Applying the CSIR Urban Simulation Platform: An eThekwini Case Study

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Introduction

The Department of Science and Technology (DST) commissioned the CSIR and the HSRC to co-operate with other science councils and institutions of higher learning to develop an integrated information and modelling platform (IPDM) to support integrated planning, development and service delivery for South Africa. The first phase of the multiyear IPDM Project focussed on the development of a geospatial information platform (Profiler) for a specific study area. The team was then tasked to expand the coverage of regional scale information to the entire country and to enhance and apply urban growth simulation in the four city regions of Cape Town, eThekwini, Gauteng and Nelson Mandela Bay.

The Aims and objectives doing the urban simulation exercise in eThekwini

The aims and objectives of doing the urban simulation exercise in Ethekwini Municipality (EM) was to allow allow planners and decision-makers to assess the likely impact of demographic and economic growth in the context of specific spatial policies or plans or to evaluate the impact of investment decisions such as a proposed mass transit scheme.

Development challenges in eThekwini

eThekwini Metro, on the east coast of KwaZulu-Natal, covers an area of about 2297 km² stretching from Umkomaas in the South to beyond Tongaat in the North, it extends up west and inland as far as Cato Ridge. While the eThekwini Municipal Area (EMA) covers 14% of the province's total area, it is home to over a third of its population and 64% of its economic activity (eThekwini Municipality, 2012).

Three unique factors in the eThekwini development challenge are, i) its topography which is extremely hilly, which impacts substantially on development costs and poses particular challenges for delivering RDP-type housing within the standard subsidy amounts as well on infrastructure delivery costs and maintenance costs; ii) land ownership which is affected by a private company, Tongaat- Hulett, with significant land holdings and thus a powerful influence over the direction and nature of development in the Metro. Iii) eThekwini also has significant tracts of land within the Metro under tribal ownership which provide challenges for development of this land in line with the Metro's SDPs (eThekwini Municipality, 2004).

How the urban simulation platform was applied in eThekwini

A long engagement process with stakeholders was embarked upon to define finalise the scenarios to be tested for eThekwini Metro. From the beginning, the importance of creating a new sustainable urban form, and using densification as a means to achieve this, came up as the key issue in the living lab engagements. It was agreed that a Trend and a Blue Skies scenario would be simulated and compared.

The **'Trend' scenario** is based on the supposition that Development continues around existing trajectory. That no specific interventions are driven by the state, private sector or metro aside from development events or urban management interventions that are already unfolding i.e. approved, in the pipeline, with approved business plans. It includes the full housing delivery programme and incorporates bio-physical and other constraints to development.

This **'Blue Skies'** scenario takes the position that the metro drives a focussed strong densification scenario in support of public transport as a preferred scenario and that the metro combines a range of spatial planning instruments to give effect to this scenario which include:

- Increased densities of:
  - 40du/ha within 400m of Integrated Rapid Public Transport Network (IRPTN) Trunks in Urban Centres;
  - 40du/ha within 400m of IRPTN Trunks in Prime Corridors;
  - 40 du/ha around Rail Stations;
- Development events with very likely implementation and take-up;
- Planned subsidized housing as per the trend scenario; and
- Development constraints as per the trend scenario.

These scenarios tested the feasibility of promoting strong densification in producing a sustainable public transport network.

The outcomes and outputs of the exercise

The simulation platform renders a time series of annualised spatial images depicting future spatial development patterns that will result from the implementation of spatial plans and policies. These sets of time change maps are underpinned by data and statistics on a range of variables associated with the households and enterprises that will make up the metropolitan area.

Figure1. Below, illustrates the difference achieved by the proposed policy interventions, which in the case of eThekwini included permitting higher densities in buffer zones around designated urban nodes as well as the Integrated Rapid Public Transport Network (IRPTN) trunks (400m wide primary corridor and 2km secondary corridor). The results show some evidence of the uptake of higher densities in new developments towards the north but very little in older built up areas.

