SASCHA KORF

SHARED WORK WITH:

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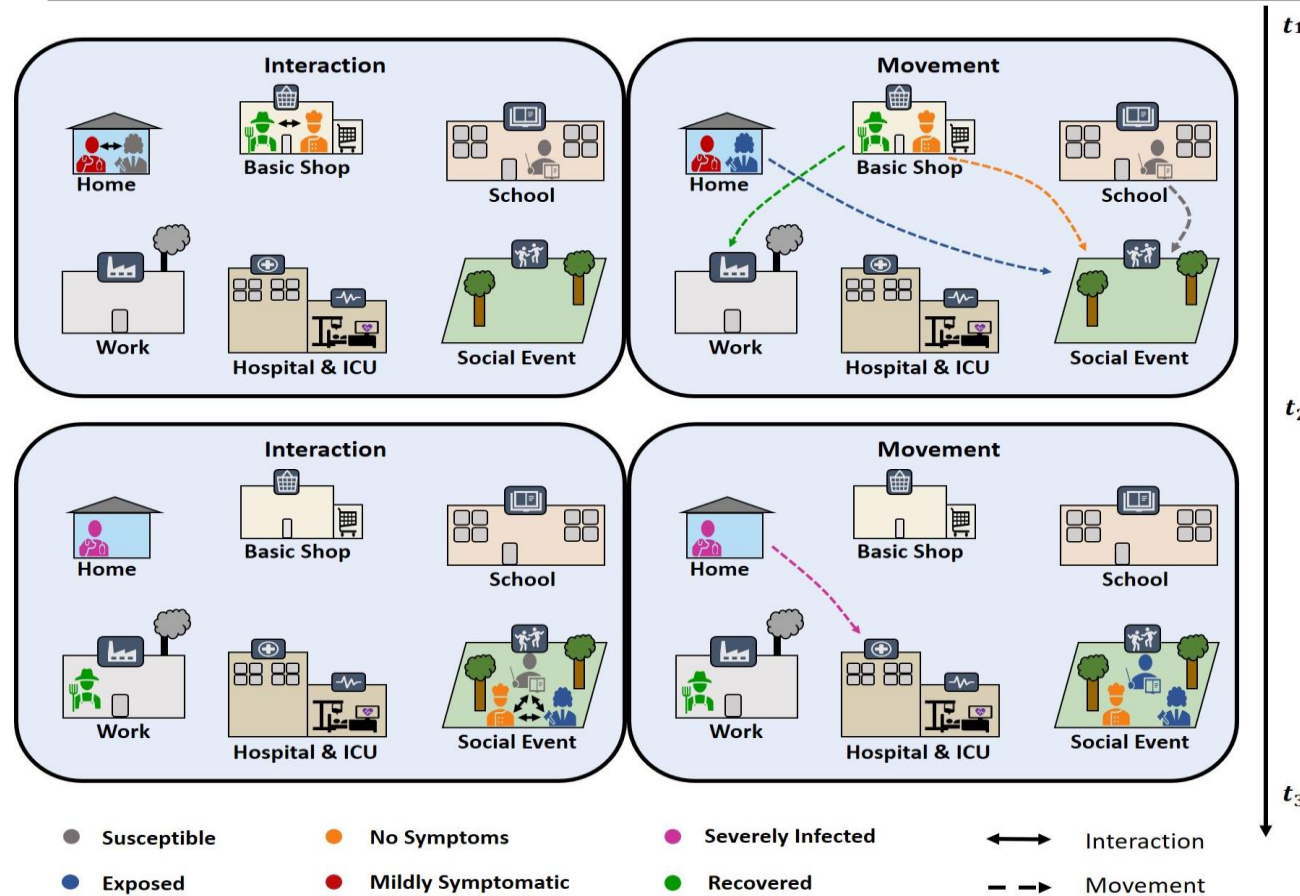Achim Basermann
Martin J. Kühn
Michael Meyer-Hermann

AGENT-BASED MODELING FOR REALISTIC REPRODUCTION OF HUMAN MOBILITY AND CONTACT BEHAVIOR TO EVALUATE TEST AND ISOLATION STRATEGIES IN EPIDEMIC INFECTIOUS DISEASE SPREAD

