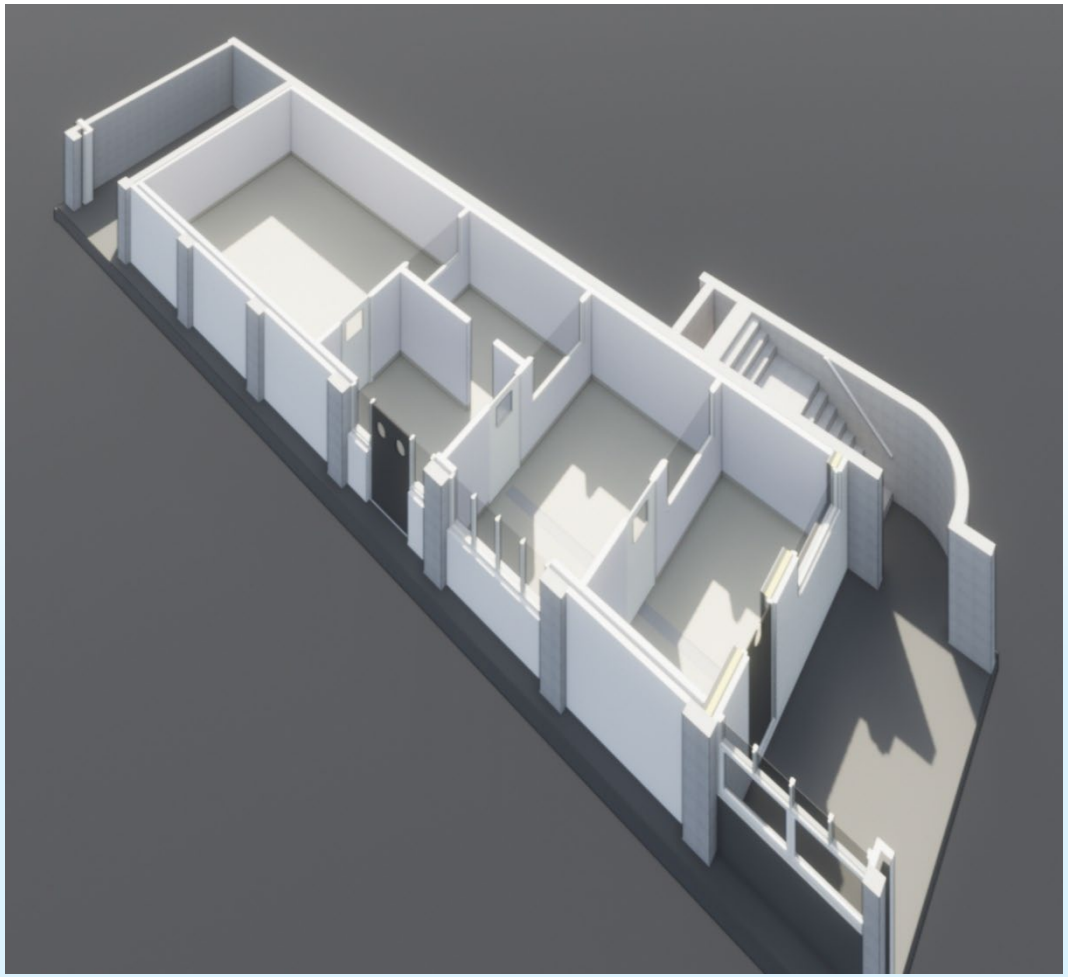
Faecal sludge Laboratory

Berend Lolkema (IHE Delft)

Map of FS lab



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Rooms FS laboratory

Entrance lab

Map of FS lab

Lecture room

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Rooms FS laboratory

Helminth lab

Analytical & weighing lab

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Rooms FS laboratory

Preparation & cleaning room

Facilities of FS laboratory

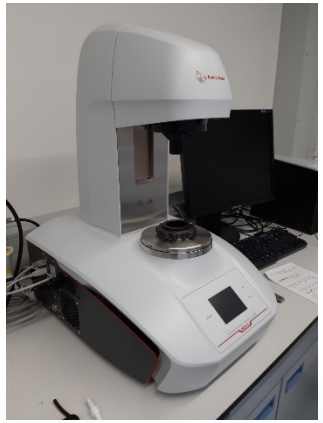
Faecal sludge laboratory is build for:

- Education (main purpose)/ showing how to work with FS
- Research (advanced measuring technologies)

