

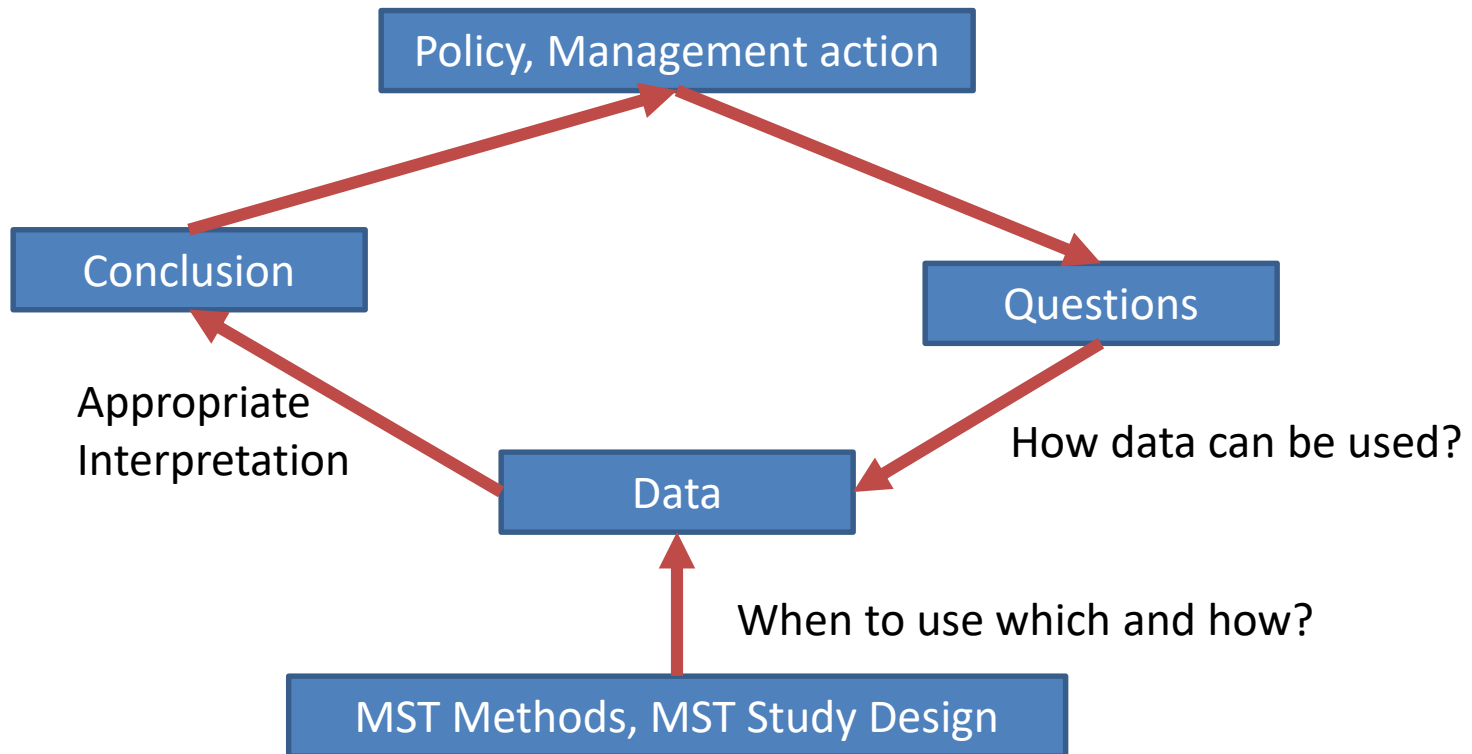
# Identify and Monitor Human Fecal Matter

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Source Molecular

CASA/SCAP Exfiltration Workshop  
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# Goal

- Lecture so you become MST experts?
- Discuss the basic science to understand how important conclusion/data are generated to support management decisions and actions



