What exists:

1. Reaction (published)

* Markov rxns -- stochastic
* MCMC rxns -- St
* Analytical soln (ODEs) – deterministic
* Stochastic ODEs – St
* *No space*

1. Diffusion

* Finite difference (nodal/spatial) – Det
* Random walk (nodal/spatial) – St
* TODO: Multinomial Markov random walk (nodal) – St (2)
* Eigenmode solution (modal/spectral) – Det
* Eigenmode Markov model (modal/spectral) – St
  + TODO: expand to 100 spatial locations (1)
* TODO: tube diffusion in MCell as ground truth comparison (3)

1. Reaction-Diffusion

* Finite difference + rxns (nodal/spatial) – Det
* TODO: Random walk + rxns (nodal/spatial) – St (4)
  + *Alternating between 1. across species for each node and 2. across nodes for each species*
* TODO: Multinomial random walk + rxns (nodal/spatial) – St (5)
* Eigenmode soln + rxns (modal/spectral) – Det
* TODO: EigenMarkov + rxns (modal/spectral) – St (6)
  + *Alternating between 1. across species for each mode and 2. across modes for each species*
* TODO: Multinomial EigenMarkov + rxns (modal/spectral) – St (7)
* TODO: tube rxn-diffusion in MCell as ground truth comparison (8)
* *Bio complexity: 1d, VDCC point source, 2-state calbindin buffer, calcium, SNARE as observation point*
  + TODO: VDCC as rxn point process (no nodes/modes)? (*time dependent*)
  + TODO: calbindin 9 states (*time dependent*)

Next next next:

* Run on actual synaptic geometry in Blender with same bio complexity as 3.
* SNARE kinetics