Student regulations:

- Vaccinations of students (Diphtheria, Tetanus, Polio (DTP) and Hepatitis A & B (Twinrix)
- If students don't want vaccinations they need to sign a declaration
- Students should wear their lab coat at all times (+ safety glasses)
- If students don't work accordingly they get yellow card (red card → report to professor)

Equipment of FS laboratory

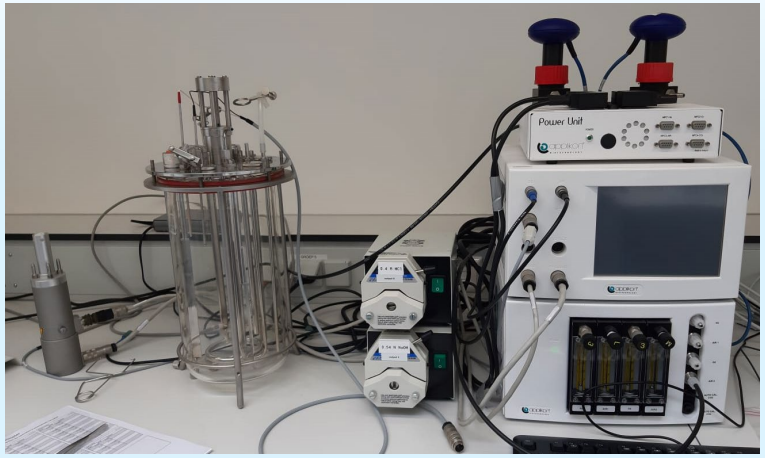


Rheometer

Advanced equipment

Calorimeter

TGA-DSC



Applikon biocontroller

Equipment of FS laboratory

Basic equipment

Field-spectrophotometer

Microscope with camera

Dishwasher

Fridge

Drying oven

Muffle oven

Autoclave

Field FS Laboratory

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(Based on IFRC/ Austrian Red Cross/ MSF)

Setup of FS laboratory

The FS lab consists of several spaces

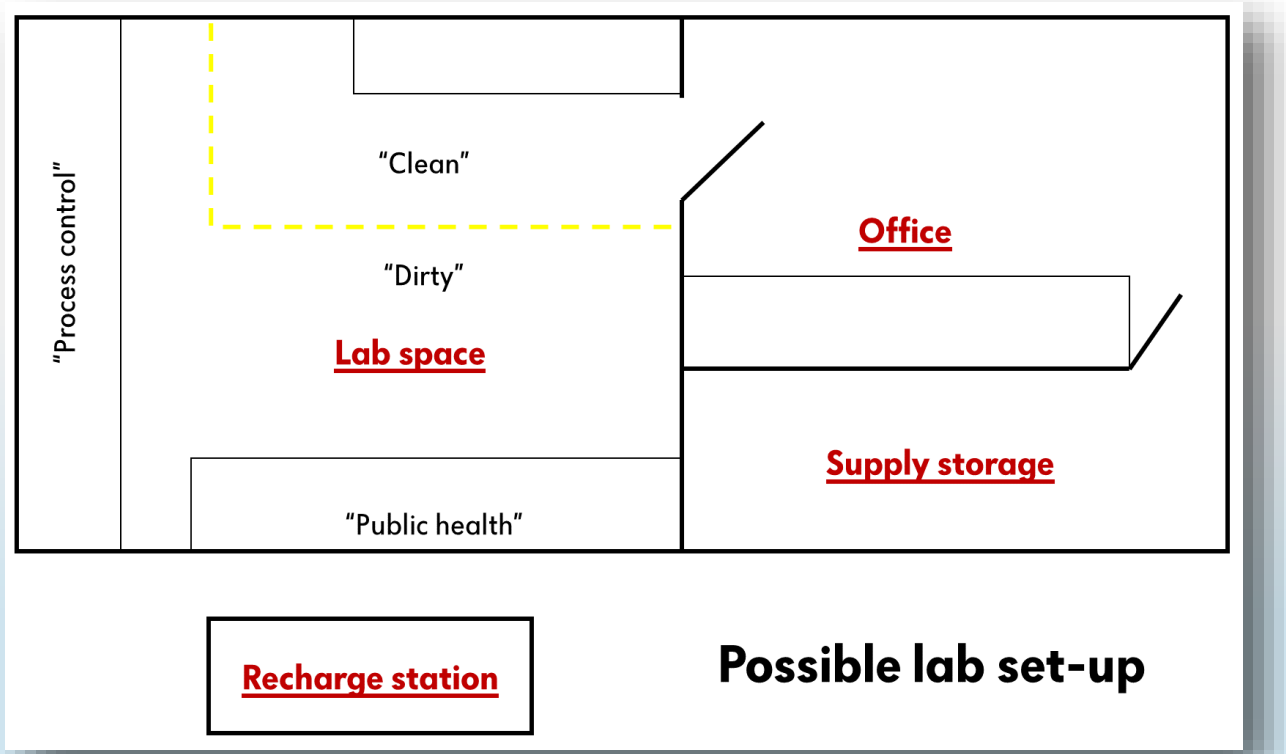
1. Office → data evaluation/ administration
2. Lab (clean & dirty)→ laboratory working space