3RD (INTER-) NATIONAL CONFERENCE ON INFECTIOUS DISEASE MODELING

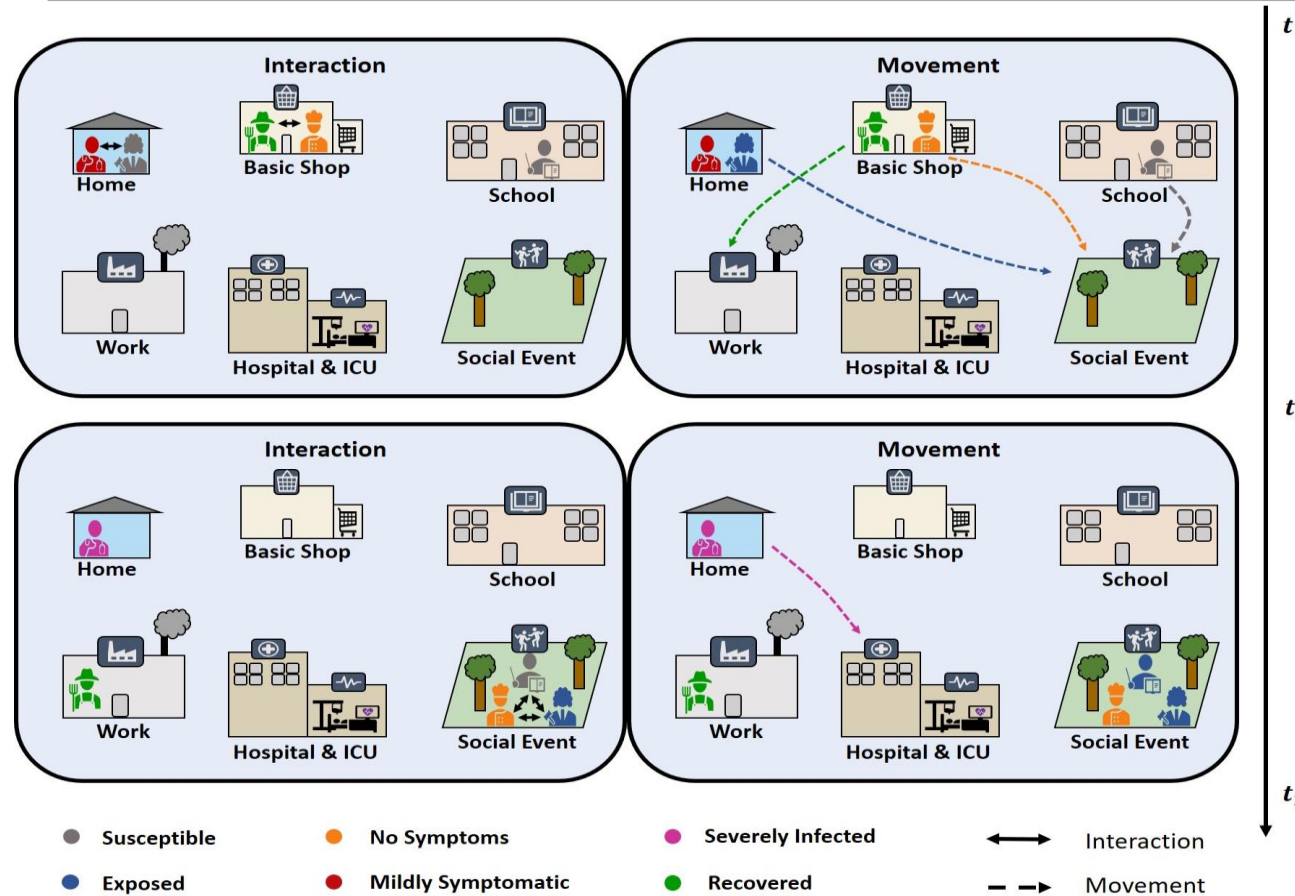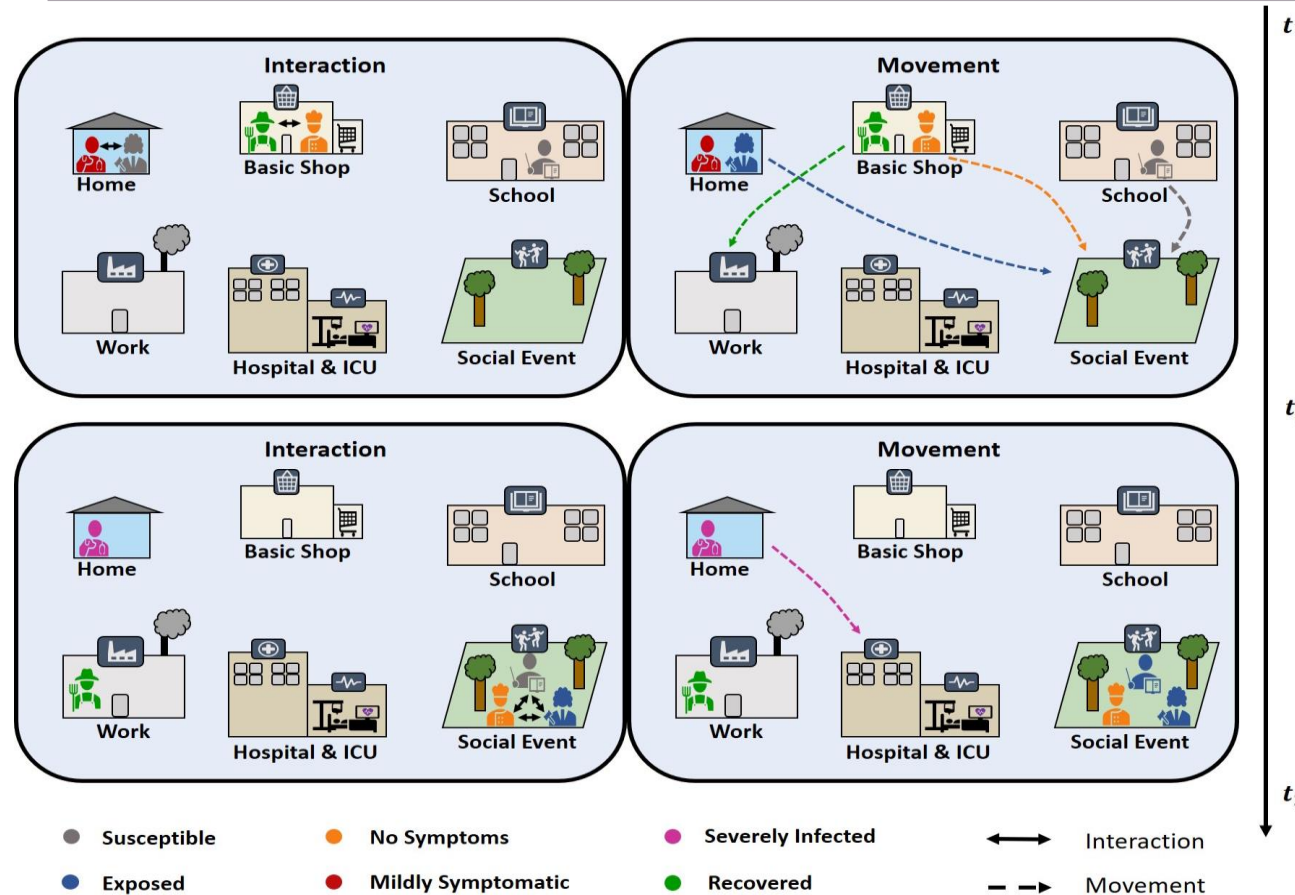26 – 28 FEBRUARY 2025 IN BERLIN

