



COMAP and Ebola

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Problems

PROBLEM A:

Eradicating Ebola

PROBLEM B:

Searching for a lost plane

Problem A

The world medical association has announced that their new medication could stop Ebola and cure patients whose disease is not advanced. Build a realistic, sensible, and useful model that considers not only the spread of the disease, the quantity of the medicine needed, possible feasible delivery systems (sending the medicine to where it is needed), (geographical) locations of delivery, speed of manufacturing of the vaccine or drug, but also any other critical factors your team considers necessary as part of the model to optimize the eradication of Ebola, or at least its current strain. In addition to your modeling approach for the contest, prepare a 1-2 page non-technical letter for the world medical association to use in their announcement.

Our Schedule

Thursday: Work a little

Friday: Work

Saturday: Work

Sunday: Work

Monday: Work

How we progressed

Thursday: Pick problem

Friday: Pick and start on a model

Saturday: Make model handle more than one city

Sunday: Finish model

Monday: [Try to] Finish paper

Ideas

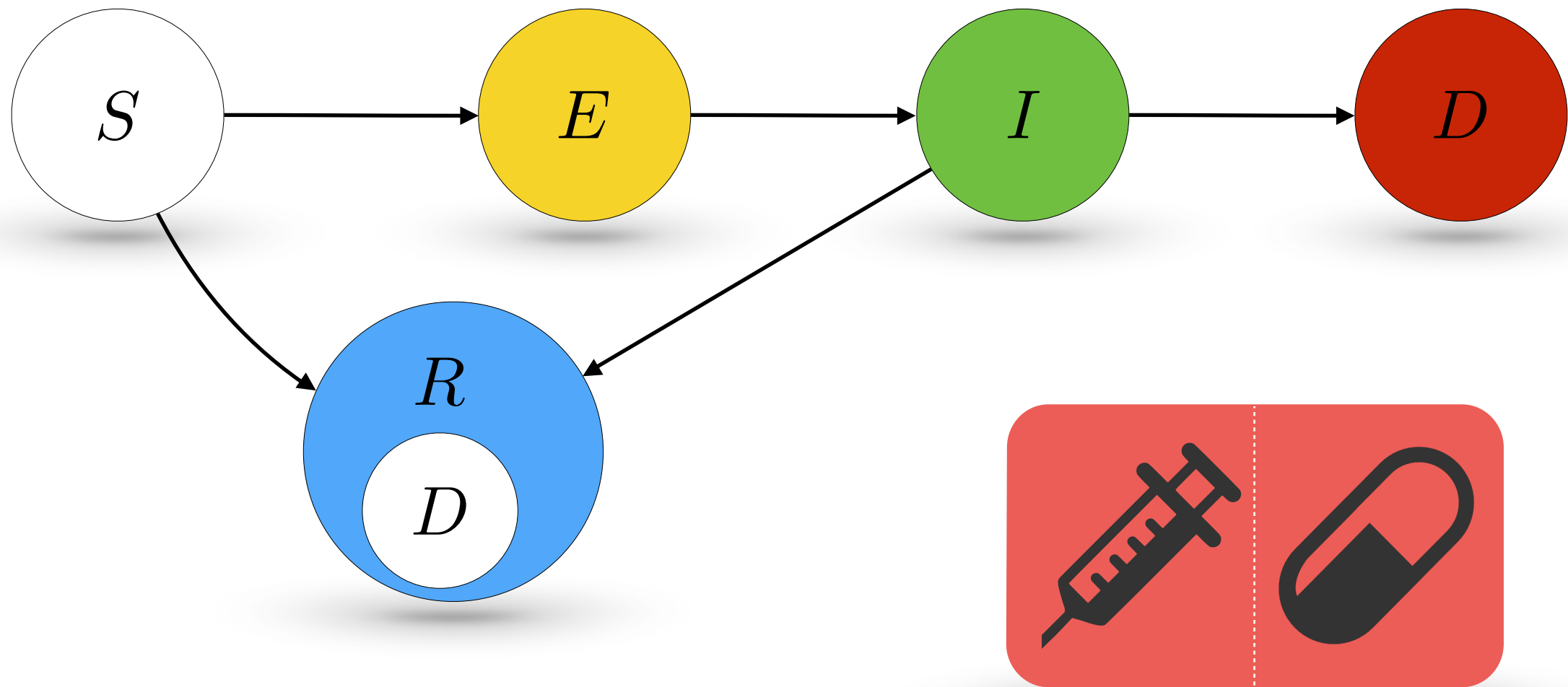


Our approach

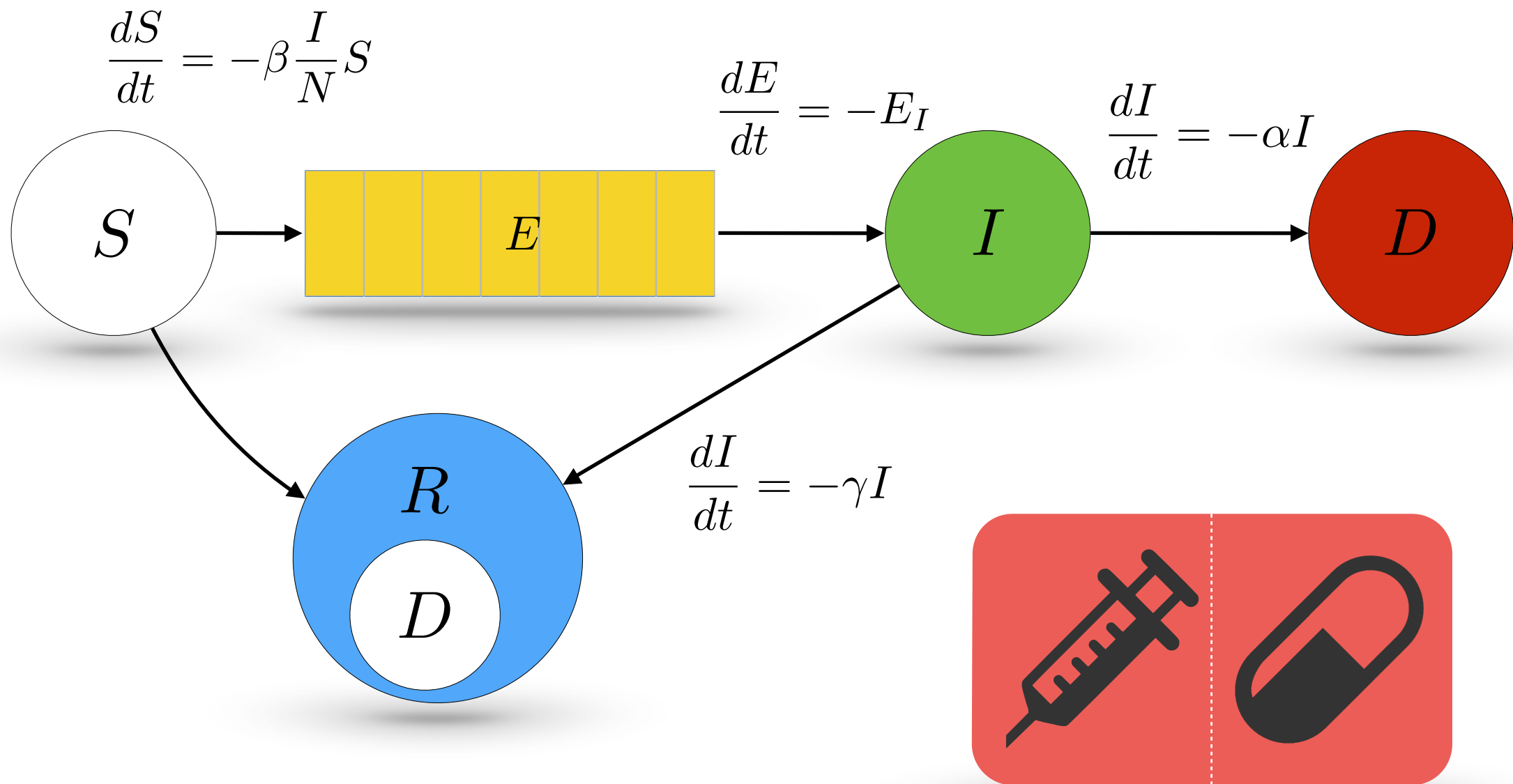
Modified SEIR Model

$$\begin{aligned}\frac{dS}{dt} &= -\beta \frac{I}{N} S + \frac{S'}{N' - I'} M_I - \frac{S}{N - I} M_O \\ \frac{dE}{dt} &= \beta \frac{I}{N} S - E_I + \frac{E'}{N' - I'} M_I - \frac{E}{N - I} M_O \\ \frac{dI}{dt} &= -\gamma I - \alpha I + E_I \\ \frac{dR}{dt} &= \gamma I + \frac{R'}{N' - I'} M_I - \frac{R}{N - I} M_O\end{aligned}$$

