System Dynamics representation of SEIR Model

Differential Equations

$$\frac{dS}{dt} = -\frac{pq}{VA} IS,$$

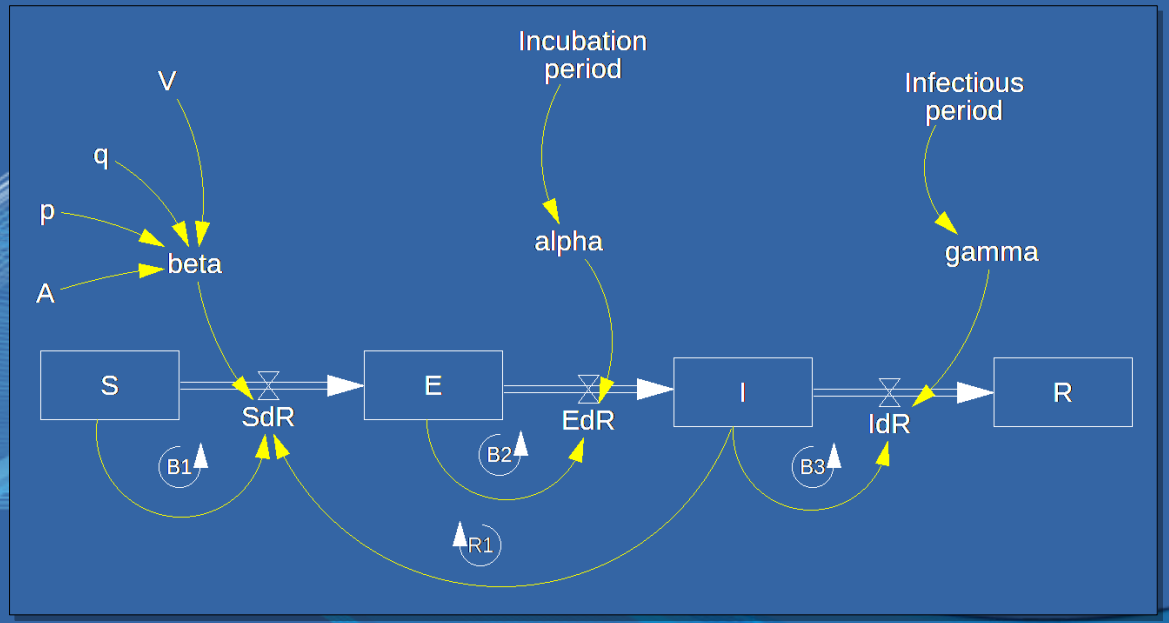
$$\frac{dE}{dt} = \frac{pq}{VA} IS - \alpha E,$$

$$\frac{dI}{dt} = \alpha E - \gamma I,$$

$$\frac{dR}{dt} = \gamma I,$$

$$S + I + E + R = N,$$

Model Representation

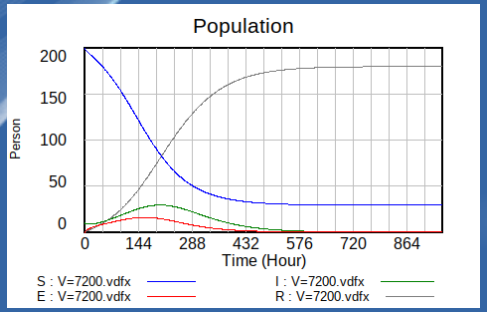


Variable	Name
S	Suceptible
E	Exposed
I	Infected
R	Recovered
V	Room Volume
A	Ventilation Rate
q	Quanta production
p	Pulmonary Ventilation rate

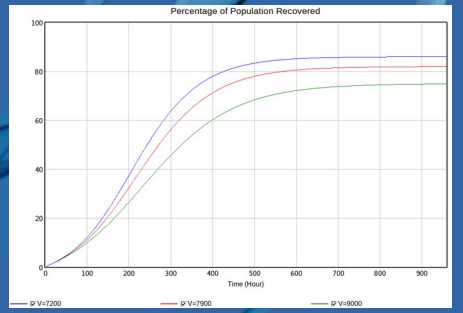
Model Source: Noakes, C.J., Beggs, C.B., Sleigh, P.A. and Kerr, K.G., 2006. Modelling the transmission of airborne infections in enclosed spaces. Epidemiology & Infection, 134(5), pp.1082-1091.

- Dynamic Simulation
  - Sensitivity
  - Phase Diagrams

SEIR dynamics



- Explicit Representation of
  - Accumulations (Inertia)
  - Causal Relationships
  - Exogenous vs Endogenous Variables
  - Feedback Loop visibility (R,B)



Sensitivity Analysis: Percentage of Population Recovered with different room Volumes, 7200, 7900 and 9000 m3