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Dynamic View of Pandemic Circumstances with Government Interventions and Social Factors

Presented by
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Introduction

- The relationship between social factors, government policies and pandemic outcomes
  - Large metropolitan size results in expressively higher COVID-19 infection and higher mortality (Hamidi, Ewing, & Sabouri, 2020)
  - Low preparedness of national health policy/actions towards COVID-19 leads to higher levels of national confirmed case and overall mortality (Chaudhry, Dranitsaris, Mubashir, Bartoszko, & Riazi, 2020)

- Review the pandemic circumstances statically
- Can we trust the numbers? Actual number of COVID infections vs. the number of reported cases
- Limited prediction on current government policies

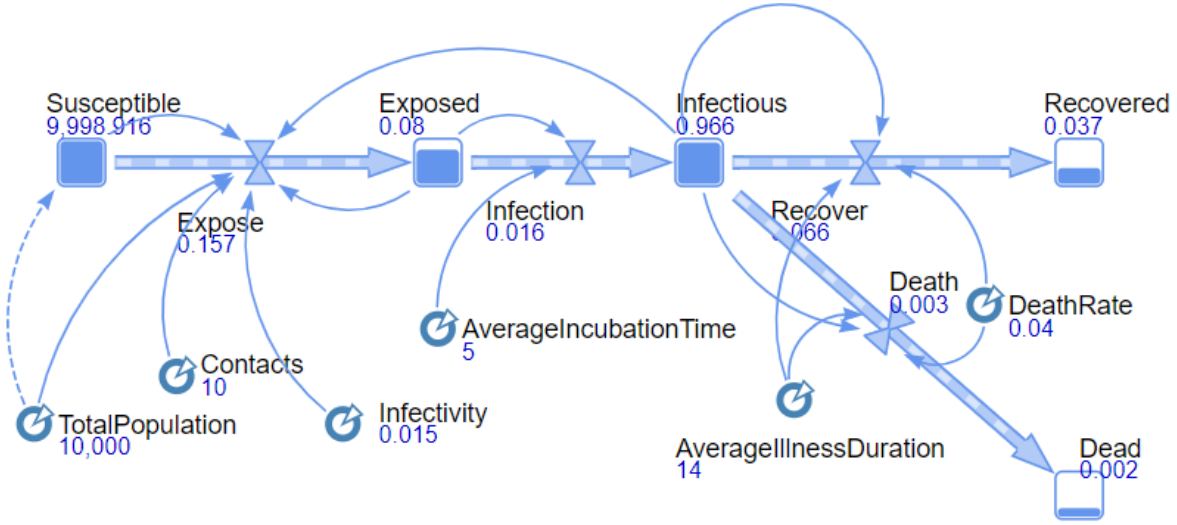
Research Questions

- How to evaluate and predict the impacts of the government interventions responding the pandemic?

- We incorporate the System Dynamics theory (*Forrester, 1968a; Forrester, 1968b; Forrester & Senge, 1980*) and construct a dynamic model to simulate how different government policies could impact the pandemic circumstances.
- We also emphasize that government policies could lead to other social effects by identifying the connecting dynamic links.

