Florida Department of Transportation Research

Development of a Prototype Land Use Model for Statewide Transportation Planning Activities
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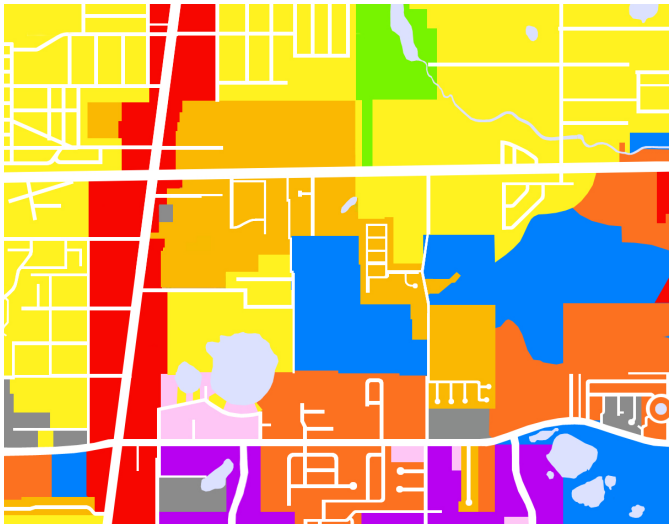
Developing computer models of land use and integrated transportation-land use are high priorities for Florida transportation planners. Land use information is fundamental to siting roadways, signaling, setting maintenance priorities, routing public transit, and more. However, in Florida's very dynamic property marketplace, a growing population continues to change the patterns and extent of development. In such an environment, transportation planning requires quality information and methods to gain insight into potential changes; more so, because transportation planning, construction, and maintenance are multiyear projects.

In this report, University of Florida researchers extend current land use modeling by using two modeling approaches, cellular automata (CA) and agent-based models (AB). Both modeling strategies are well-established and widely used to understand and make predictions in complex sociological systems, which tend to evolve under the influence of many independent agents, each with their own goals and priorities.

More specifically, the researchers used the CA model to understand how the properties of a parcel of land influence its changes. For example, using this model, they investigated how neighboring land uses, accessibility, or soil characteristics affected land use changes. The power of this model is that, using simple rules, it can incorporate the influence of many factors. While CA models focus on the influence of properties of the land itself, the AB models complement this view of the land use change process by modeling the behavior of the many agents involved with land transactions and development. Thus, the researchers examined the decision making and interactions of households, employers, developers, policy makers, and others.

The interaction of land use and transportation planning was modeled by using the CA model in a feedback loop. First, the researchers modeled



This map of an area in Orange County, Florida, is color-coded according to land use. Understanding how these land uses might evolve helps transportation planners anticipate construction, maintenance, and budgeting needs.

land use changes. They then supplied this result to a travel forecasting model, which produced revised estimates of accessibility. This result provided input for a new round of land use forecasting, and so on. This process increased the accuracy of the land use modeling. Researchers tested the procedure using both a Multinomial Logit model and artificial neural network methods, but found little difference in accuracy between the approaches. However, the Multinomial Logit model provided a clearer relationship between spatial variables and land use change, allowing better interaction with the Florida Standard Urban Transportation Model Structure (FSUTMS), the Florida Department of Transportation's suite of standard transportation planning tools.

Further development of these models promises more accurate land use and transportation modeling and new capabilities for Florida's transportation planners. The researchers envision that these models will be included in FSUTMS and made widely available.

Project Manager: Terrence Corkery, FDOT Planning Office
Principal Investigator: Zhong-Ren Peng, University of Florida
For more information, visit http://www.dot.state.fl.us/research-center