# End Game: A Chain of Inference

Fecal Indicator Bacteria



Fecal Waste



Human Fecal Waste

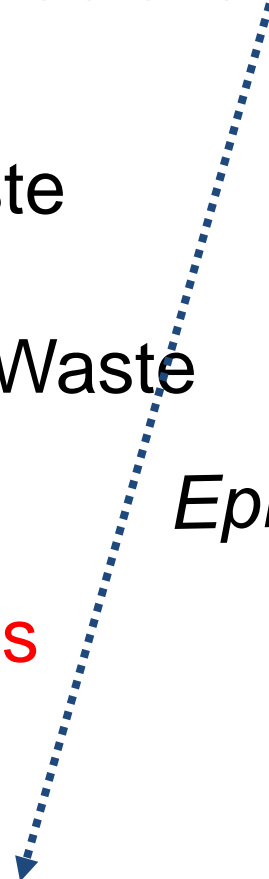


Pathogens

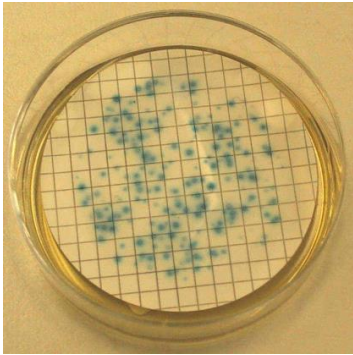


Disease

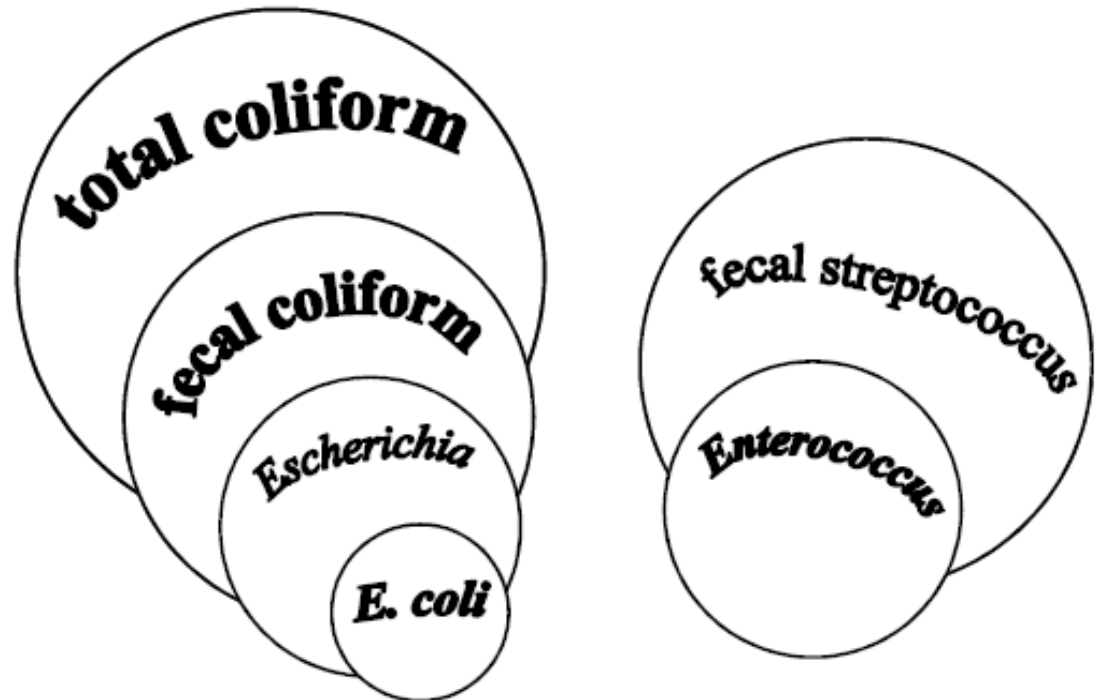
*Epidemiology*



# FIB

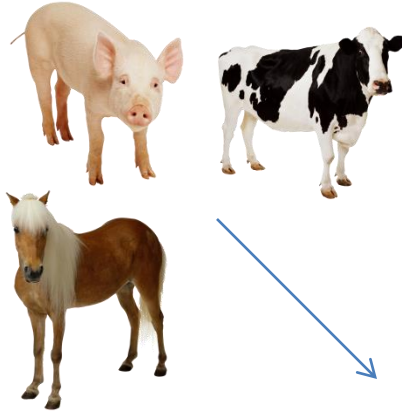


**Fig. 11.1** Relatedness of the fecal indicator bacteria (FIB, shown in *bold*), cultured as indicators of microbiological water quality



