2021 International System Dynamics Conference
July 25-30, 2021

A system dynamics analysis about the relationship between ventilation and the spread of COVID-19 in indoor spaces

Work in progress

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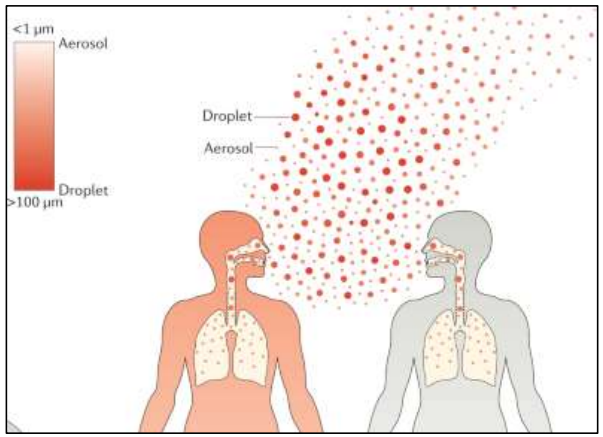
Project Case

- COVID-19 is transmissible through air
- Transmissibility is also dependent on viral concentration in air
- Principal policy focus so far on:
  - Distance guidelines (density, absolute distance)
  - Personal air filters (masks)
  - Generic ventilation guidelines
- Ventilation has an effect on air viral concentration
- Opportunity for:
  - Scenario testing for different indoor environments
  - Activity-dependent ventilation (e.g., Restaurants, Classrooms)
  - Identification of Operational recommendations
  - Ventilation System Characteristics (Q, pf, RH)
  - Activity type and duration (e.g., number and length of school breaks)



What is the relationship between transmission and ventilation?

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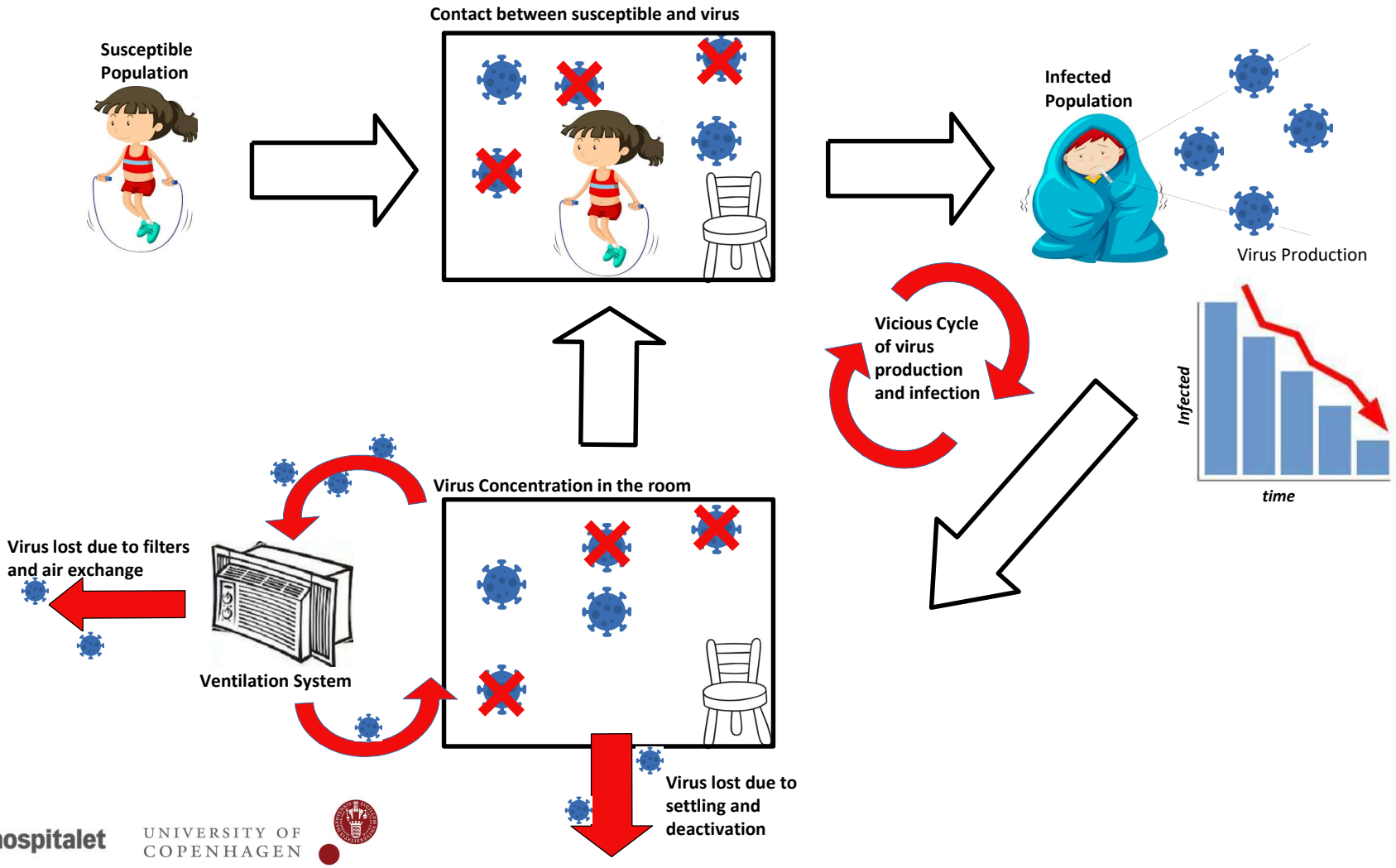