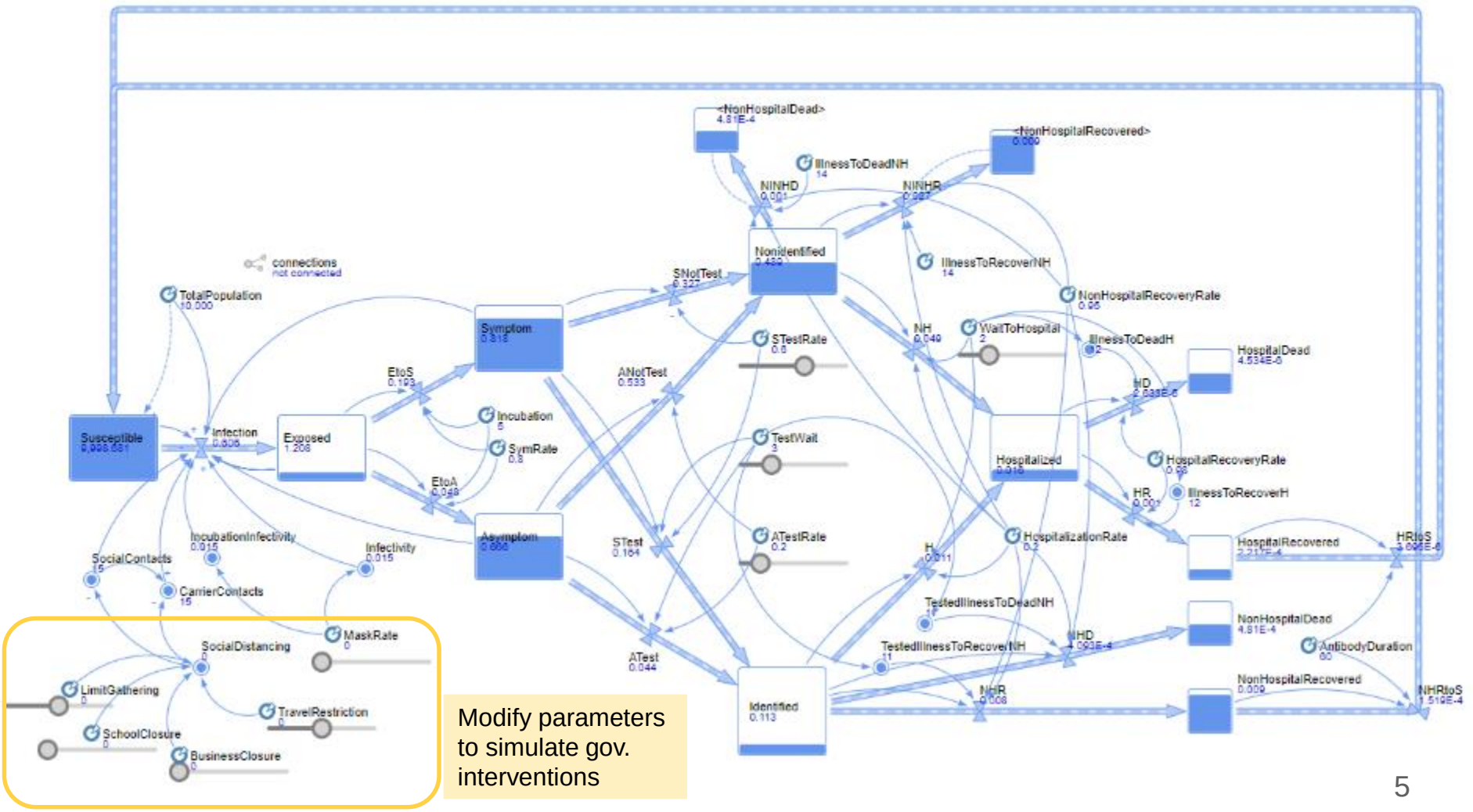
SEIR Model

- The population **susceptible** to infection
- The people that are **exposed** of the virus
- The people that are currently **infected**
- The people who **recover** and who **die**



