



DRUM

Drivers of Resistance in Uganda & Malawi

LSTM

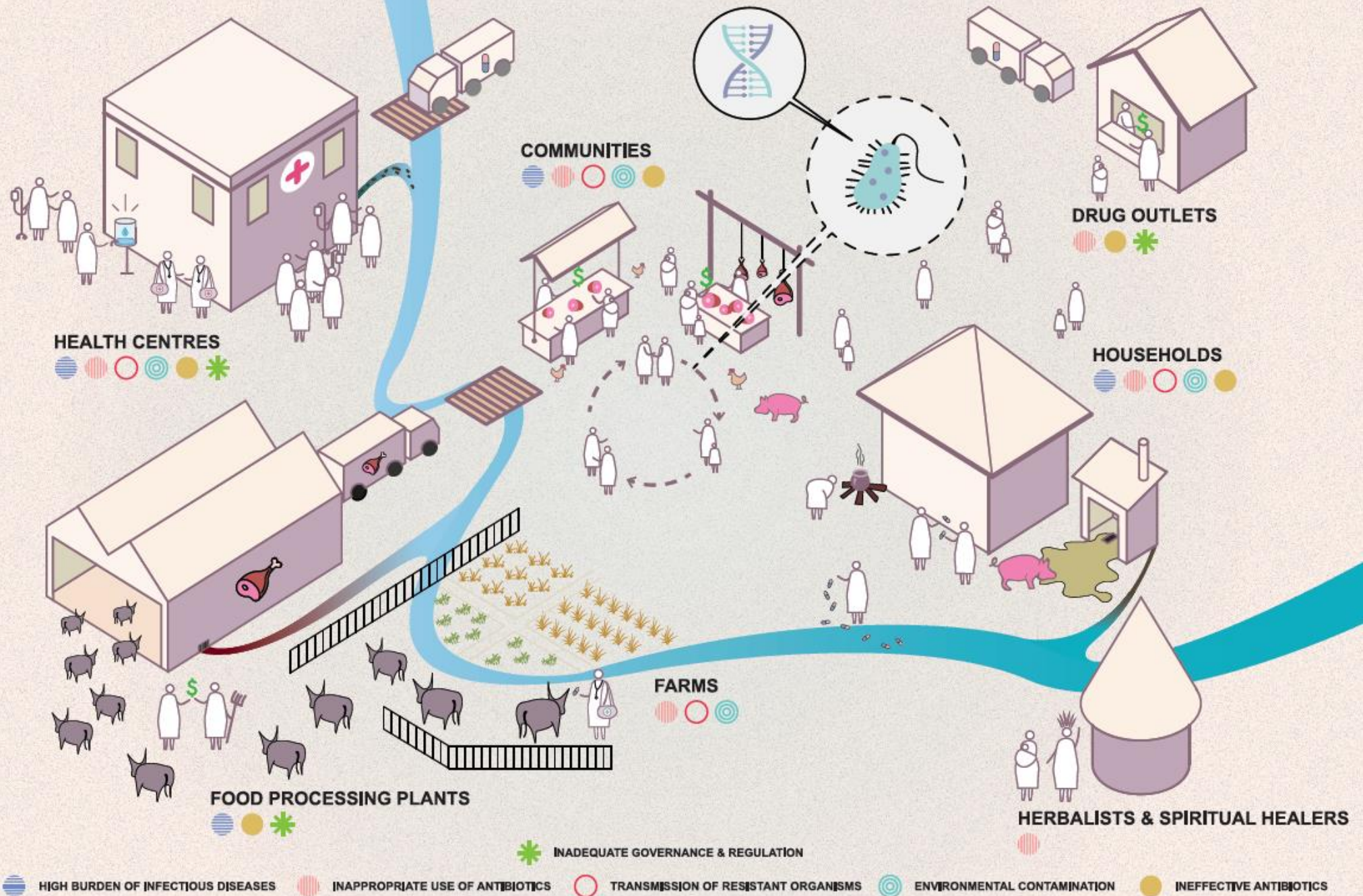
LIVERPOOL SCHOOL
OF TROPICAL MEDICINE



**A multi-disciplinary network in Uganda and Malawi to
evaluate drivers of AMR using a One Health framework**

2nd Global Network of AMR and IPC Symposium | 4-7 Mar 2019

Shevin Jacob, MD MPH



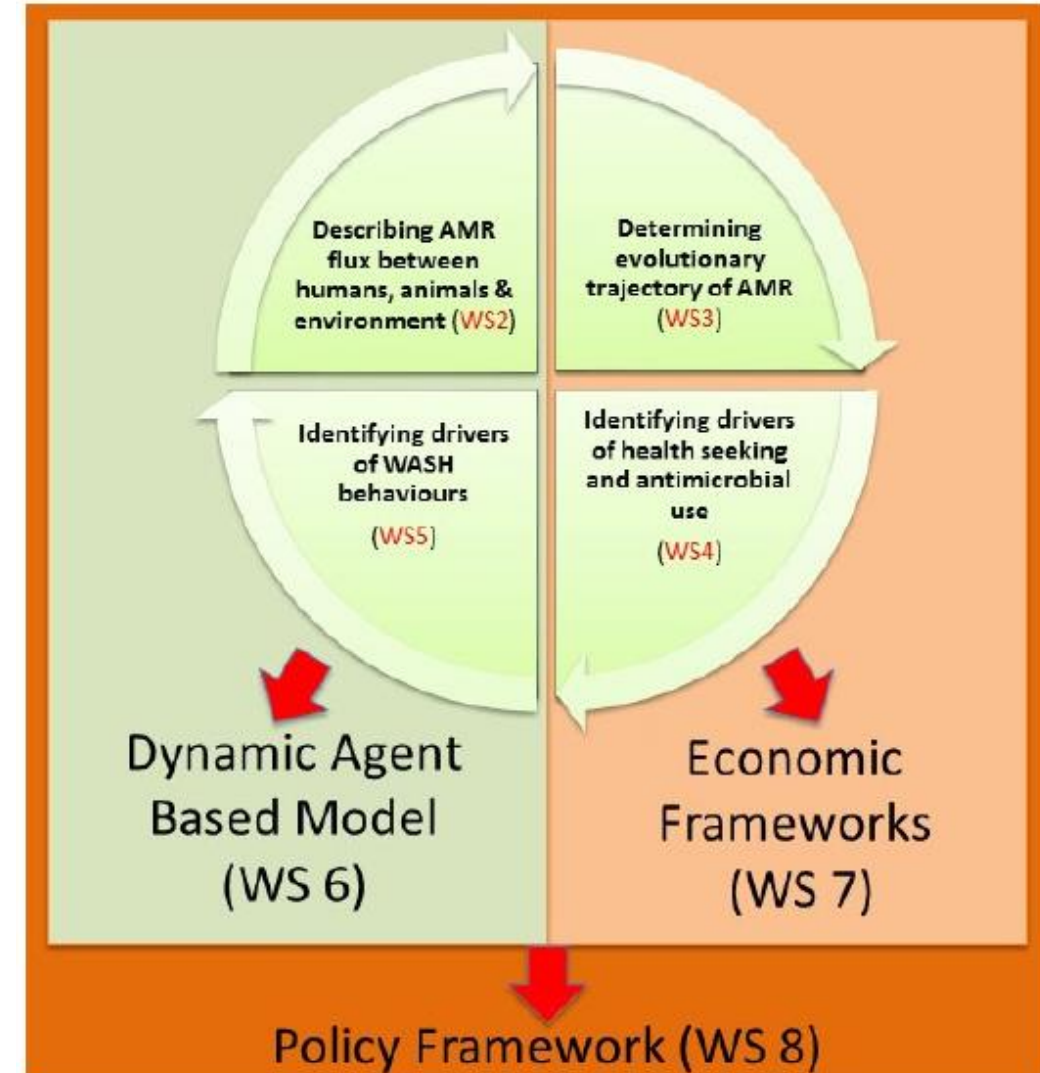
DRUM overview



- **Overall aim:** To understand drivers of ESBL *E. coli* (**ESBL-E**) and *K. pneumoniae* (**ESBL-K**) transmission
- **Study settings:**
 - Uganda
 - Malawi
- **One-Health approach incorporating:**
 1. Human health
 2. Animal health
 3. Exposure to environmental contamination
 4. Water, sanitation, and hygiene (WASH) practice
 5. Antibiotic usage