ABM Overview

ABM Interaction

- **Interactions** happen at locations where there is an infected agent
- Probability is determined based upon several features such as: age, susceptibility, or amount and infectivity of infected agents

ABM Movement

- Two ways of **moving** to locations:
  - **Rules**: Predetermined rules, e.g., going to work at specific times, going to the hospital when severely infected, etc.
  - **Trips**: Predefined trips from one location to another at a specific time for an specific agent

ABM Infection Model

- Infectiousness of an agent is determined by a viral shed curve

- Viral shed is based upon a viral load curve

- For each infection a different viral shed curve is drawn

- The course of an infection is dependent upon multiple factors, e.g., age and vaccination status
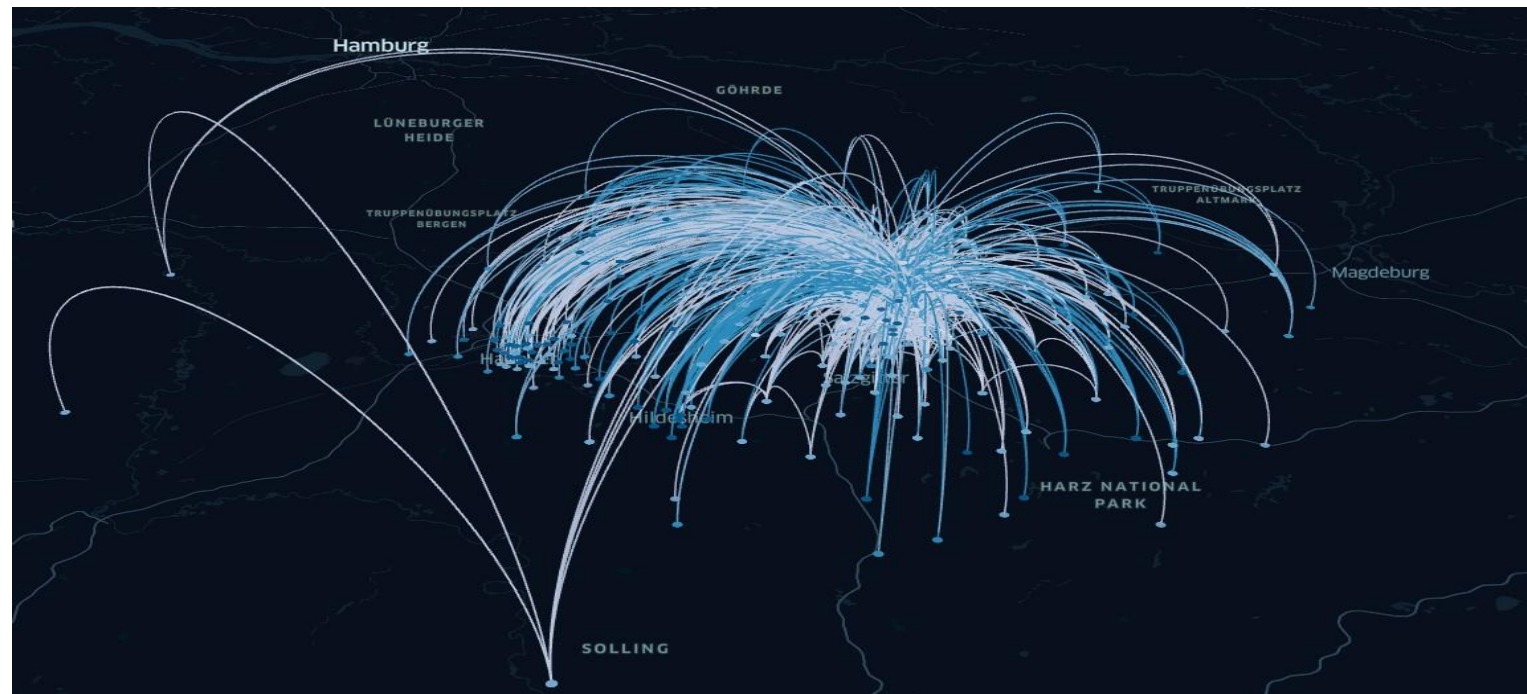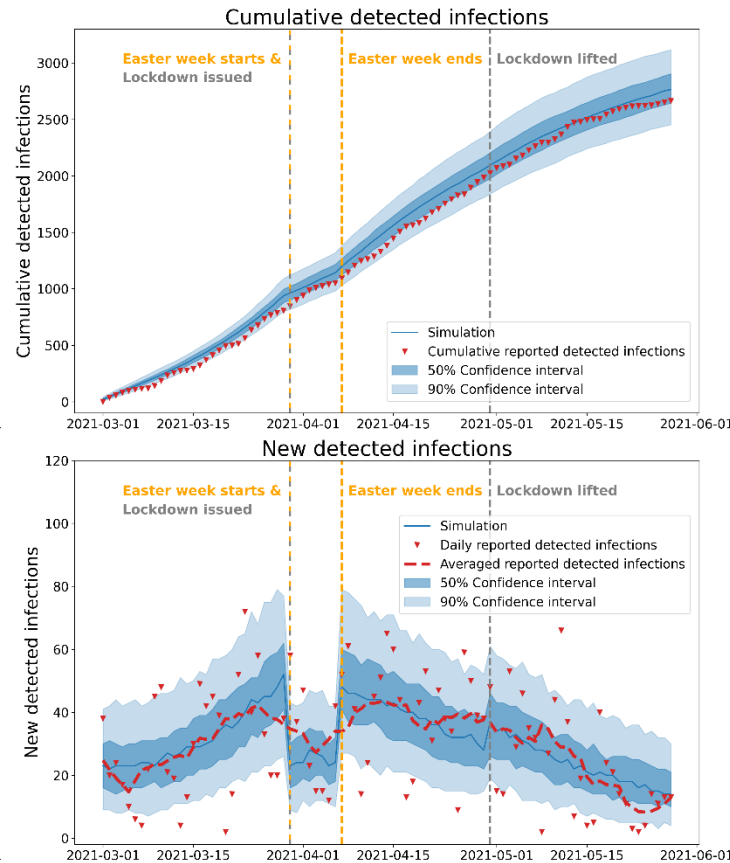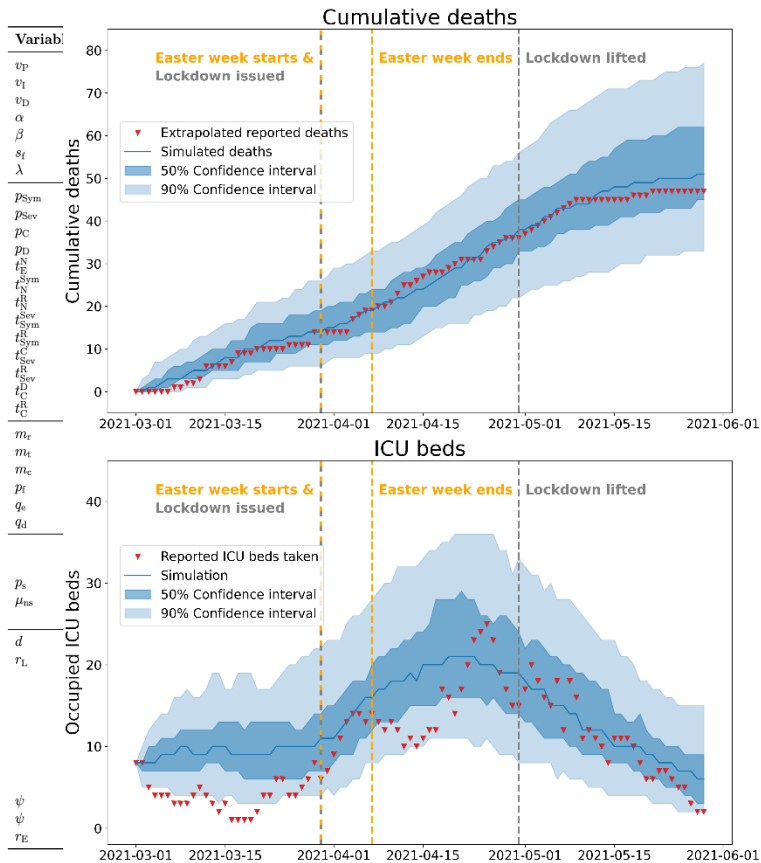