Intracity Mechanics

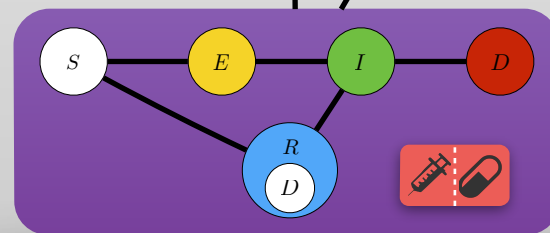
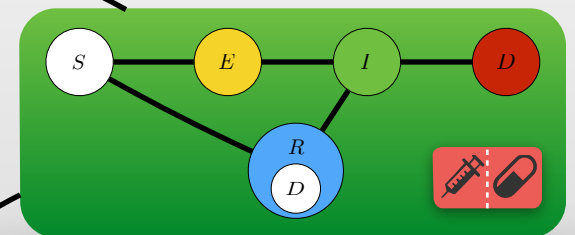
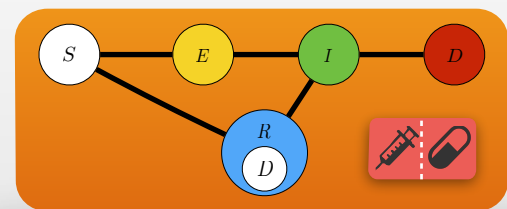