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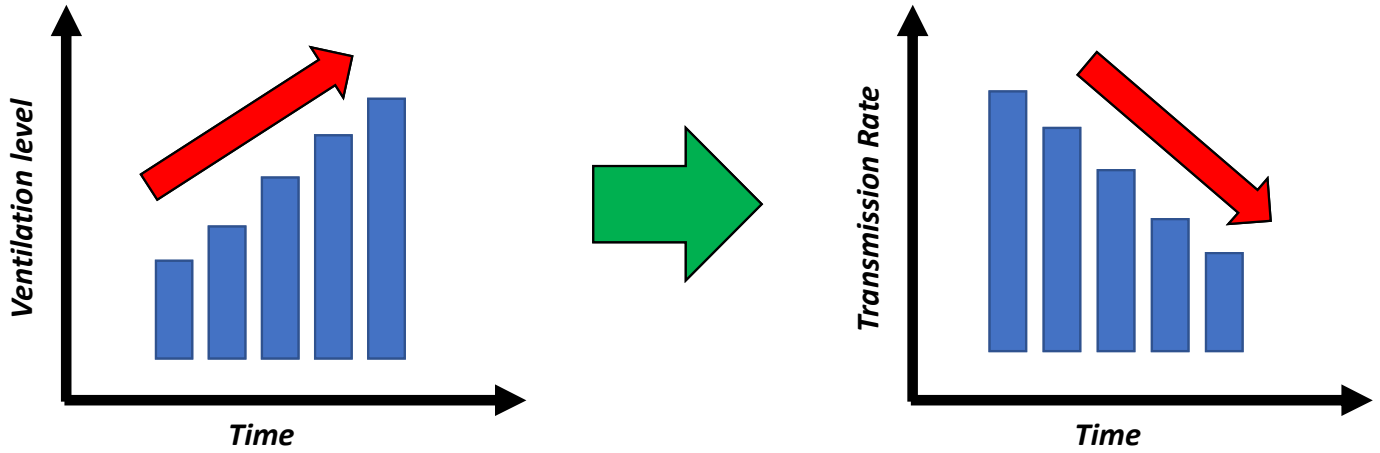
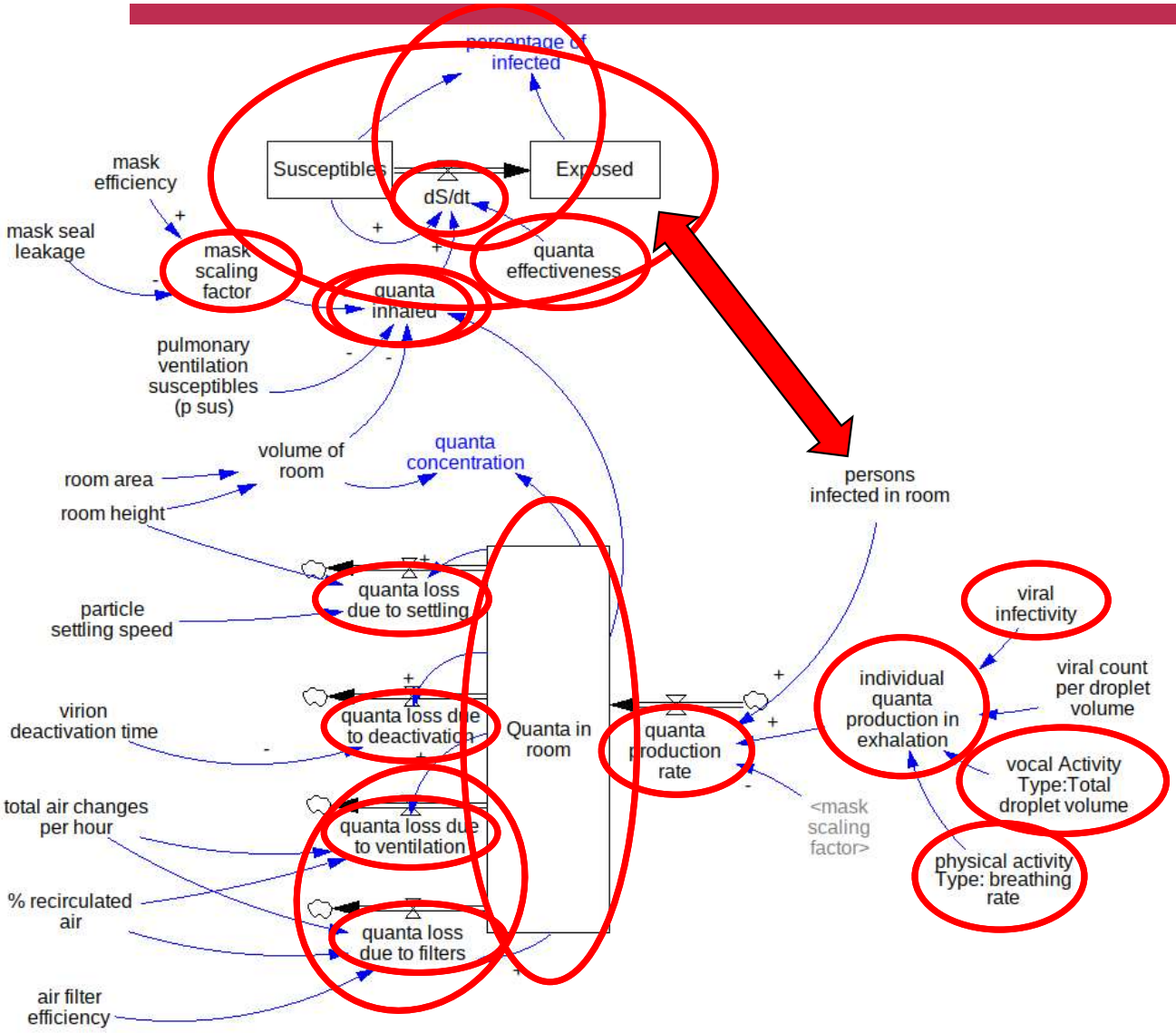
Dynamic Hypothesis