Viral shedding
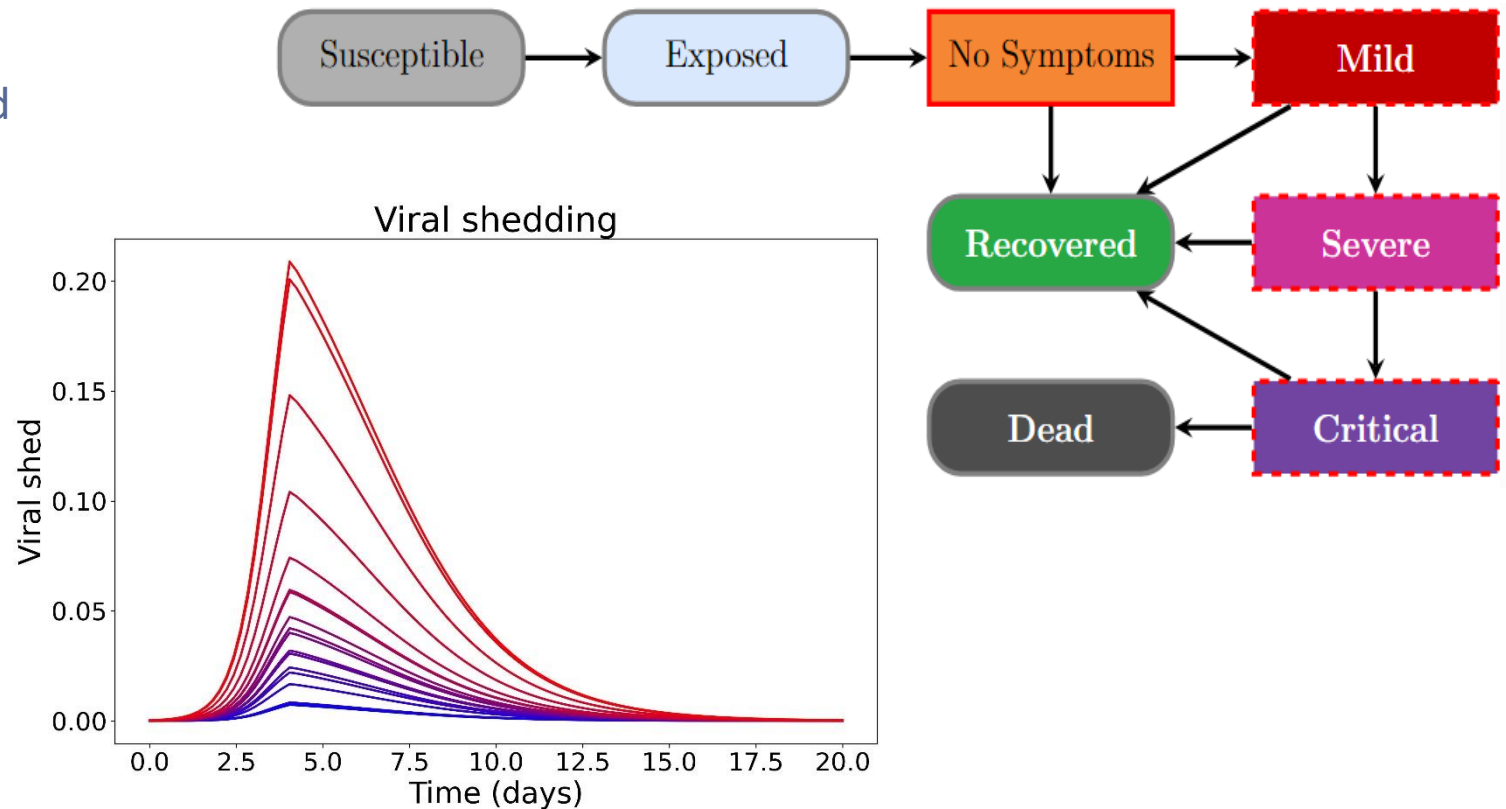
ABM Testing
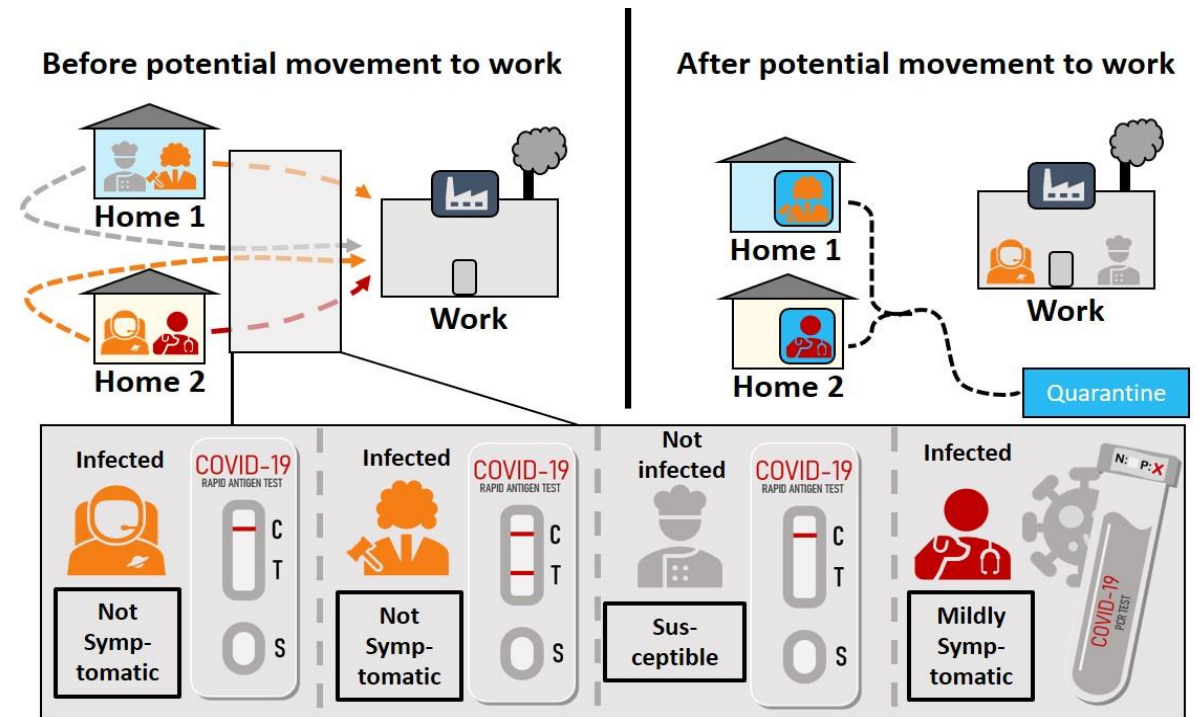