Intracity Mechanics

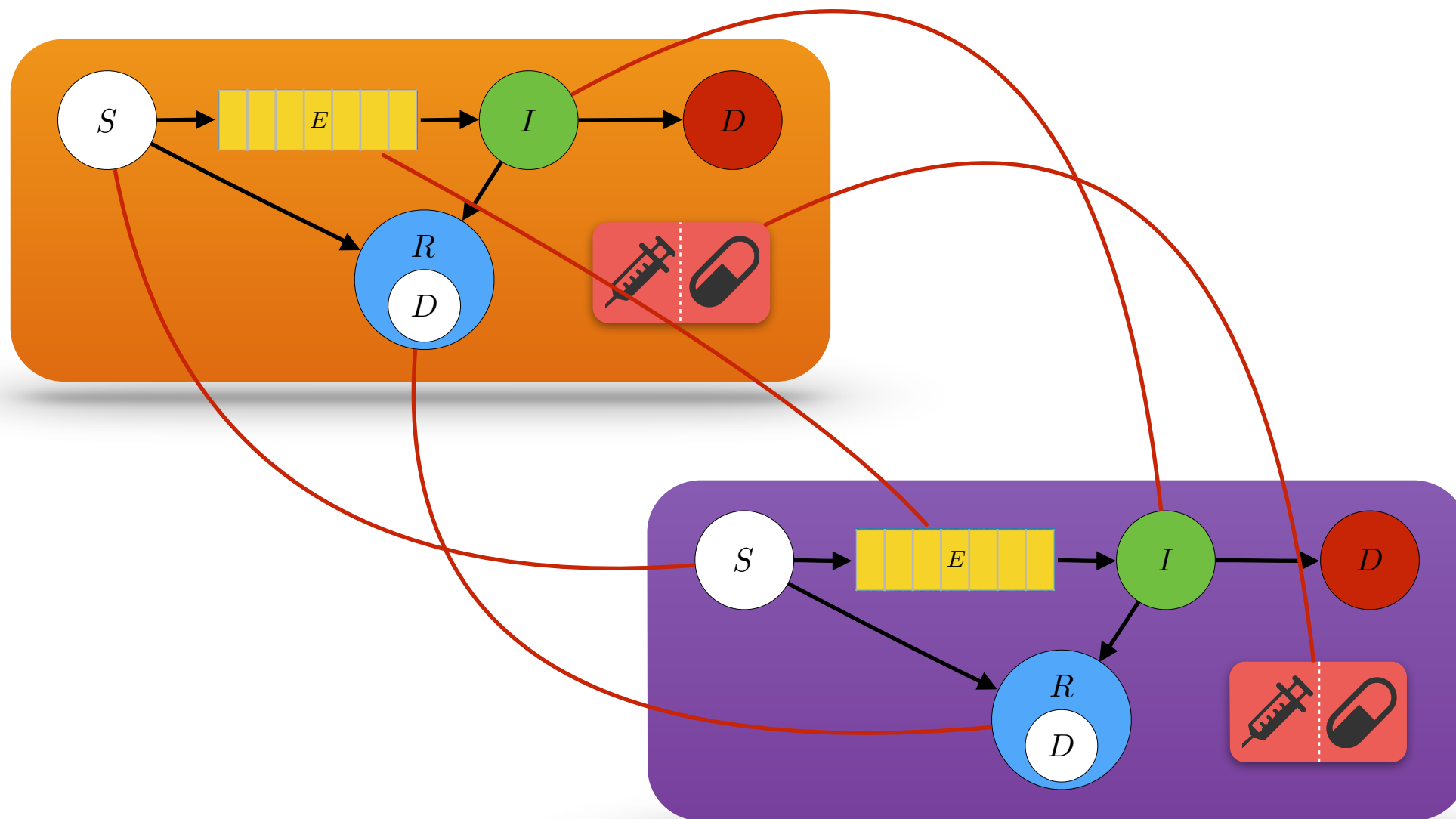


Intercity Mechanics

$$\begin{aligned}\frac{dS}{dt} &= \frac{S'}{N' - I'} M_I - \frac{S}{N - I} M_O \\ \frac{dE}{dt} &= \frac{E'}{N' - I'} M_I - \frac{E}{N - I} M_O \\ \frac{dI}{dt} &= 0 \\ \frac{dR}{dt} &= \frac{R'}{N' - I'} M_I - \frac{R}{N - I} M_O\end{aligned}$$

