

# Hospital-in-a-Box – an update

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# Outline

- Brief review of simulation (AG)
- Update on Hospital-in-a-Box (AG)
- Demo (AV)

# Simulation – a brief introduction

- Agent based models
  - Start – initialise the environment and agents
  - At every time point of the simulation, update each agent
  - Continue until simulation end condition
  - Best for:
    - complex systems with high levels of randomness at every time point
    - Geospatial modelling
  - Disadvantages:
    - Even if an event is unlikely to happen, we still check whether it has happened at every time point
    - Can be computationally expensive
  - <http://www.netlogoweb.org/launch#http://ccl.northwestern.edu/netlogo/models/models/Sample%20Models/Social%20Science/Rebellion.nlogo>

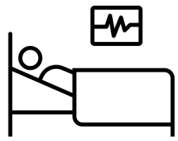
- Discrete event simulation
  - Generate processes that are run in parallel
  - Processes often include one or more 'holds'
  - Key entity is the future event list
  - Simulation usually runs until all processes finished
  - Advantages:
    - Abstraction fits better with process (flow-chart) based problems
    - Can be computationally more efficient by jumping forwards in time
  - Disadvantages:
    - One has to think in parallel, can be challenging
- System Dynamics
  - Differential equations
  - SIR is a typical example

Time 0



Future event list

Time 0

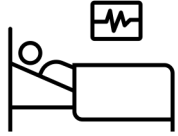



5 days



Future event list

Time 0




	Complete	5
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Future event list

Time 0



 Complete 5

Future event list


Passive/Waiting





Time 0



 Complete 5

Future event list


Passive/Waiting





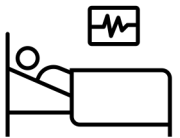
1 day





	Complete	5
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Future event list

Passive/Waiting

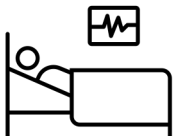






	Complete	4
	Complete	5

Future event list

Passive/Waiting

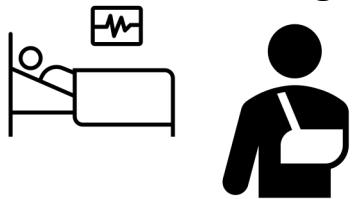




	Complete	4
	Complete	5


Future event list

Passive/Waiting



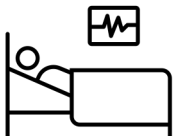
Time 4



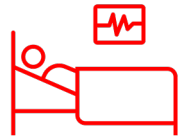
 Complete 5

Future event list

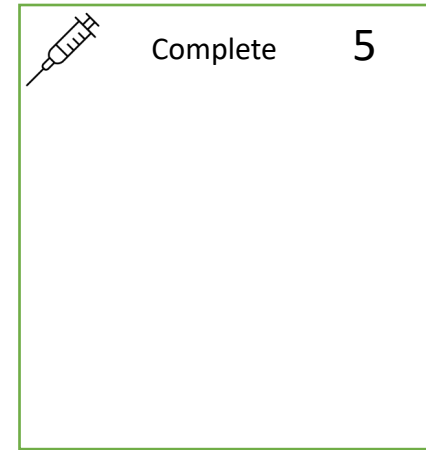
Passive/Waiting



Time 4

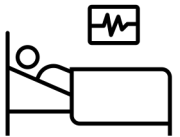


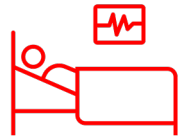
10 days





Future event list

Passive/Waiting

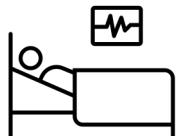






	Complete	5
	Complete	14

Future event list

Passive/Waiting





	Complete	5
	Complete	14


Future event list

Passive/Waiting



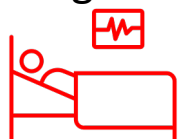




 Complete 14

Future event list

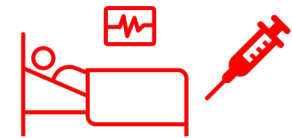
Passive/Waiting





Future event list

Passive/Waiting



- Simulation finishes when no more events in future events list

# Hospital-in-a-Box

- Back-end module that drives the sim
- Front-end module that animates the sim
- Clinical study (CSM-BSI)
  - Retrospective data
  - Observational data
  - Focus groups and structured interviews
- Laboratory module
  - Retrospective data
  - Observational data
  - Implementation

# Laboratory Data

- High certainty parameters hardcoded, highly discrete (mainly observational data, some retrospective)
- Moderate certainty data, less discrete, calibration targets – (mainly retrospective)
- Abstract data, calibrated to target (waste time, time doing other things)

Demo

# Feedback

- What laboratory applications could the simulate be useful for?
- What features are we missing?