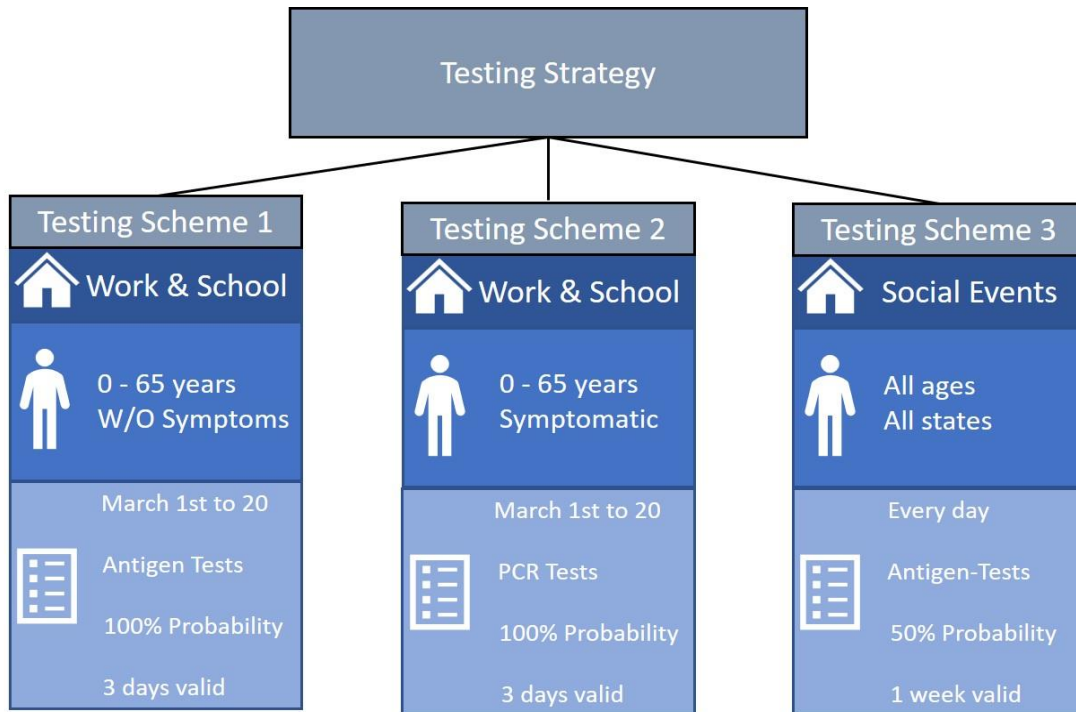
ABM
Trips for Brunswick demonstrator model

