

# Urban Spatial Simulations

## What is the urban simulation and modelling platform about?

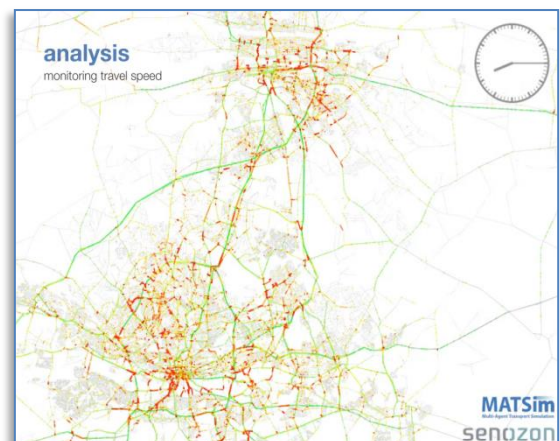
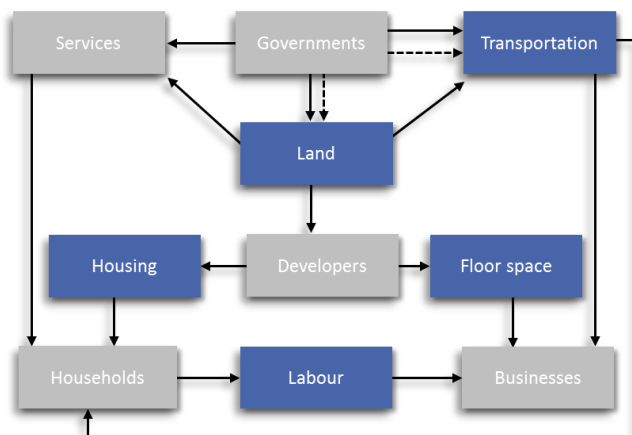
The Urban Growth Simulation Platform is a numerical modelling and simulation platform developed to study urban growth patterns 30 years into the future. This allows planners and decision-makers to assess the likely impact of major investment decisions such as a proposed mass transit scheme. The societal need for the work stems from unabated urbanisation and the quest for more sustainable, more compact and smarter cities. Based on a worldwide consensus that urbanisation is set to continue well into the future, cities require spatially-explicit long-term growth management strategies to meet the ever increasing demand for infrastructure, facilities and services such as water, electricity, sanitation, schools, clinics and hospitals.

## Has it been applied in South Africa?

The Urban Growth Simulation Platform has already been applied and validated in the cities of Johannesburg, eThekweni and Nelson Mandela Bay (funded by the Department of Science and Technology). Validation was done by simulating a period in the past (2001 – 2009) and comparing the predicted growth with observed growth over the same period. Following these successes the Gauteng Department of Roads and Transport adopted the same technology for establishing an in-house modelling and simulation capability (the Gauteng Integrated Transport Modelling Centre) to serve the provincial government and municipalities in Gauteng. The CSIR in collaboration with the University of Pretoria is currently providing the necessary technology transfer to make this a reality.

## What technologies are applicable?

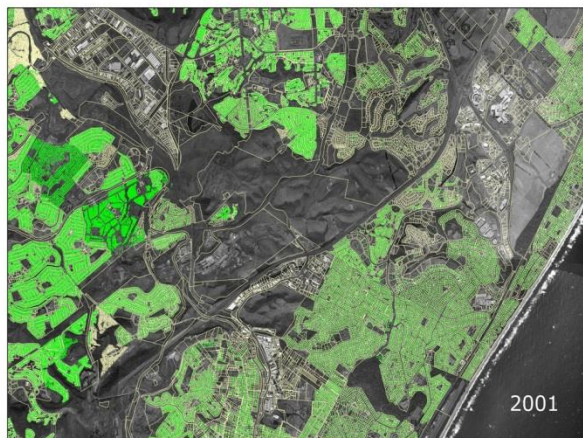
The technology is based largely on two open source software projects, UrbanSim ([www.urbansim.org](http://www.urbansim.org)) and MATSim ([www.matsim.org](http://www.matsim.org)). **UrbanSim** is used for micro simulation of the choices made by individual households and businesses as consumers of property and services, developers as suppliers of property and the government as a supplier of infrastructure and services.



**MATSim** simulates the behaviour of transportation systems from individuals pursuing their daily activity schedules such as commuting between home and work. Both models originate from the developed world and require substantial effort to prepare input data at the level of individual parcels of land, individual buildings, households, jobs, transportation networks, etc. Since very little of this information is available in SA in the same form as in developed countries, considerable innovation was required to adapt the models to function in SA, for example to deal with informal housing (including backyard shacks) and to derive the properties of buildings from a variety of data sources.

### What is the value obtained from applying urban simulation and modelling?

The technology provided the first demonstration of a fully integrated Land Use and Transportation Model in SA that can claim to model the dynamic interaction between government policies, economic cycles, where people live, where they work and how they commute between home and work across various networks. The focus has since moved to spatially explicit demand forecasting for water, sanitation, energy and solid waste and on forecasting future revenue streams for municipalities. As energy costs increase the spatial form of the city and technology trends are expected to become increasingly important to be included in the model.



For more information on the Urban Simulation Platform please contact:

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