# Using Operations Research to Improve Planning for Public Health Emergencies

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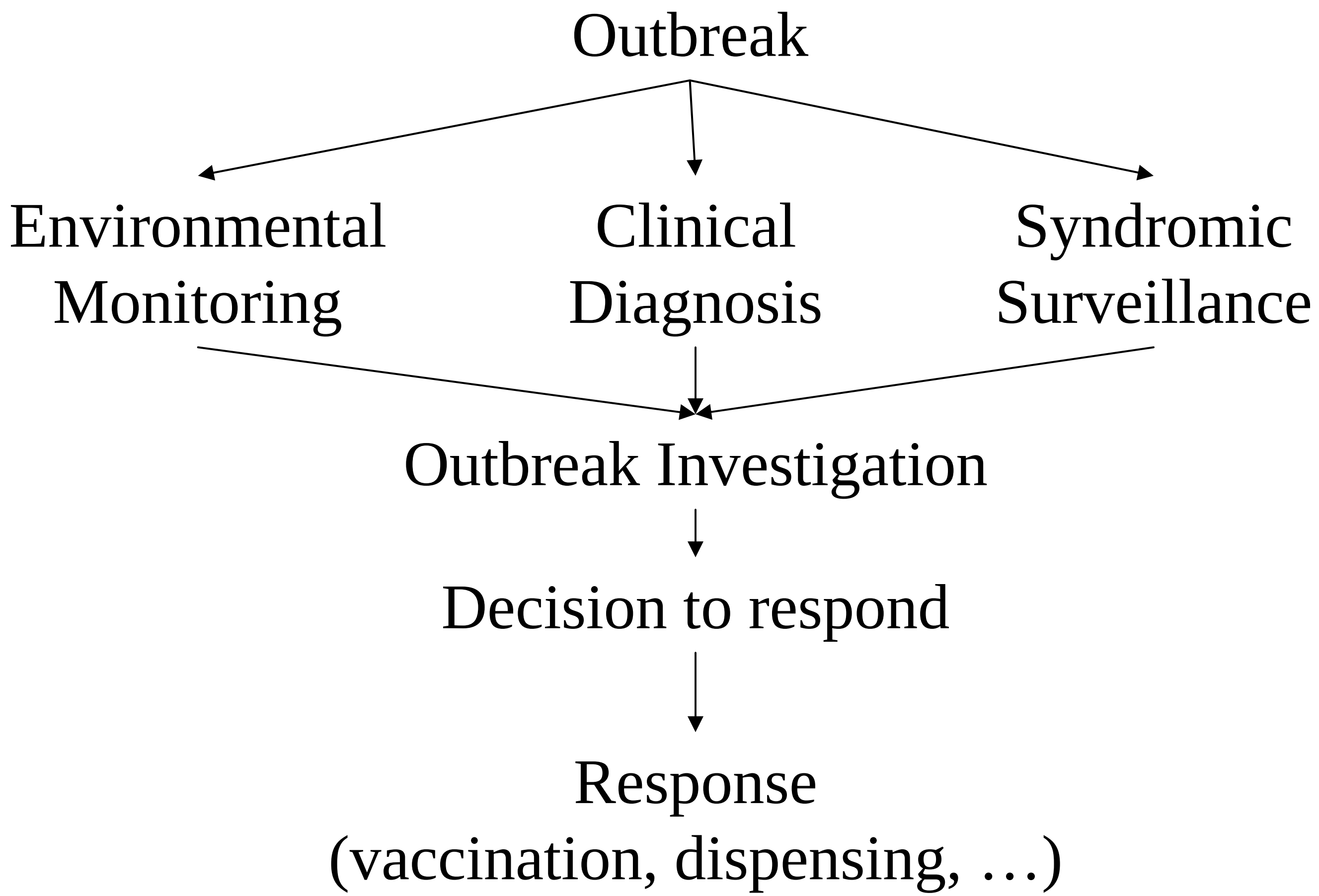
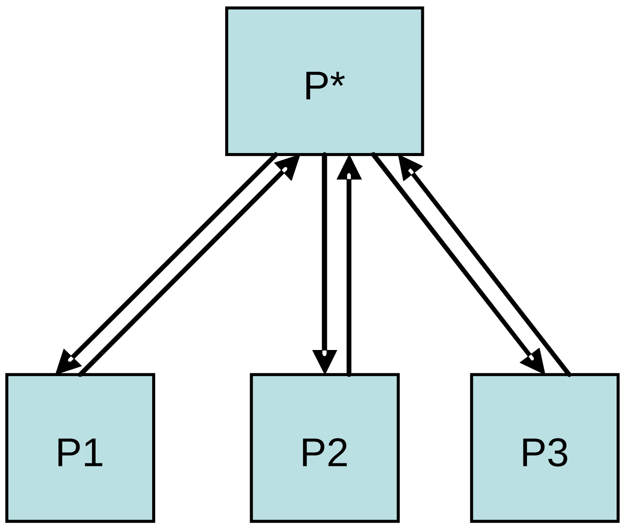
# Detection, Investigation, and Response



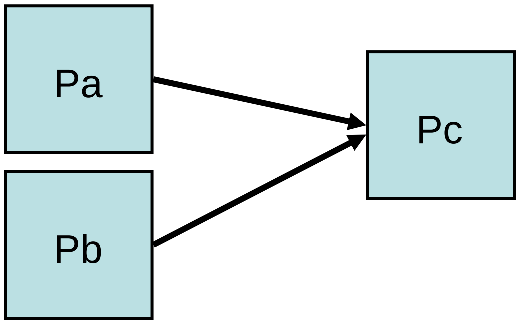
# Planning Problems

- This domain has many interesting planning problems:
  - Who should receive the medication?
  - How should it be delivered to points of dispensing (PODs)?
  - What is the best POD layout?
  - How many staff do we need?
  - How long will people wait in line?
  - How can we improve the screening step?
- Finding better, more robust solutions will require using simulation optimization to consider performance in the presence of uncertainty and randomness.

# Decomposition-based design optimization vs. Separation




(a)




(b)

(a) A typical decomposition scheme has multiple first-level subproblems (P1, P2, P3) that receive inputs from a second-level problem (P*), which also coordinates their solutions.

(b) Separation yields a set of subproblems. Solving one provides the input to the next.

# Separation

- Can simulation optimization problems with many decision variables be divided into subproblems that are easier to solve?
  - Subproblems may have intermediate or surrogate objective functions that don’t require simulation
- How good are the solutions that result?
- What is the impact on computational effort?