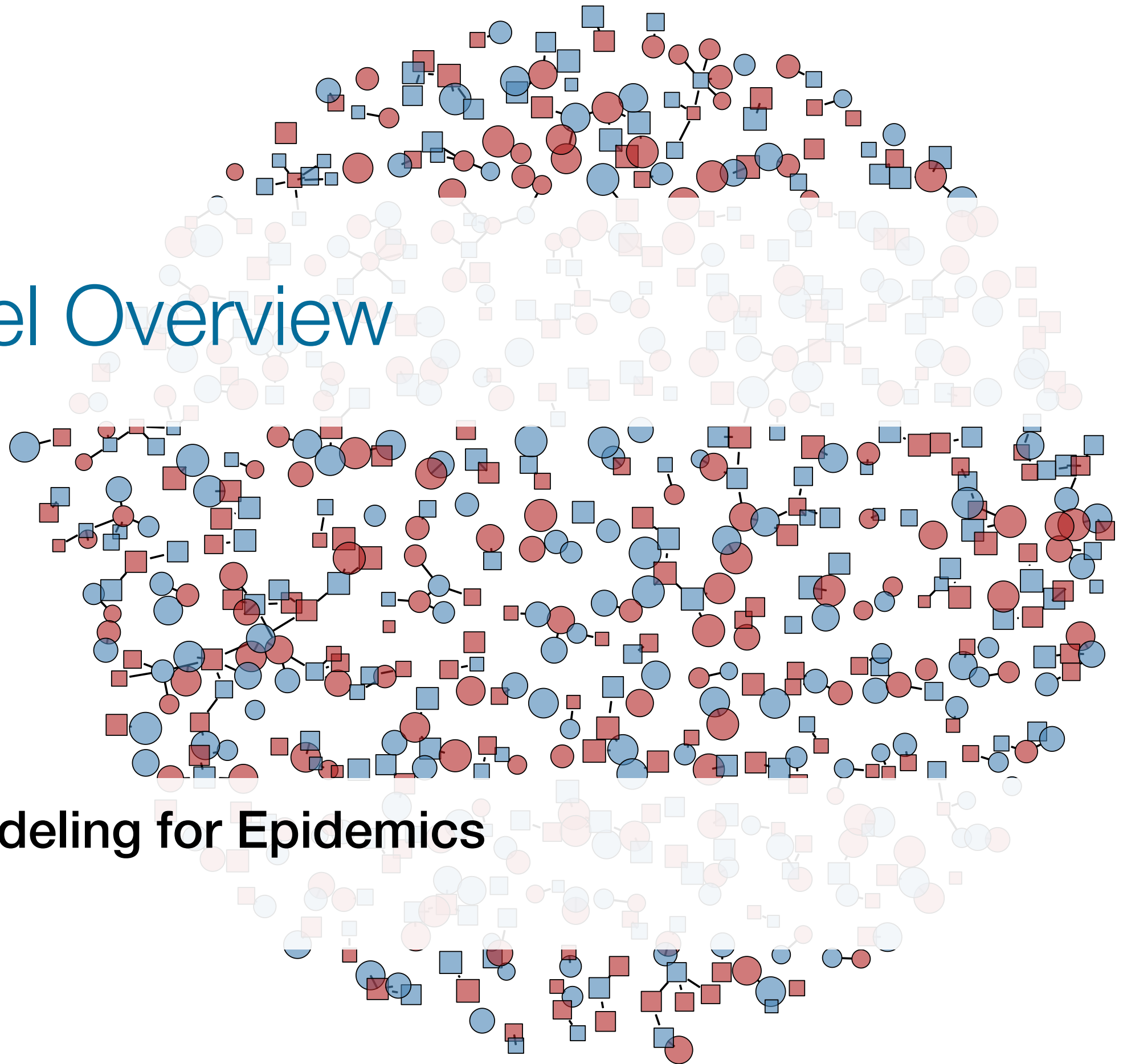


EpiModel Overview

Network Modeling for Epidemics

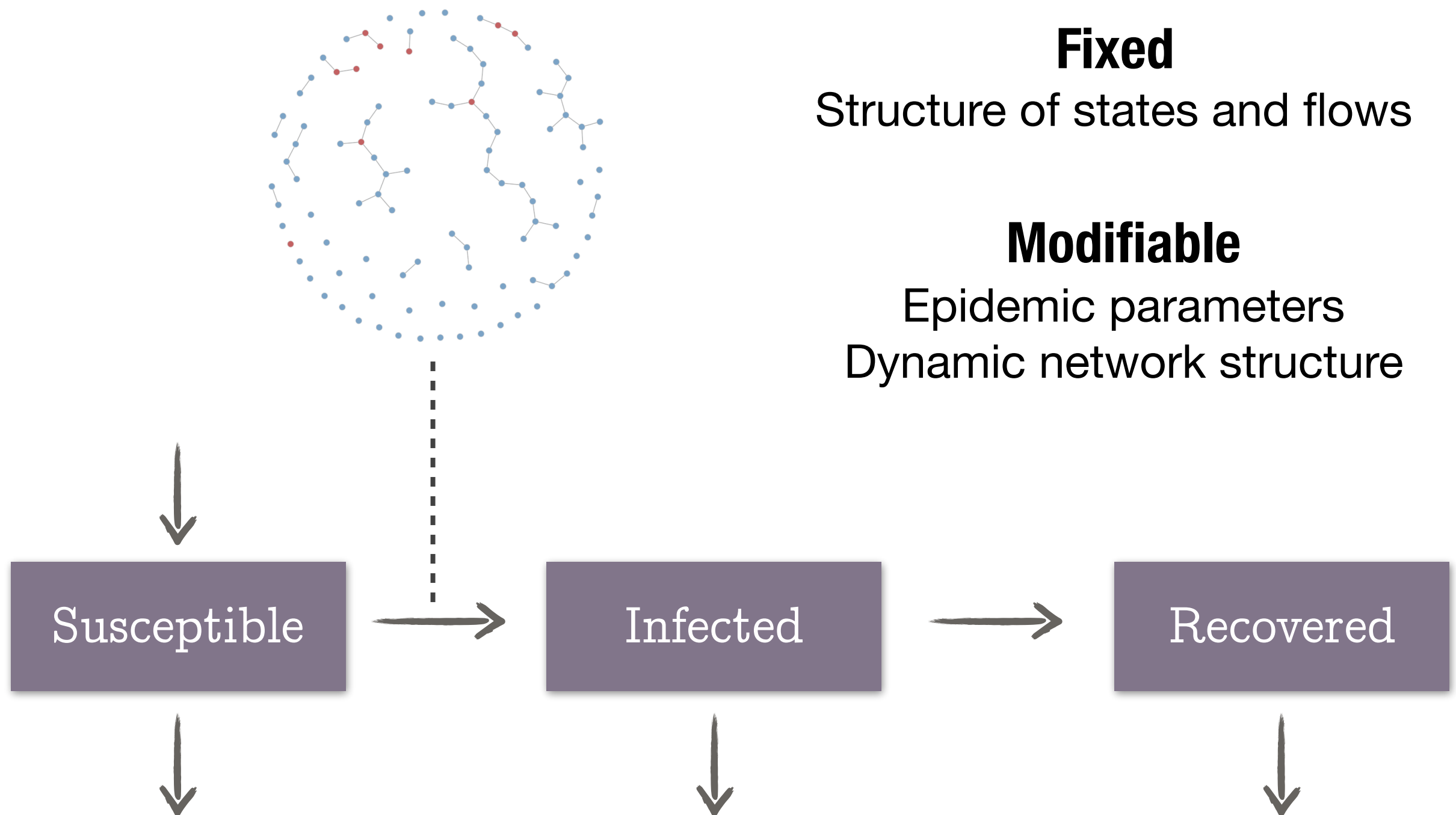
Day 3



Outline for Next 3 Days

- Wednesday
 - Modeling epidemics + networks = modeling epidemics over networks
 - Core assumption: independent simulations = closed populations
 - *Still, network structure \Rightarrow epidemiology*
 - Built-in **epidemiology** from EpiModel
- Thursday
 - Dependence: epidemiology (+ everything else) \Rightarrow network structure
 - Vital dynamics, “sero-sorting”
 - Built-in **epidemiology** from EpiModel
- Friday
 - Extending EpiModel for your research questions

