Exploration of future changes of residential locations in an urban agglomeration using an individual-based simulation model (Mobisim)

Abstract Thèse Joanne:

To ensure that housing supply is suitable to households' needs and preferences represents a major planning concern. These needs and preferences depend on the households' characteristics and on their lifecycle changes (union, birth, divorce…). Residential choice factors are numerous (housing and residential environment characteristics) and their role is often different according to the types of households. Residential dynamics involve a great variety of elements, in interaction with each other, and the causal relationships are difficult to identify. Thus, it is not possible to predict the households' residential behaviour, nor their possible evolutions, without a suitable tool.

To study intra-urban residential dynamics, we use a residential mobility simulation model (Mobisim-MR), integrated in an agent-based LUTI simulation platform: Mobisim. For each simulated year, Mobisim-MR allows for determination of households which move and their new residential location. Prior to Mobisim-MR, we created a demographic microsimulation model (Mobisim-Démo) within the Mobisim platform. It allows reproducing households lifecycle evolutions in a dynamic and agent-based way. A part of the thesis is dedicated to the calibration of both models, a required stage preliminary to scenarios simulation.

Another part of the thesis concerns the exploration of Mobisim-MR model behaviour, in order to assess the simulation results' stability and their consistency (sensitivity analysis). Agent-based models use is quite recent in geography, explaining the lack of standard protocol to explore such models. A specific protocol has been designed to explore the behaviour of Mobisim-MR. This protocol takes into consideration the parameters characteristics, simulation technical constraints, and the initial design for which the model has been built.

The last part of the thesis consists of thematic analyses aimed at studying the impact of two housing construction planning scenarios in the urban region of Besançon (named *le Grand Besançon*). These analyses highlight the ability of Mobisim-MR to answer concrete planning questions and to initiate discussion among urban planners.

Key-words : modelling – simulation – residential mobility – calibration – sensitivity analyses