A normative planning approach for the Luxembourg
Assessment based on spatial simulation

In Luxembourg, daily mobility patterns of both cross-border workers and residents lead to a strong car dependance. This process encourages urban sprawl. Meanwhile the country is faced to increasing housing needs but has to reduce land consumption. Within this context, the main objective of this thesis is to throw light about the relation between residential growth patterns and daily mobility behaviors. In this way, a normative planning approach has been adopted. This approach proposes new planning norms for achieving a series of planning objectives. Quantitative rules are the tools used to apply the norms.

Three steps has been done: i) conception of residential growth scenarios for 2030. By applying a fractal rule, we obtain realistic residential development patterns ; ii) spatial simulation of residential growth scenarios, with the MUP-City platform and iii) assessment of simulated spatial congurations regarding both the spatial accessibility to rural and urban amenities (GIS calculations) and the sustainability of daily mobility behaviors (simulations with the MobiSim platform).

In most of the scenarios, spatial accessibility to a various range of facilities (retails, services, green spaces, leisures and public transport stations) is increased compared to the initial state observed in 2010. Simulated daily mobility, by taking into account individual behaviors of agents in the model, conrms the interest of the proposed scenarios. The modal share of car use, which was 70% in 2010, decreases in all cases. It reaches 58% in 2030 for one scenario. Simultaneously, the distances and the time-budget of pedestrians strongly raise.

This doctoral research shows the interest of a normative approach applied to spatial planning issues, particularly in terms of residential development. The results obtained also underline the interest of fractals for modelling urban forms, both at local (neighborhood, municipality) and global (urban region) scales.