- The level of ventilation used is inversly proportional to transmission rate:





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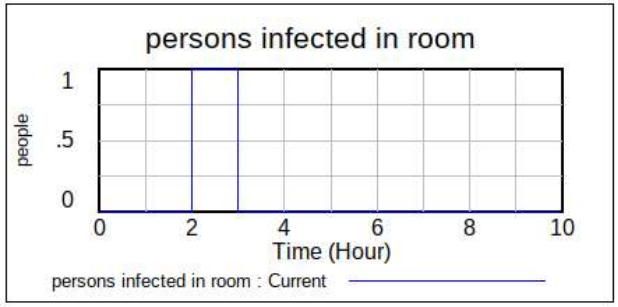
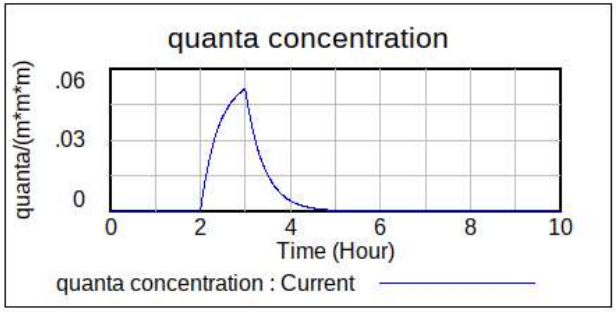
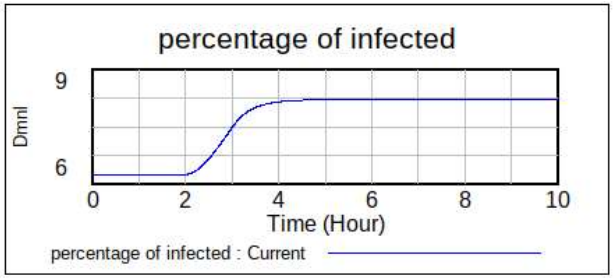
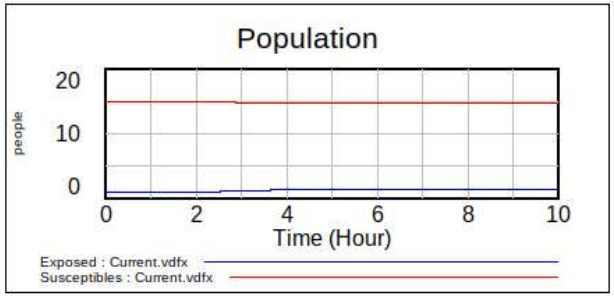
Partial Results

- Pharmacy Example (Buonanno)
- 25 m3 room
- Infected person in room for 1 hour
- 15 susceptibles in the room









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Thank you

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