUS-DRAM/EMPAL	5	MEPLAN	12	METROSCOPE
				6	MUSSA & ESTRAUS	13	PECAS
				7	CUF	14	-

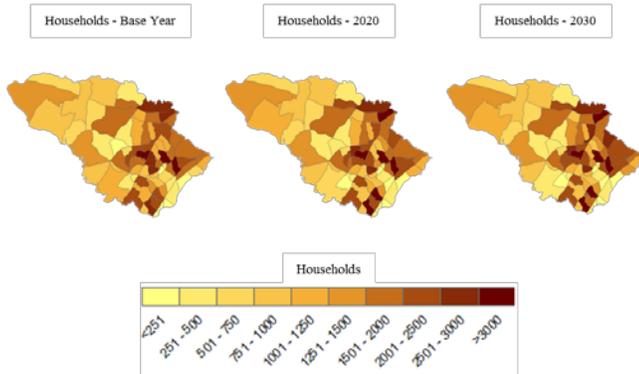
Third Generation of Land Use Models				Land Use Planning Tools			
1	SMART	7	U-Plan	1	CommunityViz	5	TRESIS
2	SAMS & AMOS	8	PUMA	2	INDEX	6	I-PLACE3S
3	ILUTE	9	LEAM & SLEUTH	3	LUCAS	7	Envision Tomorrow
4	What if?	10	ILUMASS	4	Smart Places	8	UrbanFootprint
5	RAMBLASS	11	LUSDR				
6	UrbanSIM	12	LandSys				

Operational Models with U.S. Agencies				Other Models			
1	OREGON TLUMIP Model	4	PSRC Model	1	LUTRIM	6	TELUM
2	SACOG Model	5	CalSIM	2	ULAM	7	Land Use Allocation Model for Florida
3	LUCI Model	6	-	3	SAM/SAM-IM	8	MARS
				4	LUAM	9	LUTSAM
				5	FLUAM	10	-

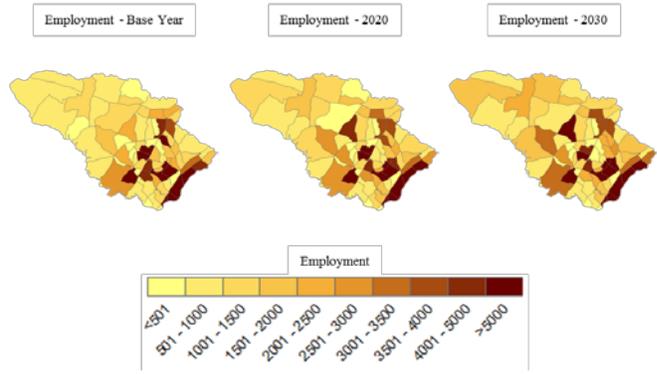
Key Challenges

- **Accuracy** of Land Use Models at Finer Geographic Level
- **Computational** Resources Requirement
- **Visual** Demonstrations versus **Computational** Complexity
- Evolving **Indicators** and **Linkages** to Transportation Models
- **Methodology** to Address **Freight** Movement Patterns
- **Uncertainty** in Future Policy and Growth
- Location Choice and **Evolution** of Freight Facilities
- Demonstration to **realistic integration** with travel demand models

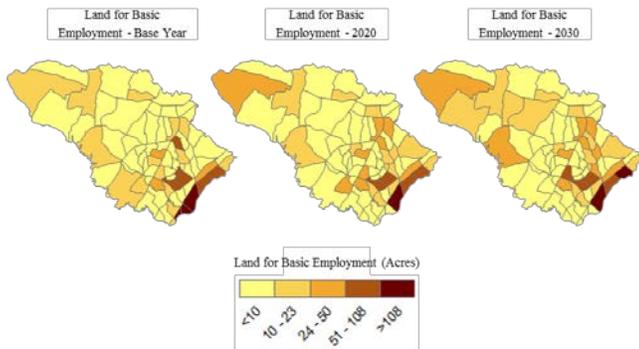
Synthetic Case Study Demonstration



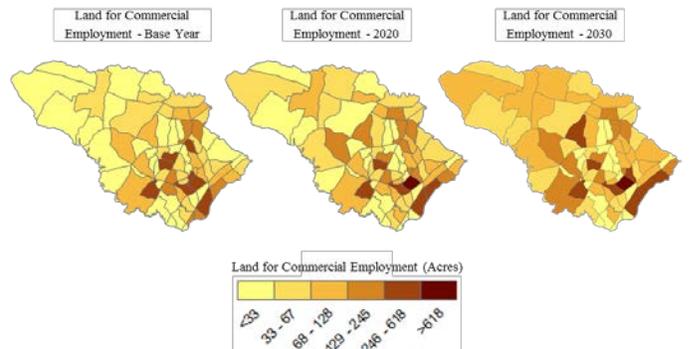
(a) Household



(b) Employment



(c) Land use for basic employment



(d) Land use for commercial employment