DRUM Workstreams

- **WS1:** Overall project management
- **WS2:** Describing AMR flux between human, animals, & environment
- **WS3:** Determining evolutionary trajectory of AMR
- **WS4:** Identifying drivers of health seeking and antimicrobial use
- **WS5:** Identifying drivers of WASH behaviours
- **WS6:** Dynamic Agent-Based Model
- **WS7:** Economic framework
- **WS8:** Policy framework





Principal Investigator: Nick Feasey

DRUM: Uganda overview



Administrative lead: IDI

Sites

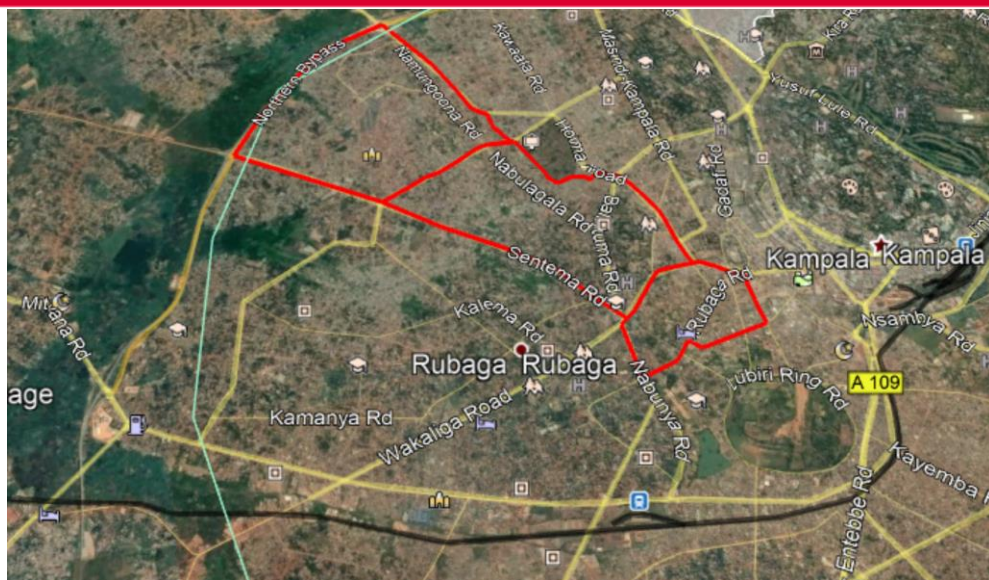
Co-Investigators:

- Shevin Jacob (LSTM/MakCHS-IDI)
- Richard Walwema (MakCHS-IDI)
- Mohammed Lamorde (MakCHS-IDI)
- Henry Kajumbula (MakCHS-SOM)
- David Musoke (MakCHS-SPH)
- Lawrence Mugisha (Mak_COVAB/CEHA)
- Anne Katahoire (MakCHS-SOM)



DRUM: Active (community-based) sampling

Kampala



Hoima



Sampling frame:

- Kampala (urban); Hoima (rural)
- Comprise households (hhs) along gradients of both human and animal population density

Sampling targets:

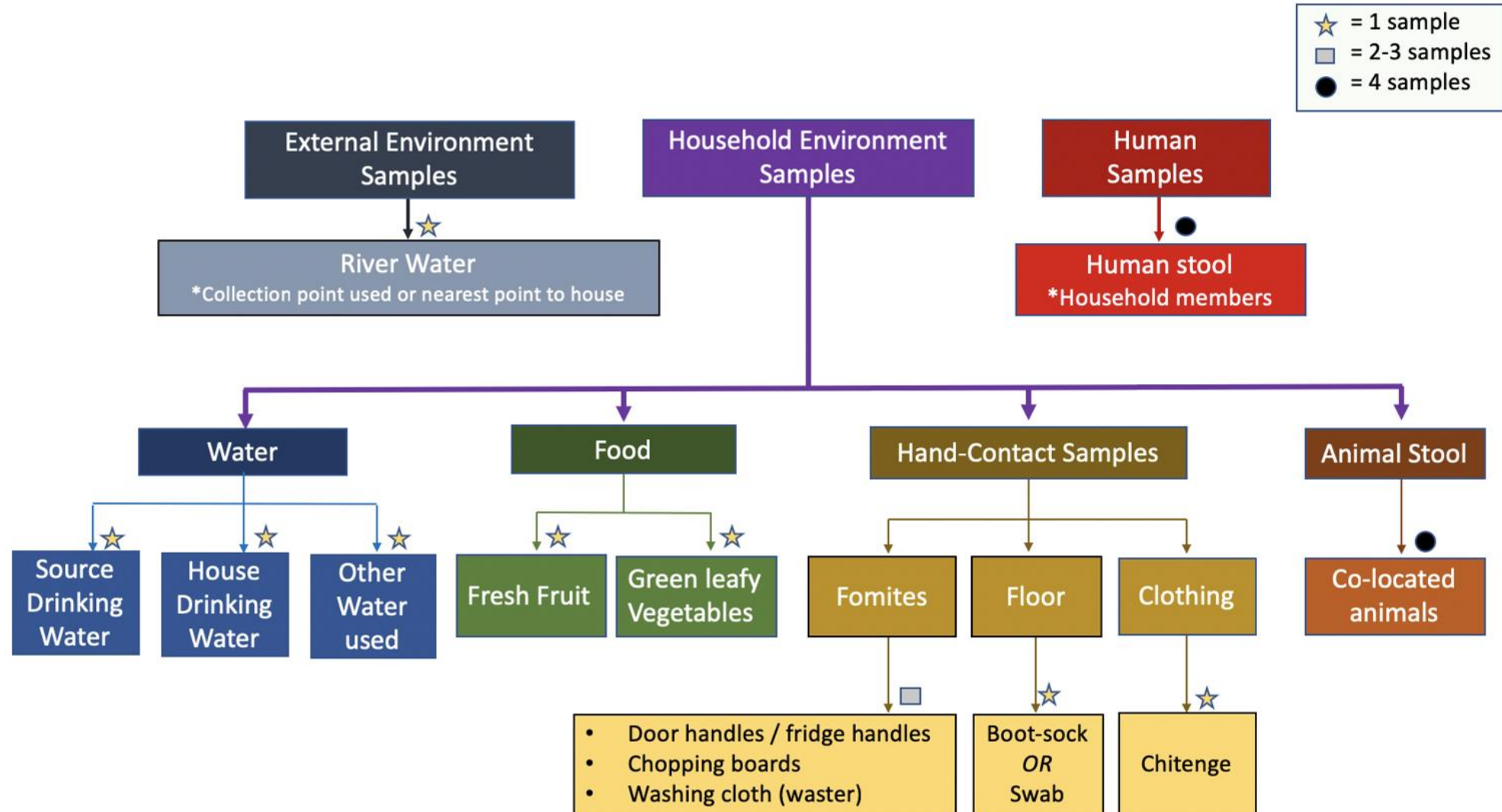
- Intensive (n=10 hhs/frame); 20 samples/hhs
- Sparse (n=20 hhs/frame); 8 samples/hhs