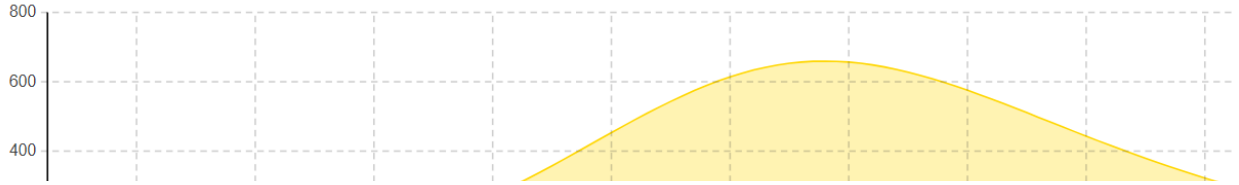
Expanded dynamic model

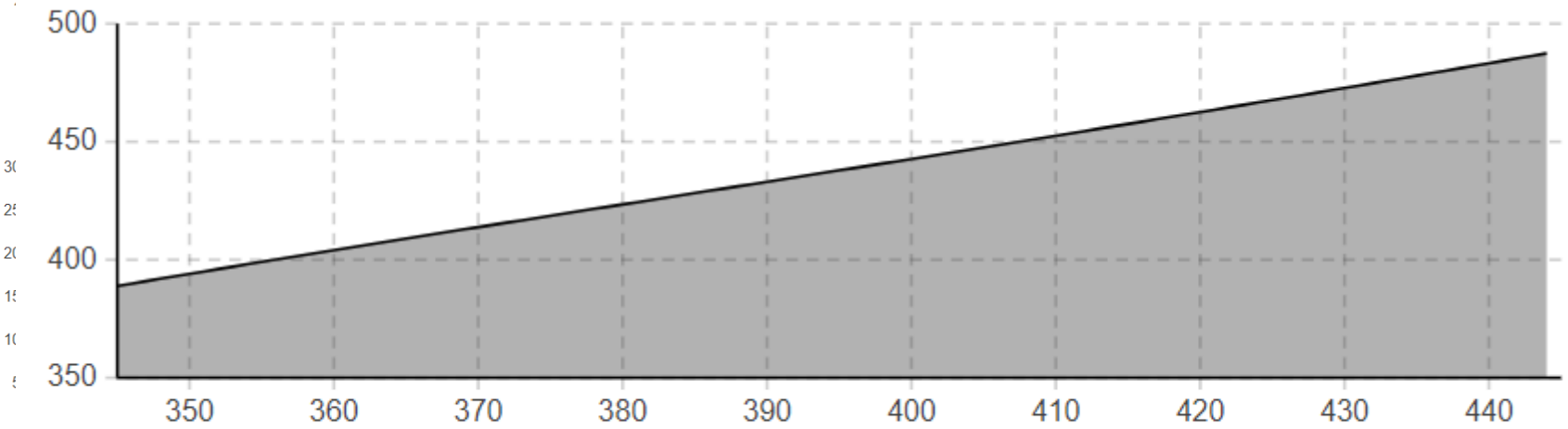
A dynamic model with susceptible, exposed, testing, hospitalization, recovered, dead.