# Why not just FIB?

Animals

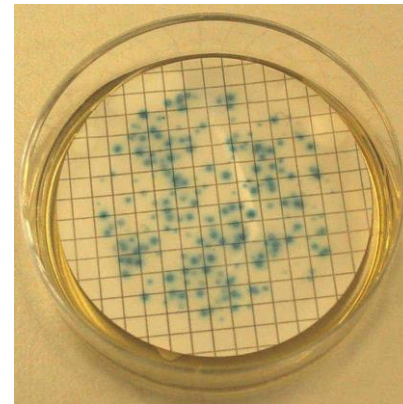


Human

Plants



Soil,  
biofilm

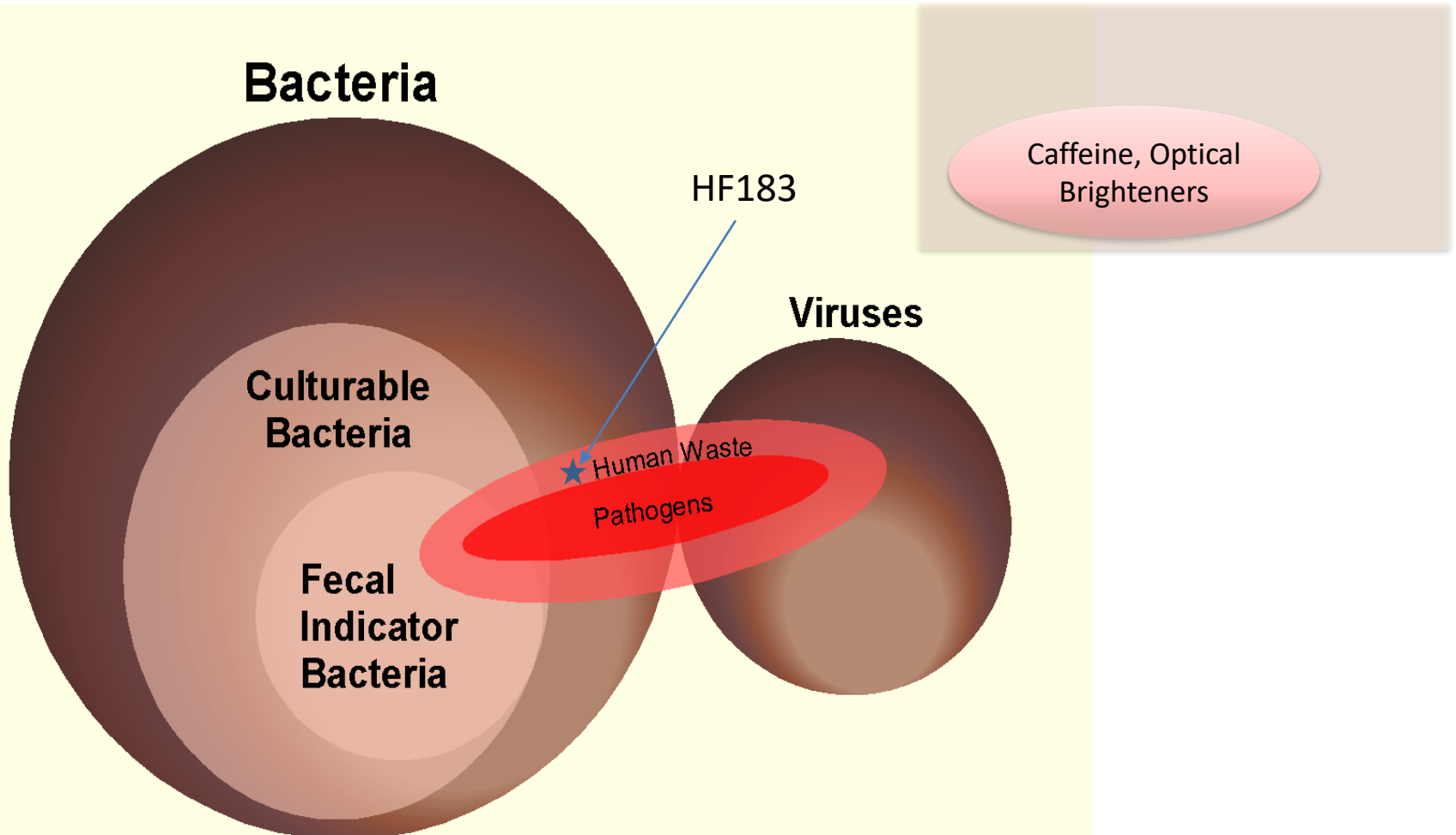


# Tracking Human Fecal Matter

- Physical approaches
- Chemical markers
- Microbiological identifiers

Microbial Source Tracking: A collection of methods to identify and monitor sources of microbial (fecal) pollution.

