

# Agent-based model for low-carbon technology adoption: A case study of Lausanne, Switzerland

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## Introduction

- Switzerland aims to be **climate-neutral** by 2050
  - 1.5 million heat pumps
  - 34 TWh PV (vs 2 TWh today)
  - High energy efficiency, heat grids, building insulation
- Requires holistic modeling tools to support decision making
  - Explore how adoption of **low carbon technologies (LCTs)** interact for **heterogeneous** households
  - Identify what would be **optimal policy mix** to support LCT adoption and meet the climate targets by 2050

## Methods

### 1. Synthetic population generation

- Real building stocks data
- Household data: Survey + Iterative Proportional Fitting (IPF) based on Census data
- Building- Household matching
- Evolution based on demographic projection

### 2. Decision making process

- Theory of planned Behavior [1] + multi-stage decision making [2]
- Calibrated based on survey data using joint segmentation of multivariate time series with hidden process regression [3]

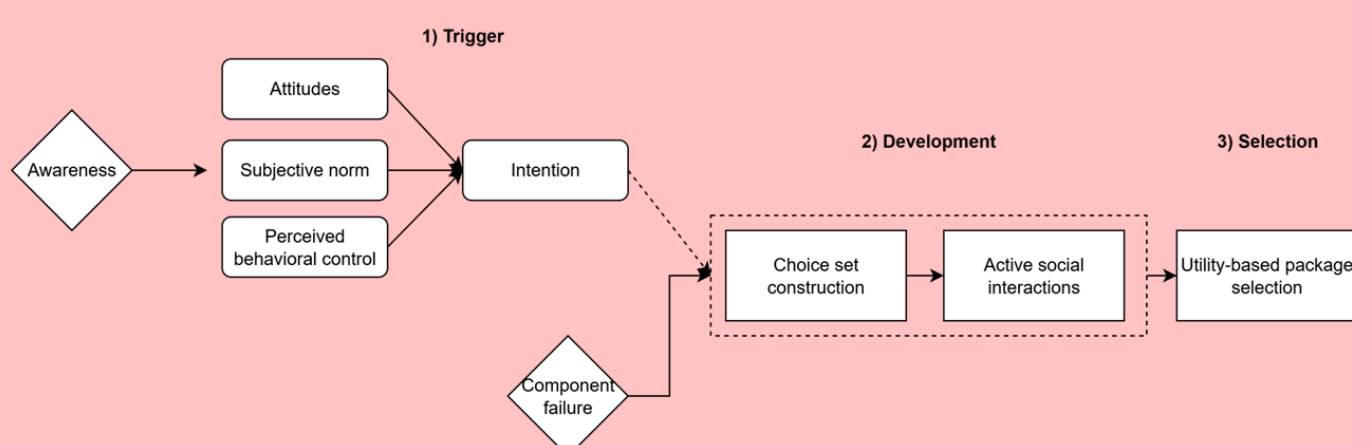


Figure 2. Household decision making process

## Conclusion & Next steps

- Introduced empirically grounded, heterogeneous decision rules with social influence
- Embedded trigger-development-selection sequence and social feedback
- Set up framework for empirical calibration & validation with incoming survey results
- Planned policy experiments: subsidies, norm-based interventions, infrastructure investments

## Research objectives

- Develop an agent-agent based model (ABM) for **co-adoption** of **PV, heat pump, and insulation renovation** with **synergies** and **tradeoffs** considered
- Design and conduct survey informed by behavioral theory to identify **drivers** and **barriers** of adoption, and use the result to **empirically calibrate** and **validate** the model
- Incorporate sequential decision making process and realistic social influence mechanisms

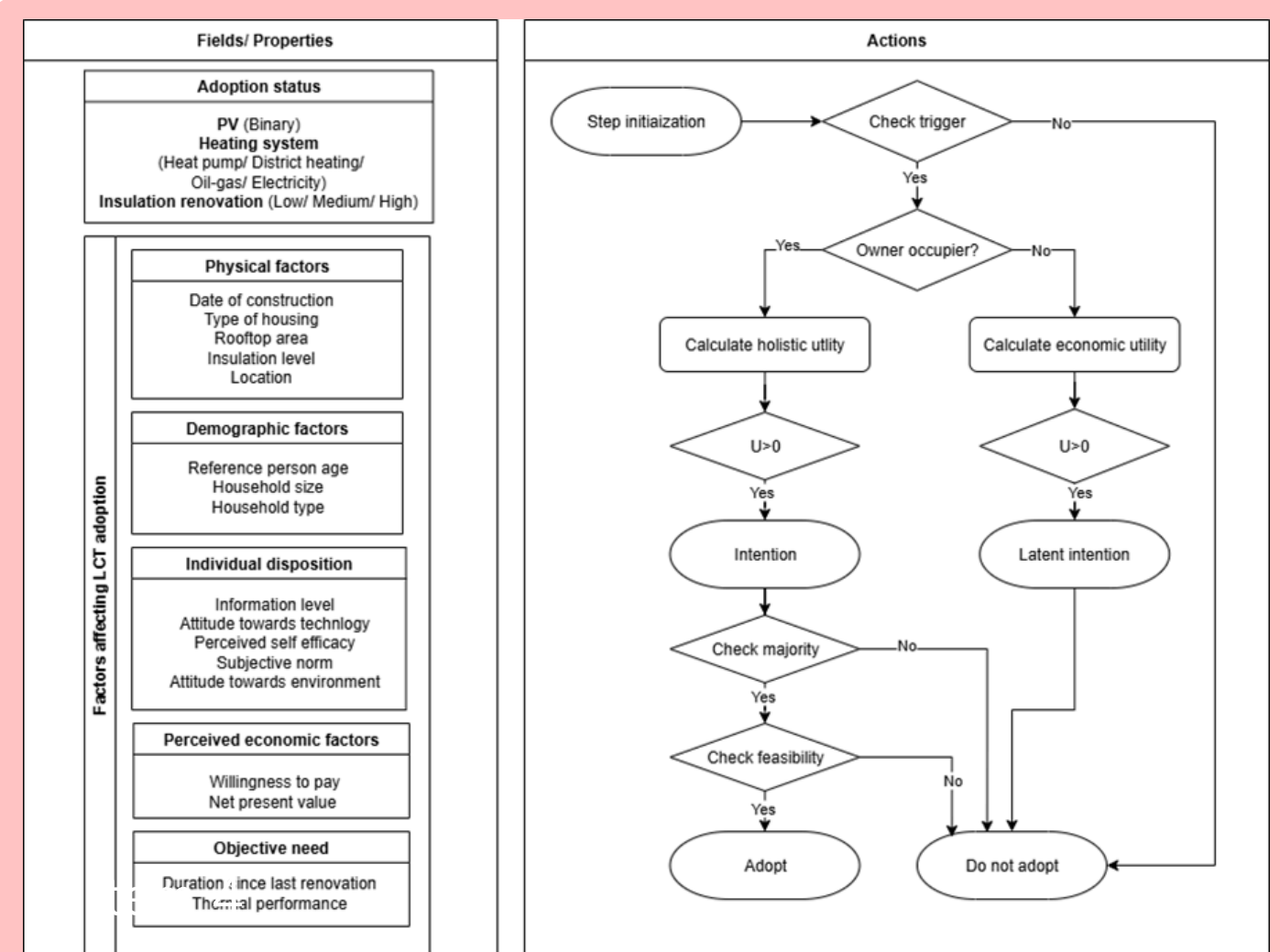


Figure 1. Overview of the ABM

### 3. Social influence process

- Network formation based on homophily and geographic distance
- Relative agreement model [4] for attitude updating

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