Alignment of growth with proposed policy interventions

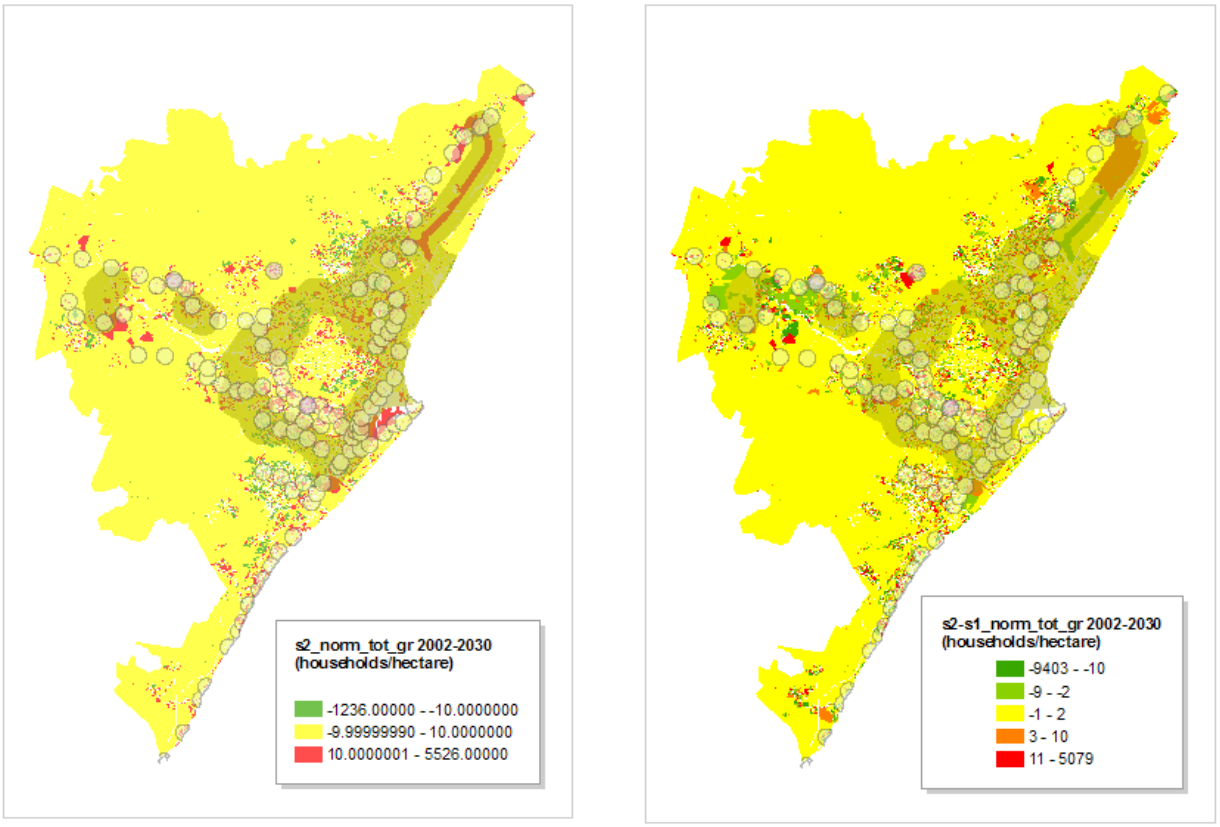

Figure 1: Alignment of 'Blue Skies' growth (left) and difference between scenarios (right) with IRPTN and nodes.

Much as expected the results indicate that higher densities are not necessary taken up and it is speculated that it would take something like an affordable and efficient public transport service to lure households and businesses into such nodes and corridors.

The simulation results pointed to two important conclusions:

- There is not sufficient growth in metro populations to achieve the densities that Metros are aiming for in their spatial and transportation planning in order for them to create the densities required to sustain Integrated Rapid Public Transportation Networks that are being proposed and funded by the national Department of Transportation and being implemented in one form or another for all Metros.
- Relatively small additional growth in metro populations up to 2030 will not be sufficient to fundamentally change city structure of South African cities.

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