- Around 370.000 persons from Brunswick and the surrounding area

- Over 1.3 million representative trips per day based upon MiD Data

ABM
Scenario

- Grid search to fit 5 parameters to real-world data

- We utilized shared and distributed memory parallelization

- Final grid search ran 2.592 concurrent simulations on a total of 3.456 compute cores multiple times resulting in 85.536 simulations in 8 hours
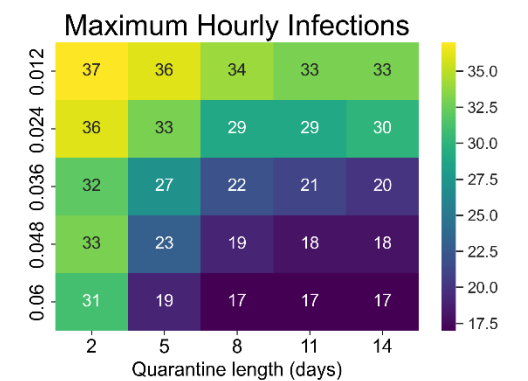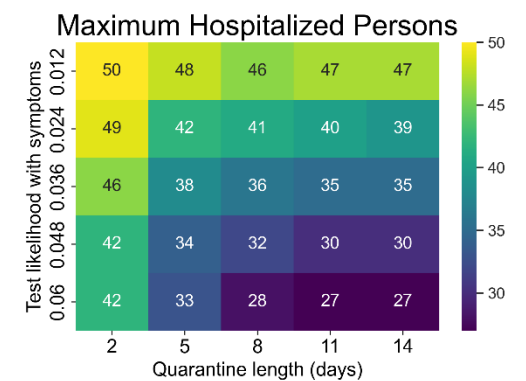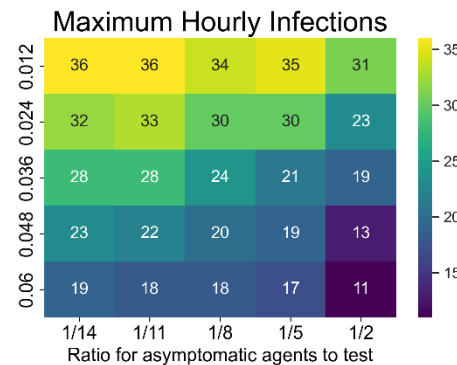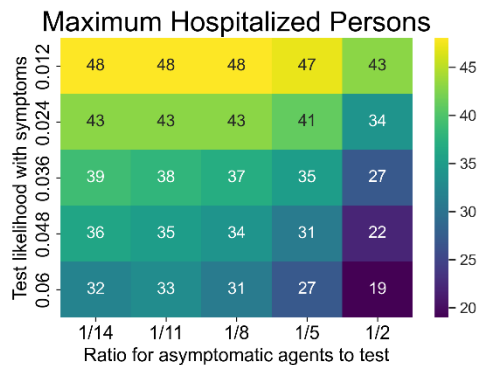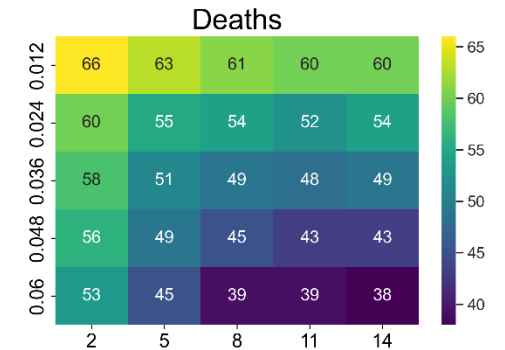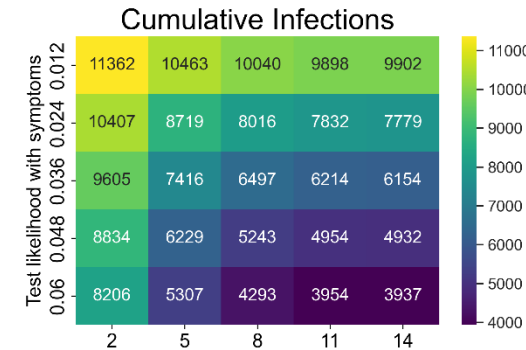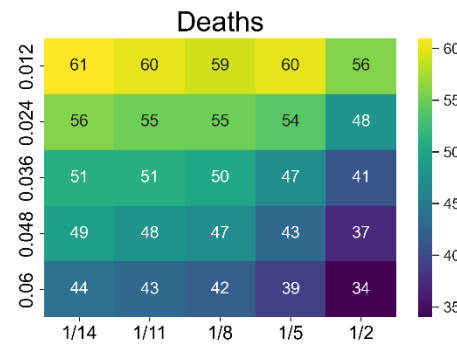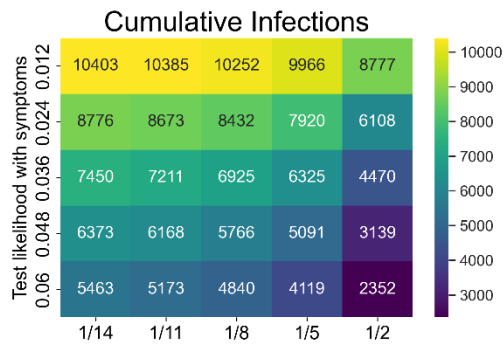
ABM
Results Scenarios

