

## SPATIO-TEMPORAL INFORMATION FOR SOCIETY – EXERCISE 4

### Exploring Urban Dynamics in Latin American Cities Using an Agent-Based Simulation Approach

Dr. Joana Barros (now at University of London) developed her PhD thesis in the Centre for Advanced Spatial Analysis (CASA) in University College London under Prof. Mike Batty. Her thesis deals with agent-based models (ABMs) to study the urbanization of Latin America after the 1960s. In her work, the dynamics of growth and change in Latin American cities are explored using agent-based simulation. The objective is to increase the understanding of urban spatial phenomena in Latin American cities, which is essential to providing a basis for future planning actions.

Barros's model is explained in detail in her PhD thesis, especially in chapter 4. In this exercise, we will consider the basic model (*peripherisation* model) and two extensions (the *spontaneous settlements* model and the *inner city process* model).

In the *peripherisation* model, the growth of the city is based only in the income capacity of the settlers. Rich settlers settle in the city center, which is conceived as the best area for living. Low-income settlers are forced out of the centre. The process of peripherisation consists of the expansion of the city borders through the formation of peripheral low-income settlements.

The *spontaneous settlements* model combines the original *peripherisation* logic with a consolidation rule. This rule refers to a process in which spontaneous settlements are gradually upgraded, and, as time passes, turn into consolidated favelas, spontaneous settlements that are immune from eviction. The spontaneous settlements module generates a more fragmented landscape than the basic *peripherisation* model.

The *inner city process* model adds new features to simulate other aspects of Latin American urban development, such as re-occupation and regeneration of older housing in attractive inner city districts. These features attempt to reproduce some of the main dynamic processes in cities: inner city decay, movement of elites towards the city edge and gentrification by the process of location and relocation of individual agents from different income groups.

The peripherization module was developed in class. In this exercise, you will extend the basic model to include the *spontaneous settlements* model and the *inner city process* model. Please refer to Joana Barros' PhD thesis document, especially the description on Chapter 4, for more details about these models.