

Open Platform for Urban Simulation

In January of 2005, several research groups from around the world who are working on projects intended to assist governments make more informed evaluations of alternative land use and transportation policies by using integrated models to assess the possible impacts of these policies met in Toronto to compare their approaches, experiences, and plans. These projects were from the United States, Canada, France, Germany, Switzerland, and the Netherlands. After the first day of this meeting, two common themes emerged: most of the objectives we articulated above were shared by all of these groups, and the frustrations of unmet challenges were equally shared. It became quickly apparent that we each were investing heavily in developing software systems to do similar things, and that due to the level of investment in the core software infrastructure for each project none had completed all the functionality that was needed for a complete and robust system with sufficient computing performance to be useful to policy evaluation, and sufficiently well-designed interfaces to allow users to effectively use them. On the basis of this assessment, we proposed an international collaboration to build a common platform that could be shared among projects, and to do so in a way that would accomplish four important aims. (1) To improve efficiency, by leveraging existing work and the efforts of research groups around the world with similar aims, by cooperating and coordinating our efforts. (2) To provide a modular software laboratory environment within which researchers may substitute algorithms and interface components in order to evaluate in a rigorous way the costs and benefits of specific changes to a working system – the lack of which has made rigorous assessment of progress in this arena very difficult. (3) To provide sufficient flexibility to adapt model systems to the different political, economic, and cultural contexts represented in these particular countries (and beyond, to the contexts of countries in Asia, Africa, and South America). (4) To design interfaces to the model system that facilitate public engagement in the process of analyzing alternative policies. We discuss these four aims in more detail below, and how our proposed collaboration would advance our capacity to achieve them.

The idea of collaboratively developed Open Source platform was dubbed the Open Platform for urban Simulation (OPUS), and significant number of participants registered interest and support. Since the initial meeting in Toronto just more than a year and one half ago, considerable progress has been made on this new initiative. The UrbanSim research group took the initiative to implement the initial version of OPUS, with input from these collaborators, since our group had already come to a conclusion that we needed to re-engineer UrbanSim. Over this period, we designed and implemented the OPUS framework, and re-implemented UrbanSim as a package within OPUS. We also designed OPUS in such a way that other research teams could interface their model systems or components of them to OPUS by creating Packages that could be plugged into OPUS.

Our proposal seeks to support the coordination of an international research network that is based on several substantial research centers and laboratories in the U.S., Canada and Europe, in addition to some individual researchers who contribute specialized expertise. The initial participants of this network are: Center for Urban Simulation and Policy

Analysis, University of Washington, university of Hamburg Germany, Technical University Berlin, Germany, Swiss Federal Institute of Technology Zurich, Ecole Polytechnique Fdrale de Lausanne, Switzerland, University of Utrecht, University of Cergy-Pontoise, France, Laboratoire d'Economie des Transports, University of Toronto, Arizona State University, and Boston University.

The overarching objectives for the working group are to coordinate our respective research agendas and projects in such a way that we accomplish more effectively the aims laid out in the research component sections of this proposal. We wish to develop a modeling platform and a set of interacting model components that are behaviorally realistic and credible, are useful for evaluating a range of policies that governments in Europe and North America wish to consider to better address the complex problems of transportation, urban development and environmental quality. We wish to do this in a way that is robust from a software engineering perspective, providing high computing performance and an effective modular design to provide flexible configuration and extension. We wish to develop interfaces to and an effective modular design to provide flexible configuration and extension. We wish to develop interfaces to allow efficient interoperation of model components, and user interfaces to allow productive engagement and use by modelers, planners, and also by policy-makers and the general public.

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