

Integrated Land Use, Transportation, and Environmental Simulation: UrbanSim Project Highlights

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1 Project Overview and Impacts

The process of planning and constructing a new light rail system or freeway, setting an urban growth boundary, changing tax policy, or modifying zoning and land use plans is often politically charged. Our goal in the UrbanSim project is to provide tools for planners and stakeholders to be able to consider different scenarios — packages of possible policies and investments — and then, based on these alternatives, model the resulting patterns of urban growth and redevelopment, of transportation usage, and of resource consumption and other environmental impacts, over periods of twenty or more years. UrbanSim [1, 3, 4] performs simulations of urban development, including transportation, land use, environmental impacts, and their interactions. It consists of a set of interacting component models that simulate different actors or processes within the urban environment. The system is written in Java, and is distributed as Open Source software. (Source code, as well as papers and reports, are available from www.urbansim.org.)

2 Collaboration Examples and Success Stories

We have two primary kinds of government collaborators. The immediate users of UrbanSim (and systems like it) are Metropolitan Planning Organizations: regional agencies that are charged with transportation planning in urban areas. In the past year, we have been collaborating most closely with two such organizations: the Wasatch Front Regional Council (the Metropolitan Planning Organization for the Salt Lake City, Utah, region); and the Puget Sound Regional Council (Seattle, Washington, and other cities and suburbs in the region). In the Salt Lake City region, UrbanSim played a central role in a lawsuit over a major highway project (the “Legacy Parkway”). The suit was settled out of court, with a central provision being an agreement by all parties to test UrbanSim for operational use in the region. An expert Peer Review Panel endorsed continuing the process of applying UrbanSim, along with providing many thoughtful suggestions for improvements. In our own region, we set up a partnership with Puget Sound Regional Council to apply UrbanSim, with the goal being to use UrbanSim as the operational model for Puget Sound. Our first major local use of the system will be the upcoming update of Vision 2020, the adopted regional long-range strategy for transportation and growth management. Working with our lab, UrbanSim has also been applied in Eugene/Springfield, Oregon; Honolulu, Hawaii; and Houston, Texas.

Our other primary government collaborators are Federal agencies. We have been fortunate to receive significant funding from the NSF Digital Government and ITR programs. The case study in Salt Lake City was funded in major part by a grant from the Federal Highway Administration, which was designated as matching funds for the Digital Government award. We have also had productive discussions with the

Environmental Protection Agency and the Department of Housing and Urban Development, and hope to set up collaborations with staff in those agencies.

As noted above, UrbanSim is an open source project, and we make our source code freely available via the web. As a result, groups in sites as diverse as Manila, Paris, Taipei, and Torino have downloaded our system and are seeking to apply it in their regions.

3 Challenges and Barriers

Urban regions are incredibly complex systems. The resulting technical challenges include difficulties in identifying or developing the necessary theoretical basis for modeling such regions, significant computational challenges raised by massive amounts of data and fine-grained simulation, and the issue of how to make the results accessible and relevant to the stakeholders. A second set of challenges arises from aligning academic and government objectives. Academia and NSF wants long-term, risky, potentially high-payoff research. Planning agencies, on the other hand, are fundamentally risk-adverse, with limited funds, and must make politically charged decisions under heavy public scrutiny. Another challenge is the tension between research and deliverables. On one side, we want to do research on alternative approaches, to explore different architectures, to make rapid progress. On the other, our domain requires that we deliver a robust, highly reliable, credible system. A third set of challenges arises from the difficulties of doing academic interdisciplinary research. A forthcoming paper [2] discusses these challenges in more detail.

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