If possible: split these spaces 1 & 2!

Organisation with a Faecal sludge laboratory in Cox's Bazar:

- **MSF**
- **Red Cross (IFRC/Austrian Red Cross)**

Example of FS laboratory



Picture from Austrian Red Cross

One room setup

multiple room setup

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Important things in FS laboratory

Important things in the laboratory are:

- Supply of electricity (Solar panel + Wind turbine)
- Supply of water
- Waste management

Other

- Vermin control
- Temperature control
- Instruction of neighbours
- Safety lab staff (vaccinations, etc.)

Equipment of FS laboratory

Restrictions equipment & others:

- Electricity should be adaptable on power box or have battery
- Or the electricity should be generated by a generator (be aware of noise for neigbours)
- Equipment should be easy to replace (sustainability)
- Consumables for equipment should be accessible (if imported take enough time for customs!)
- Level of training of the laboratory staff

Field equipment for FS laboratory/field measurement

Drying oven & centrifuge

Incubator for dry plates
(IFRC/Austrian Red Cross)

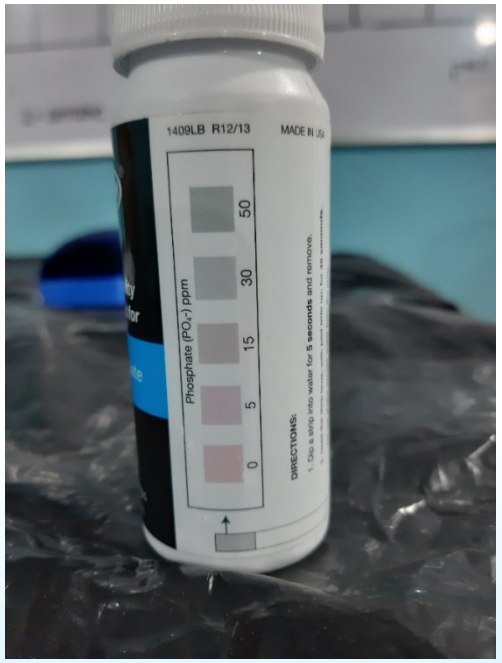
Blender

COD/ TN/TP digester
(IFRC/Austrian Red Cross)

Field equipment for FS laboratory/field measurement

EC, DO, pH measurement

Helminth eggs counting



Strips used for nutrients measurement

Spectrophotometer for COD (sometimes also for nutrients)

Difference between labs

Cost difference

- General laboratory are very high
  - CAPEX (investment costs):
    - High cost for equipment: easily above 200.000 Euro
    - Building construction are high
  - OPEX (maintenance & operational costs):
    - could be low cost if ready made kits aren't used (chemicals)
- Field laboratory are relatively cheap:
  - CAPEX (investment costs):
    - Lower cost due to the use of field equipment
    - Construction can be low
  - OPEX (maintenance & operational cost):
    - high consumable costs (depending on ready made field kits)

Difference between labs

Quality & accuracy difference

- Permanent FS lab
  - Higher quality equipment resulting in a more accurate result
  - Better measuring condition (humidity & temperature control)
  - Better separation between clean and dirty areas in the laboratory

- Field FS lab
  - Lower quality equipment, resulting mostly in less accurate results
  - Higher influence from environment
  - Higher change of cross contamination from dirty to clean area

Take home message

If you set up a laboratory there are many things to be taken in consideration a few things are:

- What do you want to measure?
- Why do you want to measure it?
- How accurate does the measurement need to be?
- What is your budget?
- Why do you set up the laboratory (research, commercial, education?)
- How much space do you have?