How can we use Individual Based Models? What can we learn?

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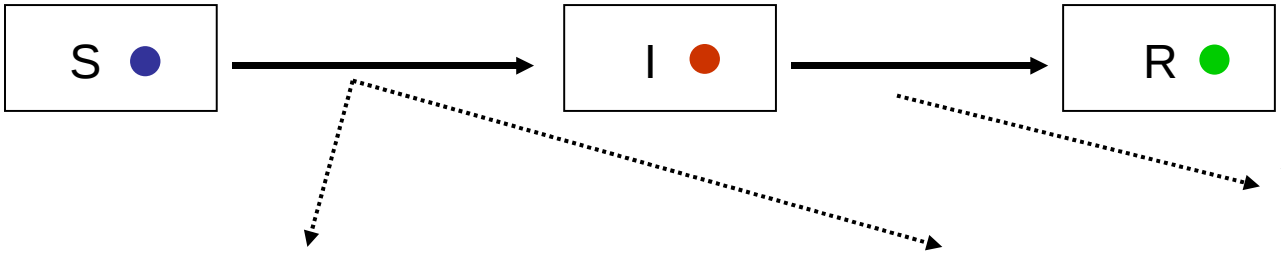
- Epidemiology: a pioneer in the use of individual based and stochastic models.
- General understanding and use of the basic reproductive ration (R0) mainly focuses on the mean field paradigm.
- Epidemiology is a data-driven subject:
  - Difficult and expensive to collect data at the individual level.
- We propose the use of Individual Based Models (**IBM**) to test the influence on the global dynamic of the variation of non-quantified or poorly known individual level parameters.
- It can improve data collection and the general understanding of disease spread.

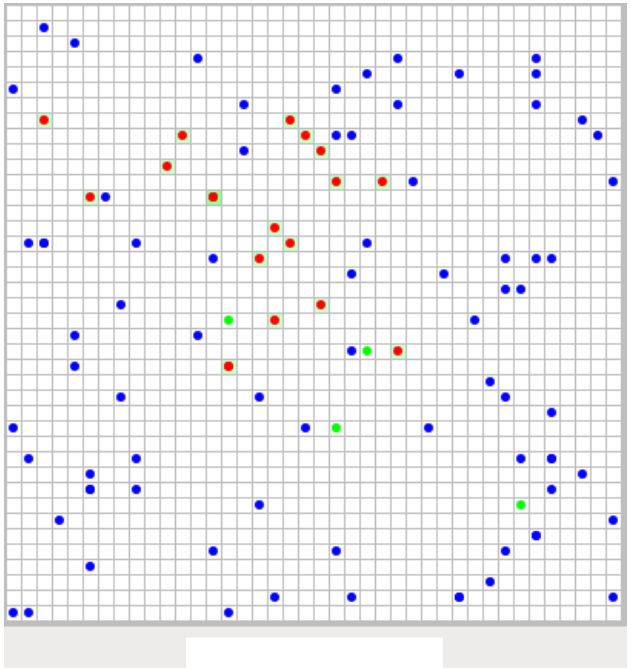
Illustration with a simple SIR IBM model



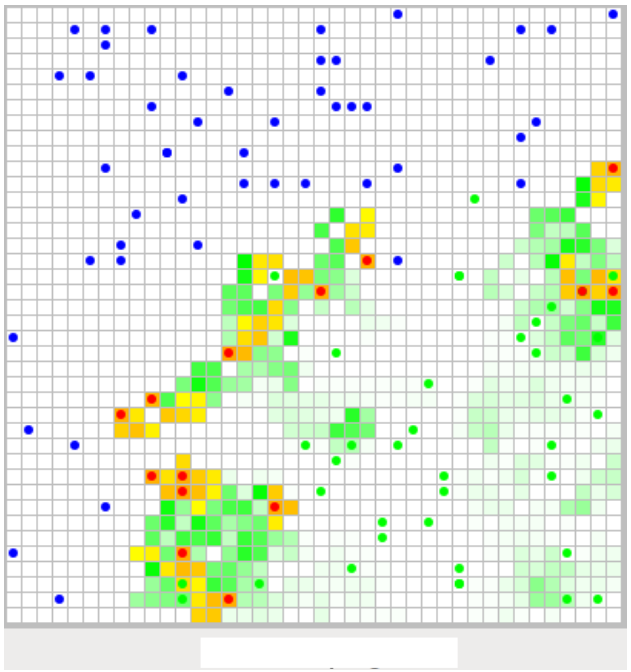
(S + I + R = Cst)

After 30 units of time
(Constant recovered time)

Infection by close contact



Infection via the environment



Random walk

Individuals have independent displacement speed

The concentration of the pathogen decreases exponentially

Explicit representation of space and movements

- Implicit development of spatial correlations
- Implicit dynamic of the contact network

Illustration with a simple SIR IBM model

What is the influence of individuals displacement speed and infection mode on the global dynamic?

Infection by close contact

Infection via the environment

Fast population

Slow population

Fast population

Slow population