An ABM to support collective reflection on the evolution of mobility

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Keywords

Urban mobility, Traffic simulation, Collective reflection support, Prospective simulation

Abstract

Transport infrastructures play a large part in defining a smart, sustainable and resilient city. Planning transportation systems traditionally rely on well-known evolutions of roads or public transportation (roundabouts for security, etc.). Yet, infrastructures might also benefit from, or may have to adapt to, recent disruptive innovations concerning modalities, technologies and societal organization (autonomous cars, smart infrastructure, homeworking, etc.). However, innovative urban policies might either facilitate mobility and increase citizen well-being, or create negative side effects. Urban planning therefore requires the city to assess the impact of these disruptive innovations by using "what if?" prospective studies. However, cities are complex sociotechnical systems: dynamics of transportation are nonlinear, and even wise choices might lead to negative side effects (*e.g.* the improvements in road layout might decrease the number of accidents, but increase road use and therefore increase pollution). Unfortunately, even if urban planning models and methodologies are available for traditional modalities (car, bus, etc.), no tool, nor methodology, exists today to assess the potential impact of disruptive innovations, and how they can be progressively integrated into planning infrastructures.

The SwITCh project aims at providing a tool for a participative reflection on the evolution of urban mobility in the next 30 years (horizon 2050). It aims to support decision-making for urban planning related to transport issues, by providing a participative simulation tool. The ambition of the project is not to produce a simulator that can predict what will happen from now to 2050 and to solve all the problems, but to help stakeholders (urban planners, citizens, etc.) enrich their reflections and build a shared project to improve transport infrastructures. The tool is based on an agent-based model (ABM) of citizens' mobility, implemented on the GAMA platform, which simulates different scenarios of city/environment evolution (based on a combination of literature review and interviews with experts and stakeholders) and tests different strategies to face them.

In this presentation, we will introduce the approach in order to illustrate four different scientific challenges: (I) the modeling of individual mobility choices by the agents, (II) the multi-level modeling of the city, (III) the design and exploration of different scenarios of mobility evolution, and (IV) the design of a methodology based on the proposed tool to support collective reflection.

Additional material

The website describing the project is at the address: <u>https://www6.inrae.fr/switch_eng/.</u> All the models code is publicly available on the project GitHub organization: <u>https://github.com/ANR-Switch</u>.

Acknowledgments

This work is part of the SwITCh (Simulating the transition of transport Infrastructures Toward smart and sustainable Cities, ANR-19-CE22-0003) research project funded by the French Research Agency (ANR).