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### ► **To cite this version:**

Leonard Higi, Tobias Schröder, Diego Dametto, Gabriela Michelini, Antje Michel, et al.. PaSyMo + SmartUpLab: Developing and Testing a Participatory Modelling Toolbox for Urban Systems. 1st conference GAMA Days 2021, Frédéric Amblard; Kevin Chapuis; Alexis Drogoul; Benoit Gaudou; Dominique Longin; Nicolas Verstaevel, Jun 2021, Toulouse (Online), France. hal-03523638

**HAL Id: hal-03523638**

**<https://ut3-toulouseinp.hal.science/hal-03523638>**

Submitted on 12 Jan 2022

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# PaSyMo + SmartUpLab: Developing and Testing a Participatory Modelling Toolbox for Urban Systems

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## Keywords

Participatory modelling, Urban Development, ABM, Urban Planning Toolbox

## Abstract

In order to provide small and mid-sized municipalities with a collaborative decision support system to engage local stakeholders in the planning process, we are developing a participatory modelling toolbox for urban systems across multiple research projects at the University of applied sciences Potsdam.

Our contribution presents a brief overview of the development of the toolbox comprising hardware and software tools in the project *PaSyMo* (Participatory Systems Modelling) as well as an insight on the user-centric approach for urban mobility challenges focused on co-modelling for comparative scenario analysis in the project *SmartUpLab*. We describe the challenges of using GAMA-Platform in our participatory modelling approach within different contexts, levels of analysis and with project partners and stakeholders. Finally, we identify GAMA features that can be relevant for our future work in the mentioned areas.

*PaSyMo* represents a frugal approach to participatory modelling, and features a growing library of simulation models, a mobile interactive modelling lab, (georeferenced) survey tools as well as serious games. Focusing on challenges of mid-sized German towns in the state of Brandenburg, we conducted iterative testing. During testing, researchers, experts, and stakeholders co-create models of specific urban contexts and phenomena, integrating implicit knowledge as well as georeferenced datasets and survey results. Participants interact with the models in workshops and adapt them continuously to support decision-making processes. The first field applications addressed residential mobility and population dynamics in a late-GDR social housing district in the city of Potsdam and scenarios for future population development of the town of Luckenwalde. The stakeholders engaged in these processes are experts of the municipal housing company, the municipal urban planning authority, local enterprises as well as civil society.

The ongoing research project *SmartUpLab* aims to expand the *PaSyMo*-toolbox by designing a platform that integrates urban mobility stakeholders, gathers and processes data and simulates scenarios. Rather than providing estimations of traffic flows, the tool facilitates the envisioning and communication process among different mobility stakeholders by including demographic and land-use variables. For this purpose, we build on a user-centric approach based on co-creation methods for translating stakeholders' needs and ideas into formal model requirements and features. Over several meetings we identified and developed together with the stakeholders mobility concepts, scenarios and key performance indicators (KPI) relevant to them, which will be compared.

Conceived as a modelling platform that facilitates GIS data integration into agent-based models and allows spatially-explicit ABM with a relatively low level of coding knowledge, GAMA's range of possibilities continues growing. In our research, GAMA has a central role as a rapid prototyping platform for agent-based modelling, integration of data, visualisation of dynamic scenarios and stakeholder interaction with co-created models. Considering different user roles, levels of analysis and purposes of use, we will illustrate our next steps and discuss how they can be matched with the development of future GAMA features.