- Three different scenarios for the likelihood of testing when moving to a location

- Fewer tests during Easter week with special gatherings at Easter Sunday and Monday

- Less mobility when a lockdown is issued from March 29, 2021 to April 30, 2021
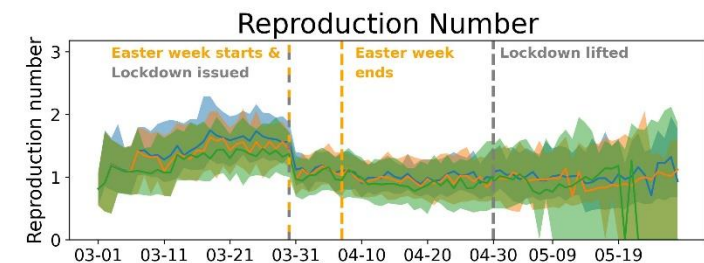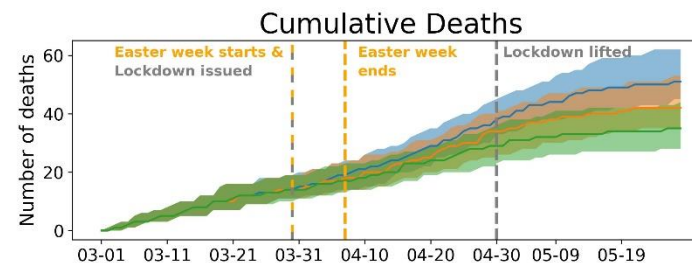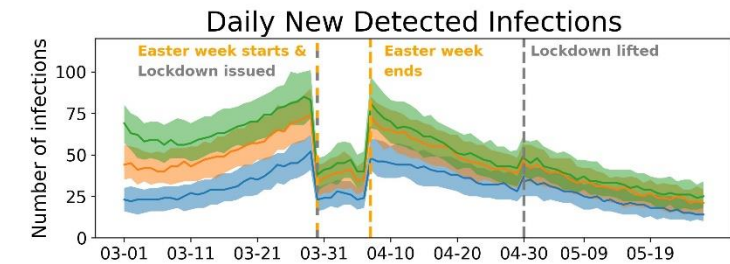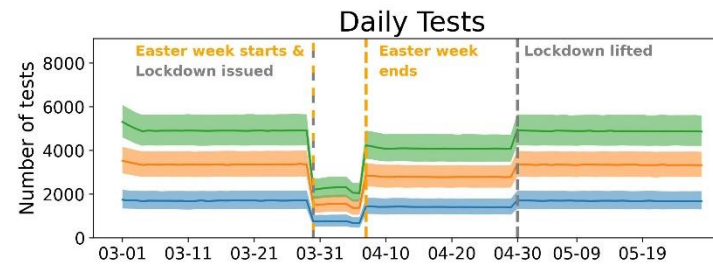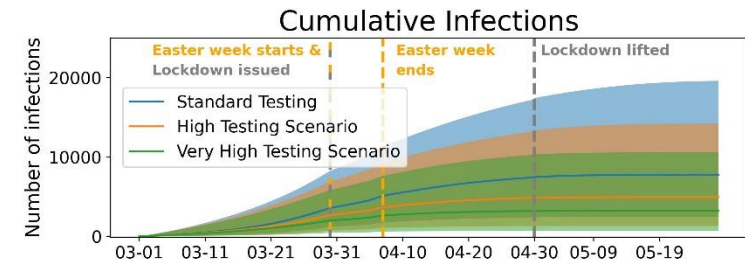