Sampling duration: 6 months

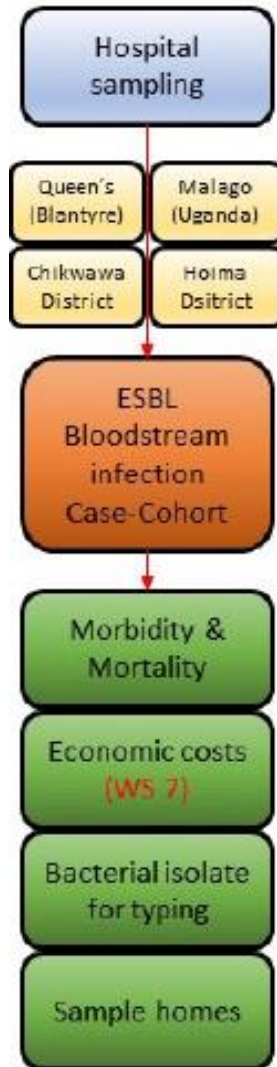
Methods:

- **Multi-disciplinary field teams** with oversight by human health, veterinary health, environmental/WASH, and social science experts
- **Mixed methods** to understand WASH behavior for faecal exposure
- Bacterial DNA extracted for sequencing at Sanger Institute
- Environmental samples analysed for antibiotics and heavy metals

DRUM: Community-based sampling



DRUM: Passive (facility-based) sampling



- **Health facilities:**

- Kiruddu General Referral Hospital
- Hoima Regional Referral Hospital

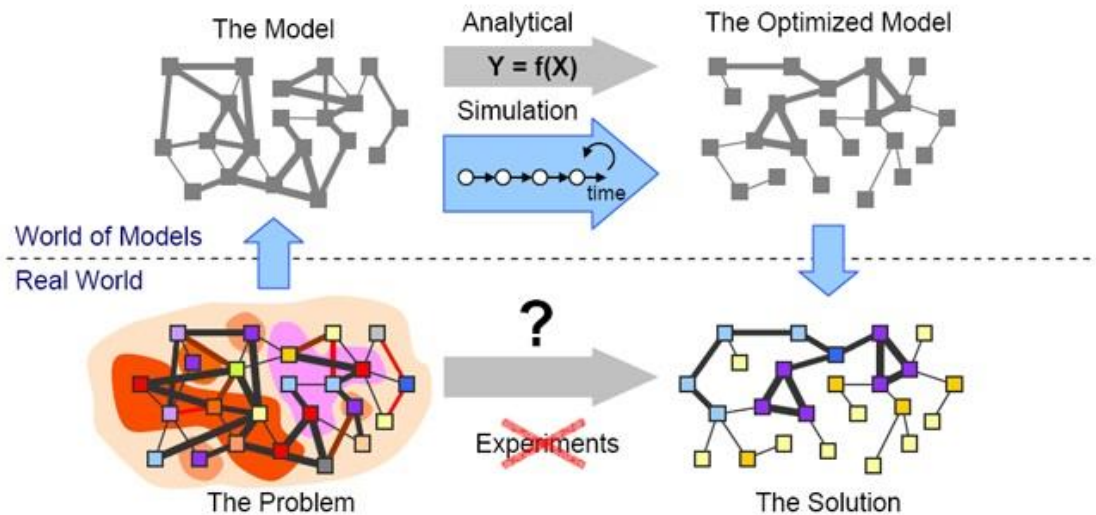
- **Target participants:**

- Non-pregnant adults requiring hospitalization for sepsis
- Post-partum mothers and neonates with sepsis (through Gates-funded DRUM+ grant)