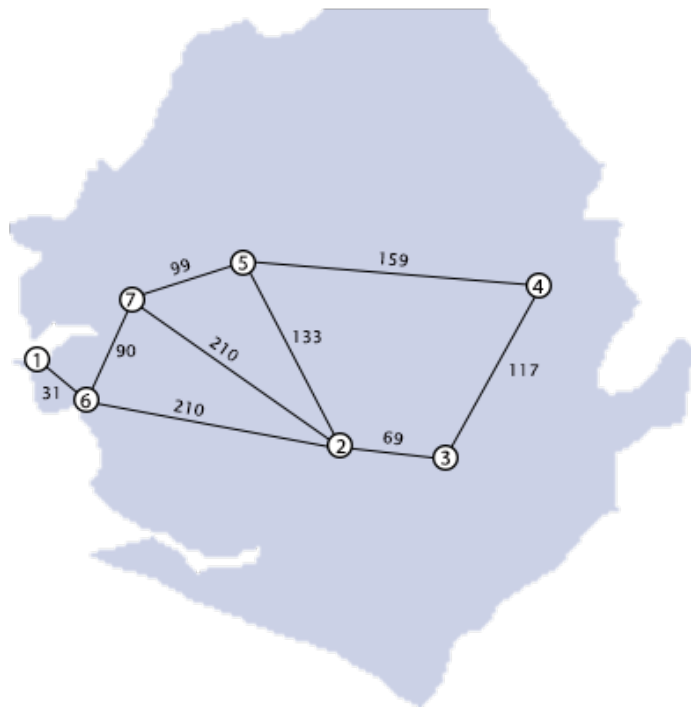


Intercity Mechanics



Graphs

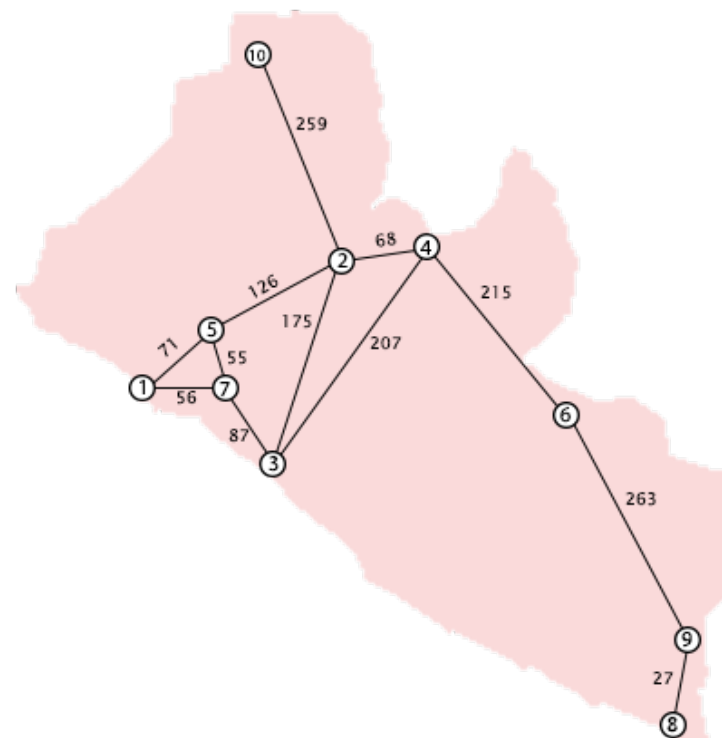
Sierra Leone



Guinea

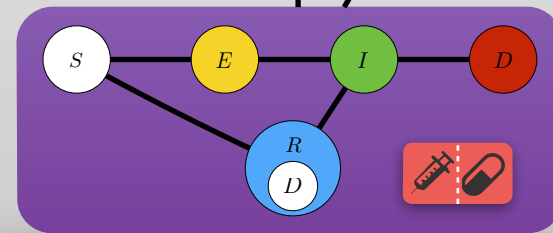
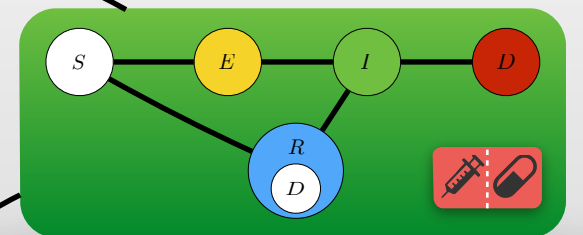
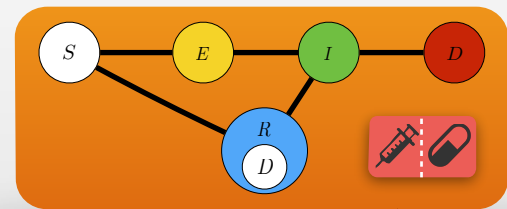


Liberia



Intercity Mechanics

```
typedef struct {  
    std::map<int, double> vaccineWeights;  
    std::map<int, double> medicineWeights;  
    long medicineDaysToWait;  
    long vaccineDaysToWait;  
    long medicineSave;  
    long vaccineSave;  
} vec;
```





MUSIC FROM THE MOTION PICTURE
MUSIC BY MARCO BELTRAMI

BRAD PITT

WORLD WAR
Z

Our experience

Eating



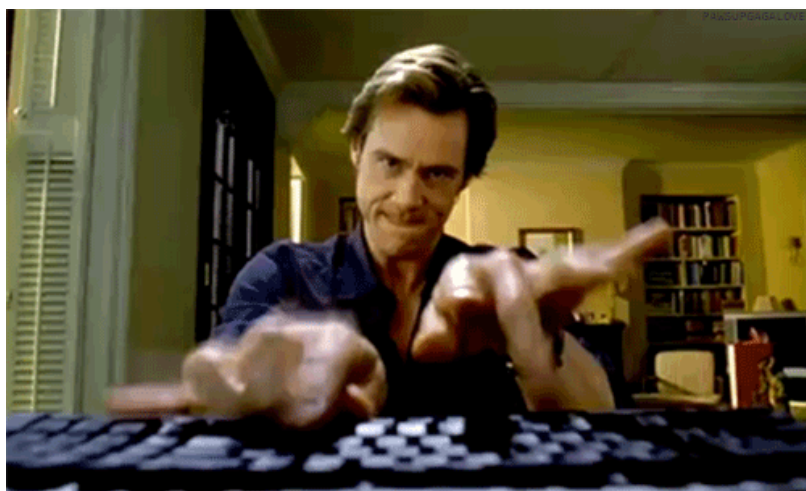
The End



Understanding



Coding



Disagreeing



Killing ideas