# FIB, HF183, Microbial Community



# Foundation of MST

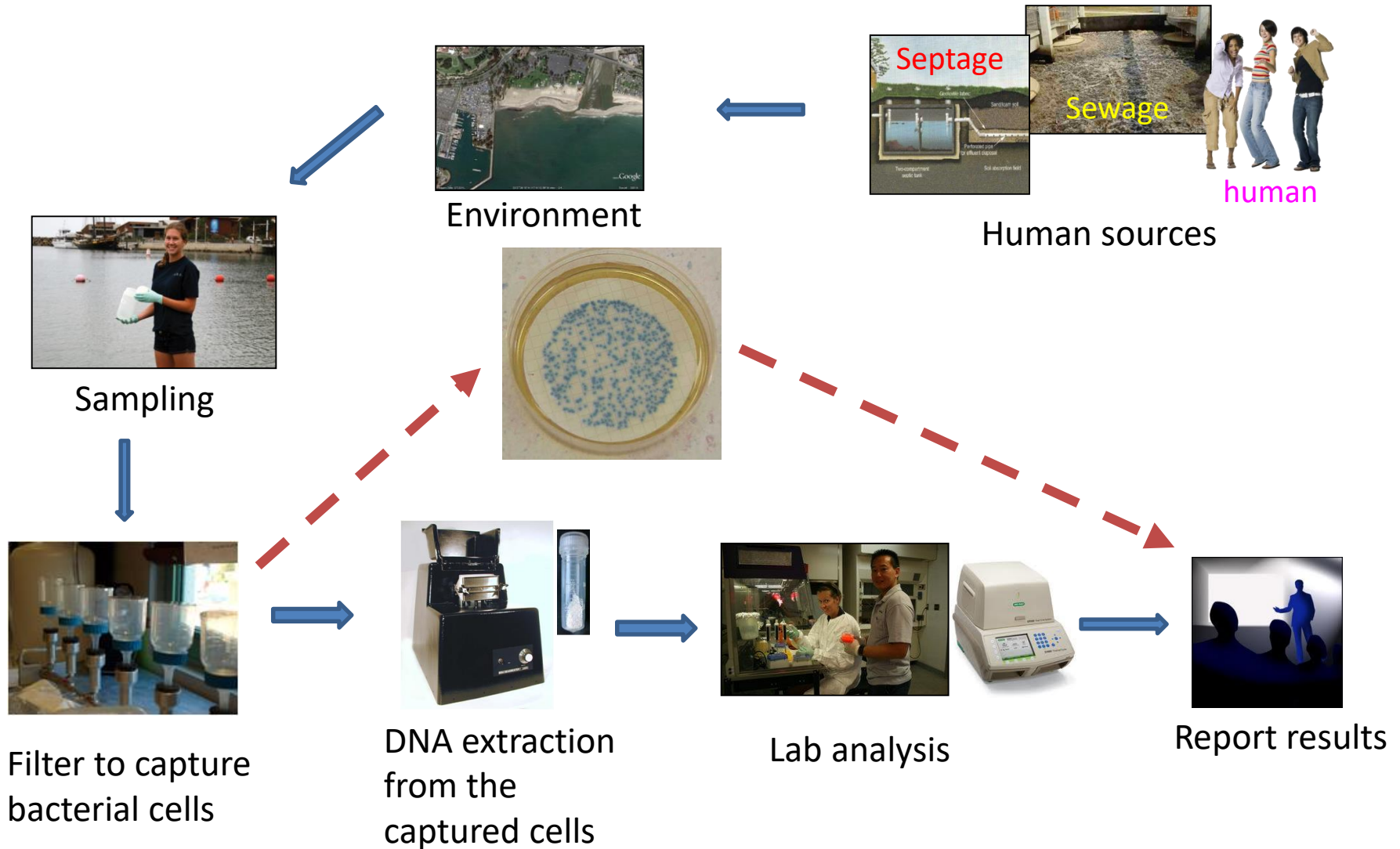
- Host and gut microbes co-evolve
  - Physiological difference of the gut
  - Dietary difference between hosts



→ “Host” environments select for different microbes, which can be used to trace contamination back to host.



# How is it measured?



# When to use which and how?



## Properties of an Ideal Microbial Source Tracking Management Tool

Goal	Description
Clear Host-Association	Strong evidence of close link with target pollution source
Known Host-Distribution	Broadly distributed across target population
Quantitative Metric	Absolute concentration information
Expert Consensus	Agreement among majority of experts
Standardization	Complete standard operating procedure available
Data Acceptance Metrics	Performance benchmarks to ensure high quality results
Validation	Multiple laboratory confirmation that the method adequately meets application needs
Field Demonstrations	Real-world examples with guidance for implementation
Technology Transfer Tools	Easy to use process, training opportunities, lab proficiency testing, troubleshooting tools, etc.

# When to use which and how?

Define your project goal is most important!

- Are method sensitivity and specificity sufficient for my management application?
  - How would the MST results be used?
  - Local method validation: what is an appropriate validation study design?
- Are microbes of interest migrating through soil matrix differently?
  - Differential fate and transport
- Are reclaimed water a big concern?
  - Viability: choose the appropriate molecular methods if you suspect large contribution from reclaimed water
- How to achieve resolution among subtypes of human fecal pollution?
  - MST methods
  - Study design

# Thank you!

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