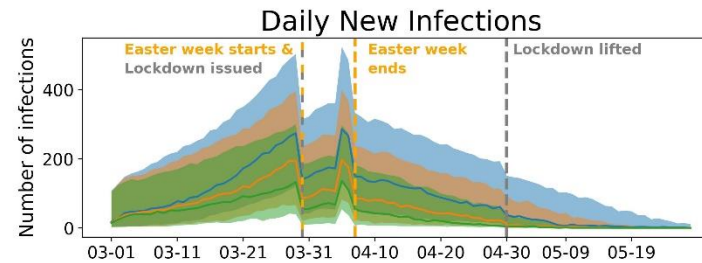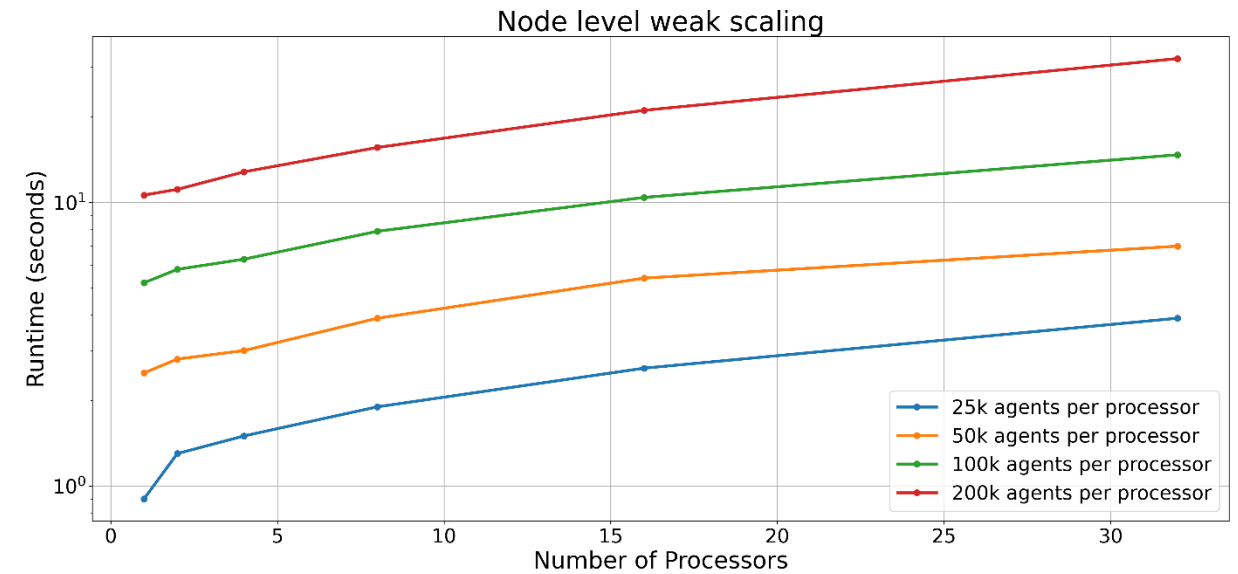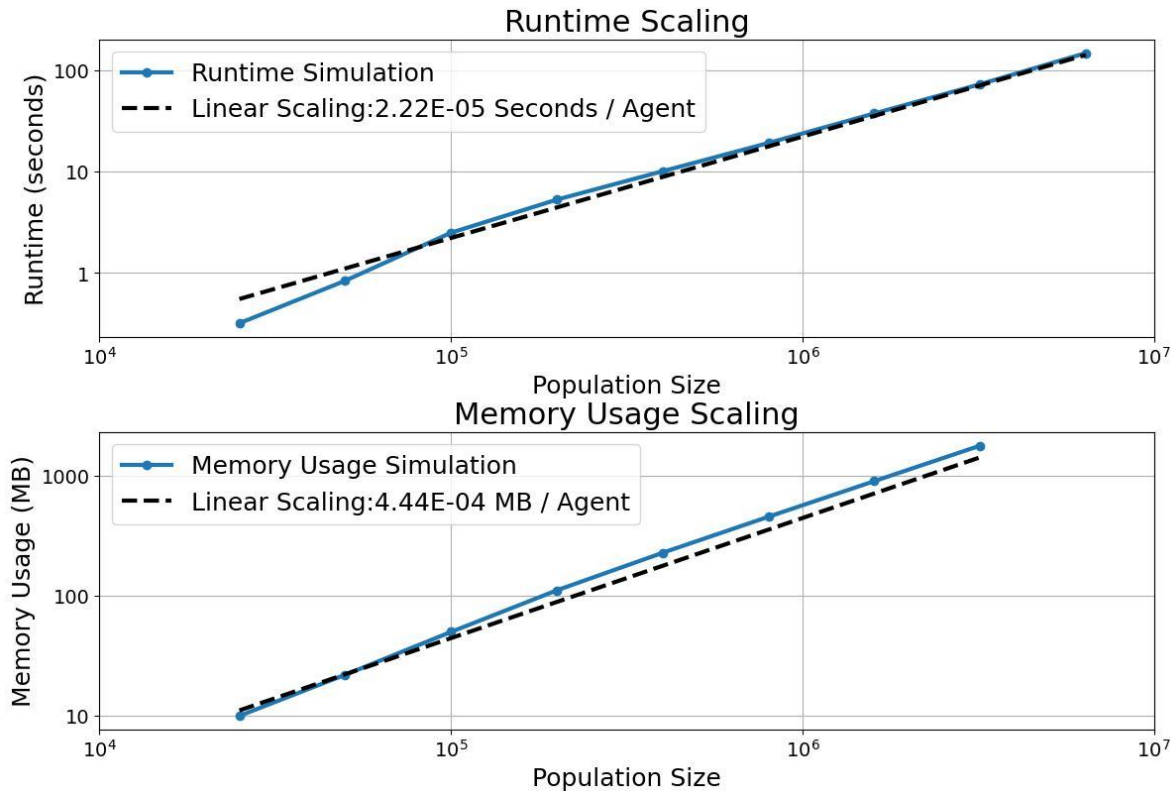
ABM
Results Parameter Variation

ABM
Scaling Results

Repository

Paper (in Review) Co-authors

MEmilio Repository

ABM (2024)

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Thank you for your attention!
Questions?

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for Severe Infectious Diseases