# Developing the "Smart Toilet": A Screening Tool for Health Monitoring Center for WaSH-AID

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**Bass Connections Open** 

#### Are we flushing away our data?

BASS CONNECTIONS

- Feces is a strong indicator of gastrointestinal (GI) health
- Hospital acquired infections account for an estimated 99,000 deaths annually<sup>1</sup>
- GI diseases cost the US \$136 billion annually in healthcare expenditures<sup>2</sup>

How can we design and build a smart gastrointestinal health and disease?

toilet for intelligent screening of feces for

### How do we find what patients need?

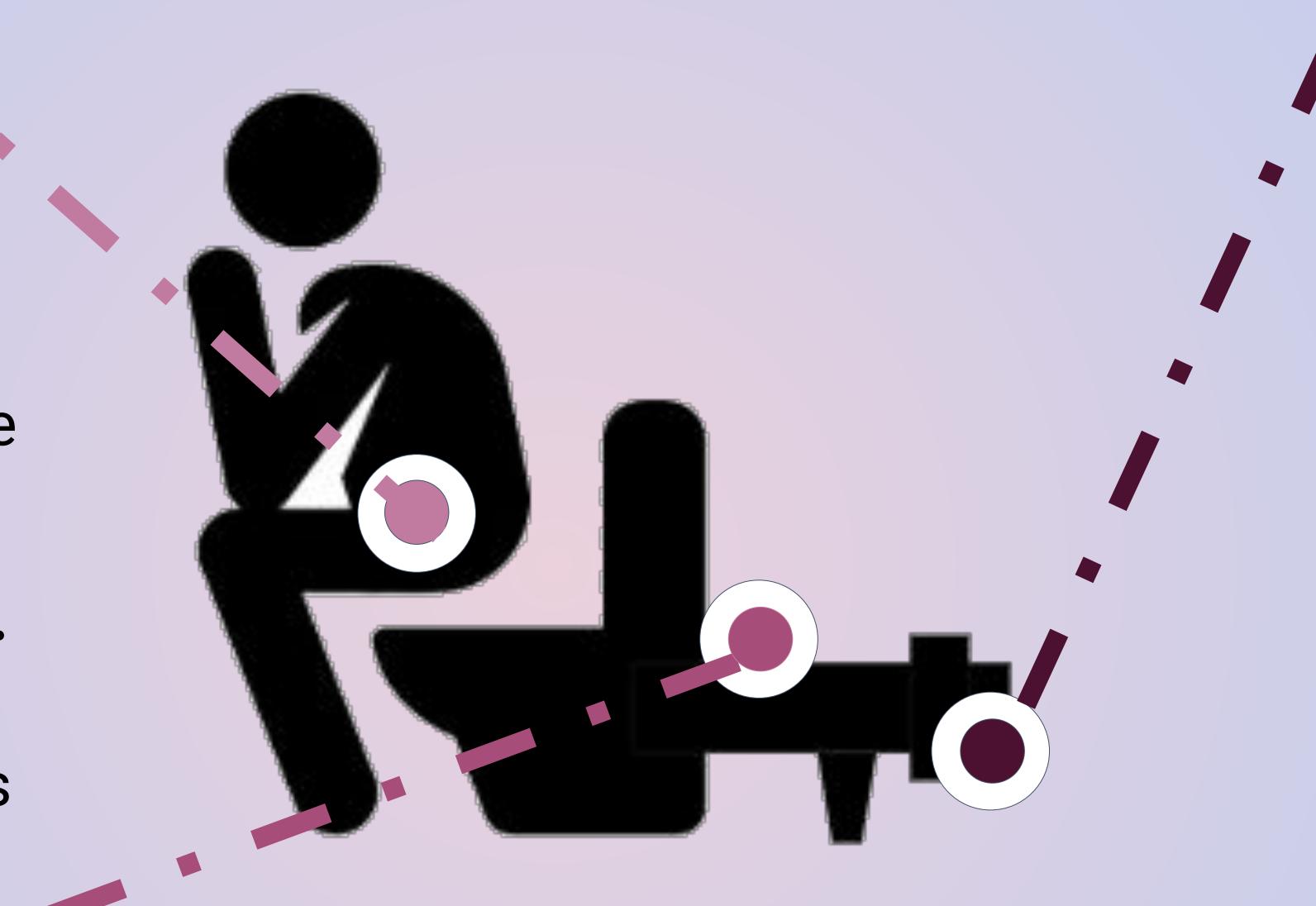
#### Identify the most suitable market for the toilet.

 Long Term Care Facilities (LTCF) → patients are disproportionately impacted due to age

#### Research feces-related public health issues.

 Huge discrepancy between medical diagnosis and verbal description of feces by both patients and doctors

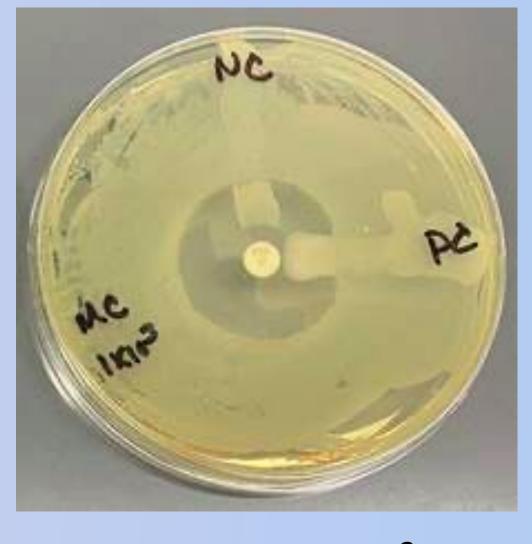




### How are we detecting GI health and disease?

#### Conduct bioanalytical evaluation of prototype with microbiome sequencing and clinical assays.

 Modified hodge tests for presence of CRE → PCR-based methods for better accuracy



Sample with a concentration of 10<sup>3</sup> CRE/mL, a negative control, and a positive control.

#### What are our next steps?

- 1. Prototype higher fidelity engineering models
- 2. Apply machine learning for fecal characterization
- 3. Seek pre-submission meeting with FDA

#### Engineer a sensor system for in situ analysis & sampling mechanism for feces extraction.



#### Sensor Analytics:

Record physical and biochemical features with neural networks for intelligent fecal characterization

#### Sampling Mechanism:

Collect samples of immobilized feces for further biochemical analysis



## **Biochemical Analysis:**

Analyze feces for HAI's, microbiome irregularities, and occult blood

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