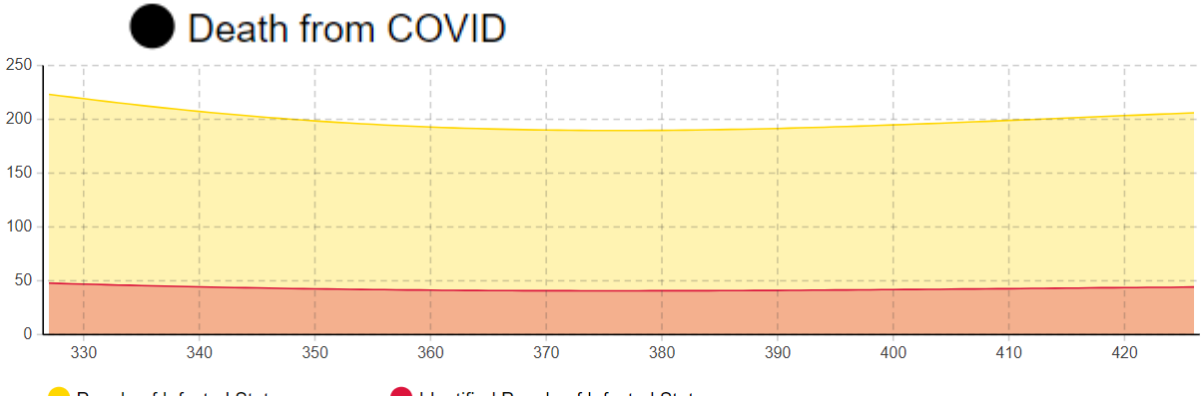


Modify parameters to simulate gov. interventions

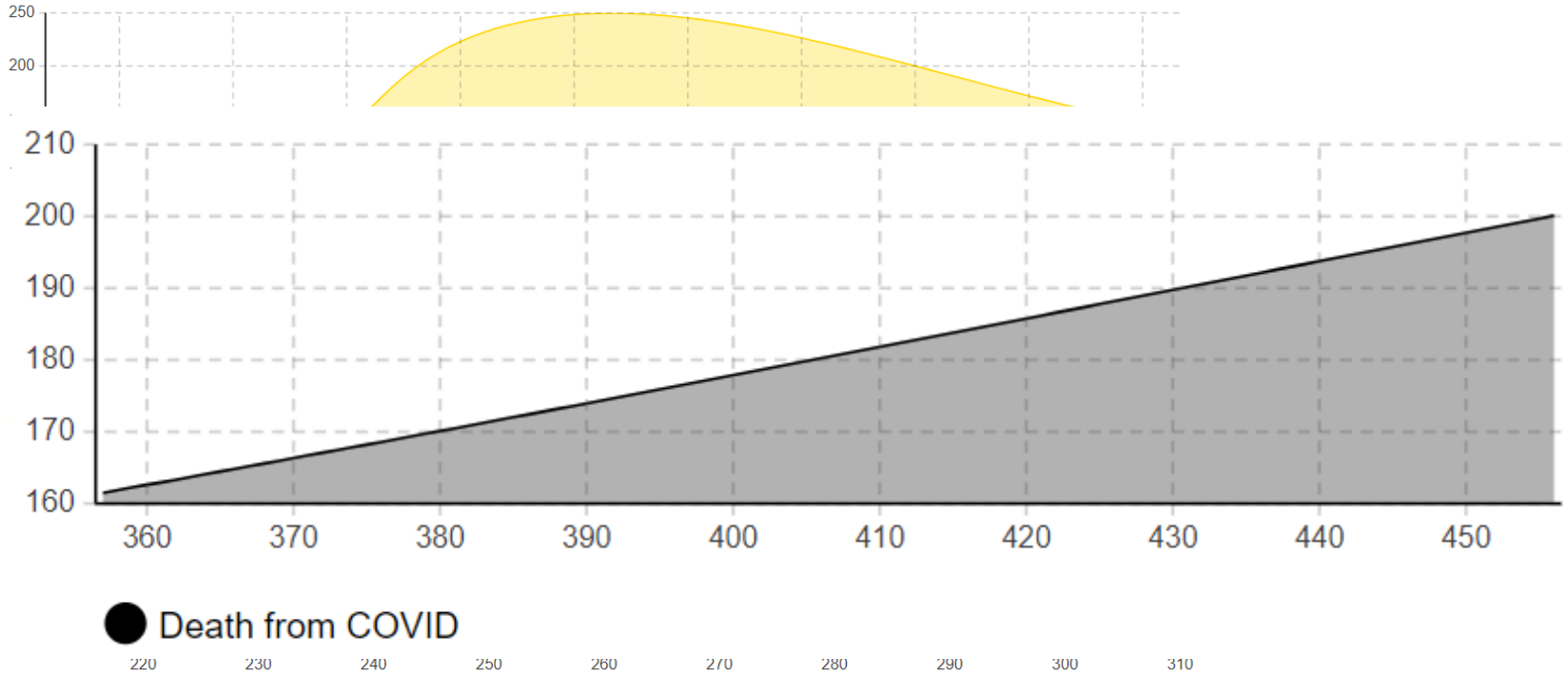
Pandemic outcomes without any government intervention (10,000 people)

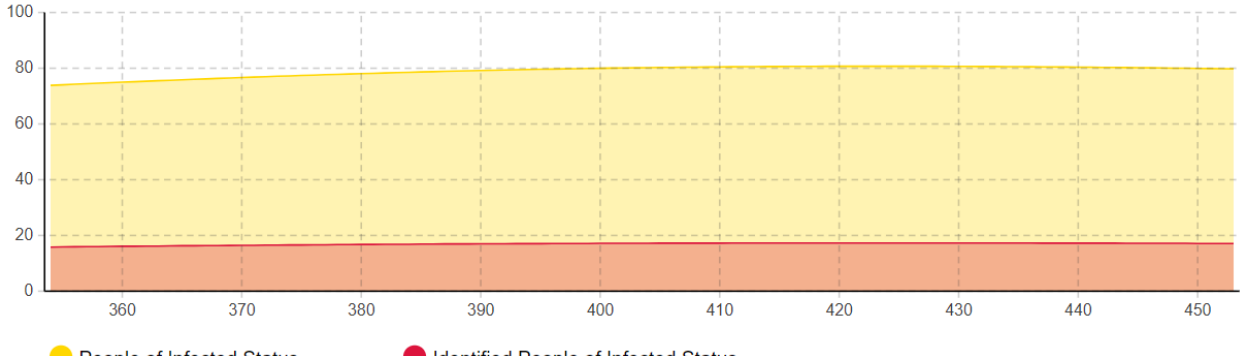






Pandemic outcomes with Social Distancing measures





Takeaways…

- The proposed dynamic model corresponds to the flow of an epidemic and provides a dynamic view to study the pandemic and to explain why current measurements fail to capture the real development of the pandemic;
- It identifies the links between the COVID-19 pandemic, government policies, and social factors; and
- It simulates different levels of government policies and predicts possible outcomes on the pandemic and related social factors to understand the global epidemic's development.

Thank you!

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