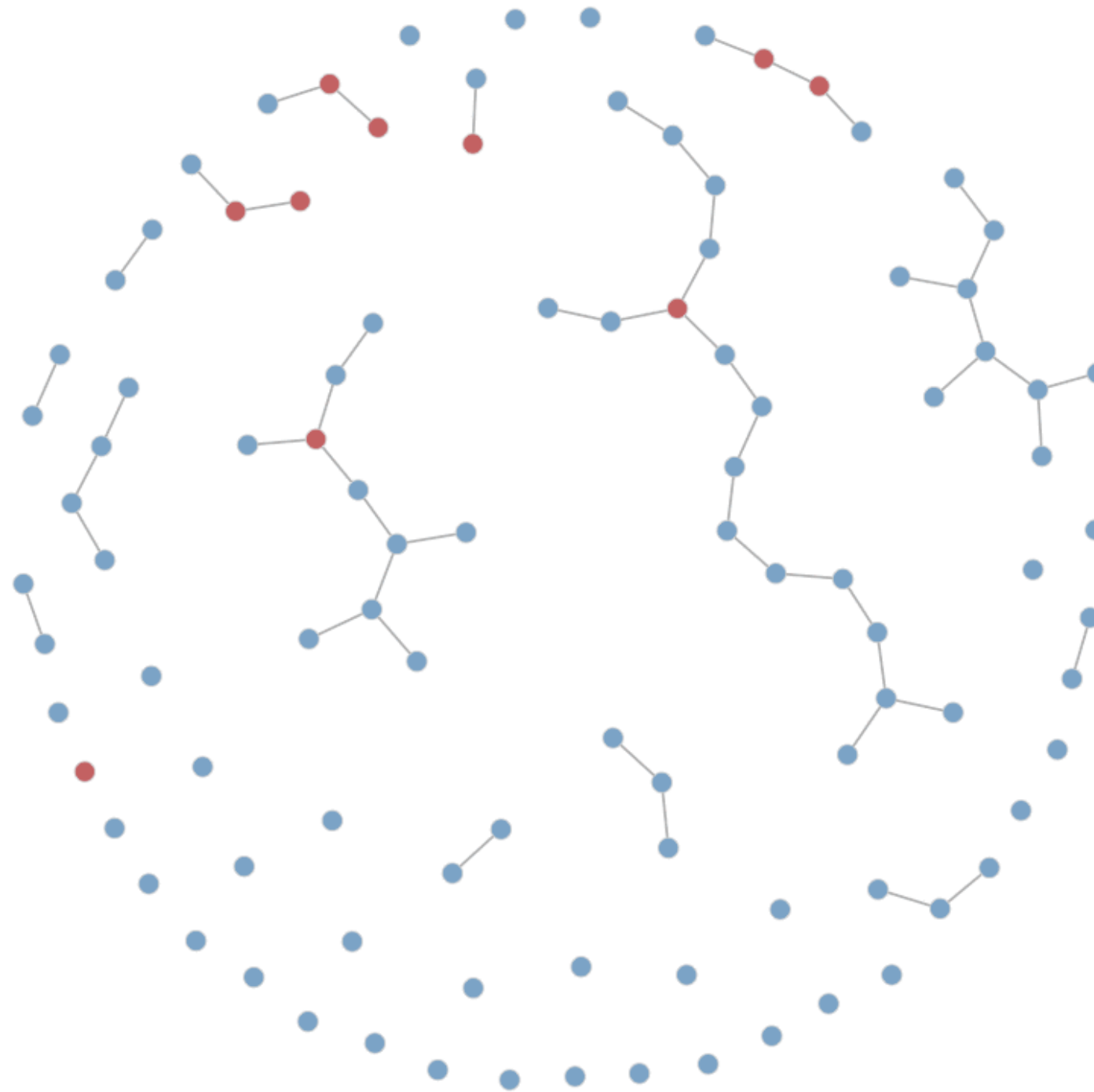
“Built-in Epidemiology”



Outline for Next 3 Days

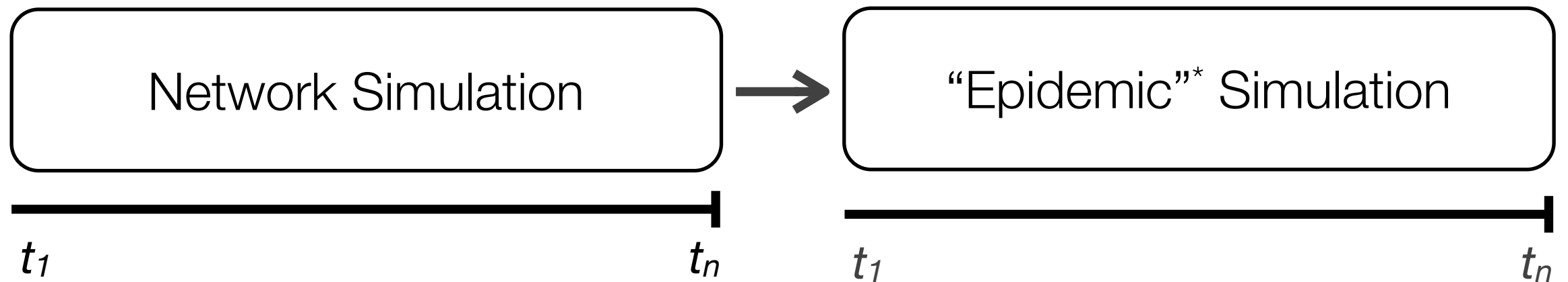
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Closed Population