- **Methods:**

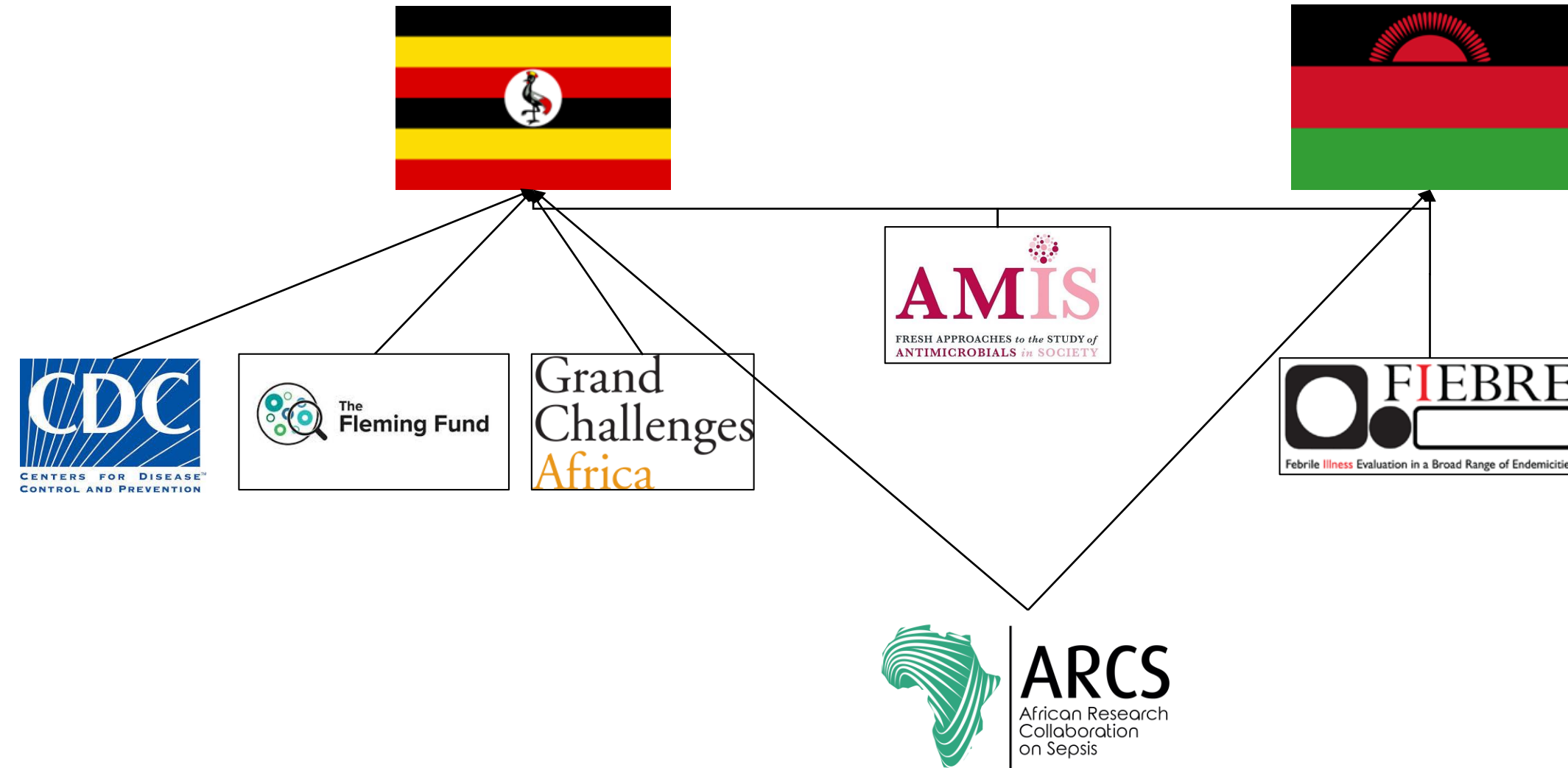
- Blood cultures to evaluate for bloodstream infections
- If identification/susceptibility culture/PCR testing show ESBL-E/ESBL-K:
 - Bacterial DNA sent to Wellcome Sanger Institute for sequencing
 - Consent obtained from participant and family members to trace back ESBL-E/ESBL-K to households for sparse sampling

DRUM: Agent-based Model (ABM)



- **Goal:** to caricature transmission dynamics of AMR in Uganda and Malawi
- ABM will enable study of how movement of specific AMR markers within the community may be affected by **putative intervention strategies**
- **ABM development:**
 - **Quantitative data:** informs parameter estimates for the model, thus calibrating it to the study populations of interest
 - **Qualitative data:** informs structure of the model by describing AMR movement between humans, animals, and the environment
- Linkages with **economics** and **policy** framework workstreams

Synergy opportunities for DRUM



Thank you!