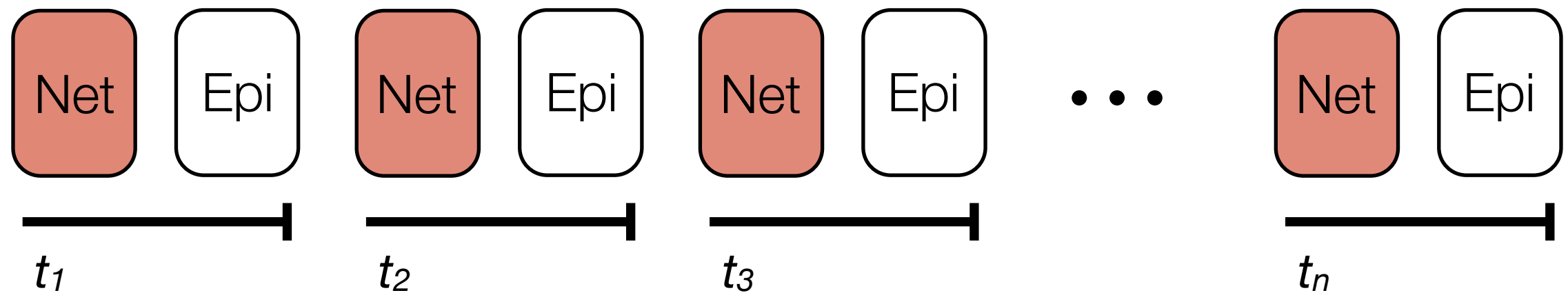


Model Dependence

Independent Models



Dependent Models



“Epidemic”^{} = biological, behavioral, demographic, etc., changes*

EpiModel Workflow for Base Models

1. Construct the (empty) network data structure
2. Parameterize the TERGM (formation and dissolution formulas and target statistics)
3. Fit the TERGM, and diagnose the model fit
4. Parameterize the epidemic model
5. Simulate the epidemic
6. Analyze the simulation data

EpiModel Workflow for Base Models

1. Construct the (empty) network data structure:
`network.initialize, set.vertex.attribute`
2. Parameterize the TERGM (formation and dissolution formulas and target statistics): `dissolution_coefs`
3. Fit the TERGM, and diagnose the model fit: `netest, netdx`
4. Parameterize the epidemic model: `param.net, init.net, control.net`
5. Simulate the epidemic: `netsim`
6. Analyze the model data: `print, plot, summary, as.data.frame, ...`

Outline for Today

Tutorial 1: SIS Epidemic in “One-Mode” Network

Lecture: Considerations for Balancing



Tutorial 2: SIR Epidemic in “Bipartite” Network

Exercise: Translating Egocentric Data to Target Statistics



Tutorial 3: Time-Varying Biology & Behavior

Tutorial 4: Simple Interventions



Lab: Infectious Disease over Networks



Lab Groups

- Today and tomorrow will feature long-form modeling labs in small groups
- You're in charge of forming a small group
- In picking your group, consider:
 - R abilities/experience
 - Prior network science and/or modeling experience
 - Population interests
 - Disease interests
- *Ideal group size: 3 – 4*

Lab Groups

Cluster 1

HIV, HIV treatment, HIV in TGW, HIV in IDU, HIV + family planning, HIV PrEP

Cluster 2

STDs, Syphilis, gonorrhea, STD resistance (NG), mycoplasma genitalium

Cluster 3

Lemurs, elk, horses, monkeys (oh my!)

Cluster 4

Plant diseases/systems

Cluster 5

Other human IDs: TB, HPV, HBV, enterics, influenza, malaria

Cluster 6

Social science applications:
communication and social diffusion,
geography/migration