UCL

Civil, Environmental & Geomatic Engineering

Container-Based Sanitation: a sanitation solution for high water-table areas?

Luiza Campos

Athena SWAN Bronze Award

ECU GENDER CHARTER

Kisumu, July 2017

Presentation Outline

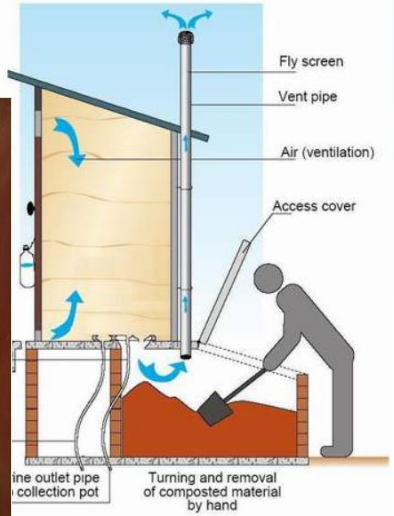
- What is CBS
- How CBS works
- Advantages of the CBS system
- Example of service providers
- Challenges and Opportunities for CBS
- Research Questions

What is Container-Based Sanitation?

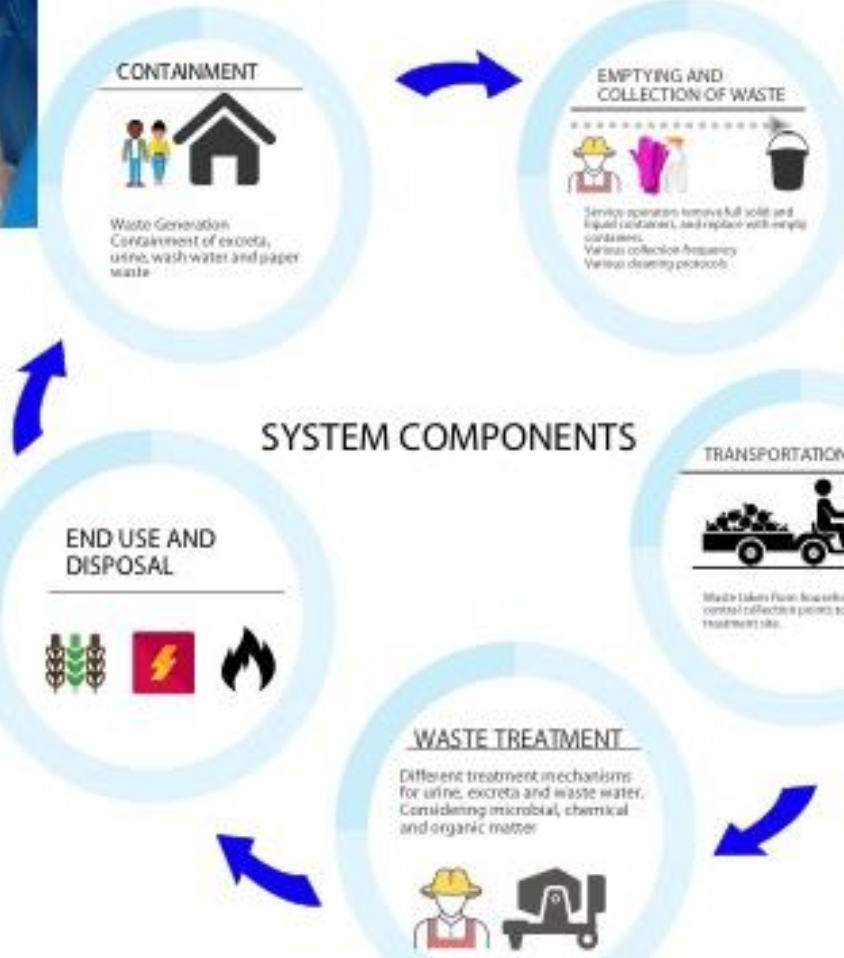
"*Refers to a sanitation system where* ***human excre****ta is collected in sealable,* ***removable containers*** *(also called cartridges) that are t****ransported*** *to treatment facilities*." https://en.wikipedia.org/wiki/Container-based_sanitation

UDDT, Ecosan, Composting toilets, Dry toilets etc. which are serviced

Images from Google



How CBS works



Slide courtesy:
Eve Mackinnon

Advantages of Container-Based Sanitation

- Adapted to urban environment – low space required
- Financially attractive, based on life-cycle-cost analysis preferential to alternative systems (BCG Report 2016)
- “Sanitation as a service” not jus technology: addresses whole service chain
- Opportunity to recovery nutrients and costs
- Modular system with different components and technologies

Slide courtesy:
Eve Mackinnon

A Global Approach

(8) CBS System and Service Providers still relatively small scale

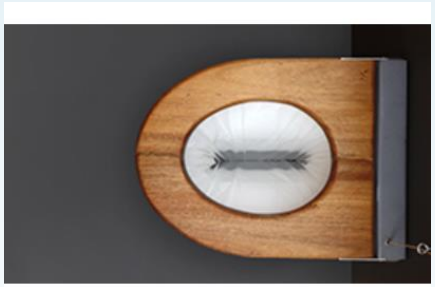
Slide courtesy:
Eve Mackinnon

Household CBS service provision is still relatively small in total households served – as compared to pit latrines for example

X-RUNNER

CLEAN TEAM

SOIL



SANIVATION

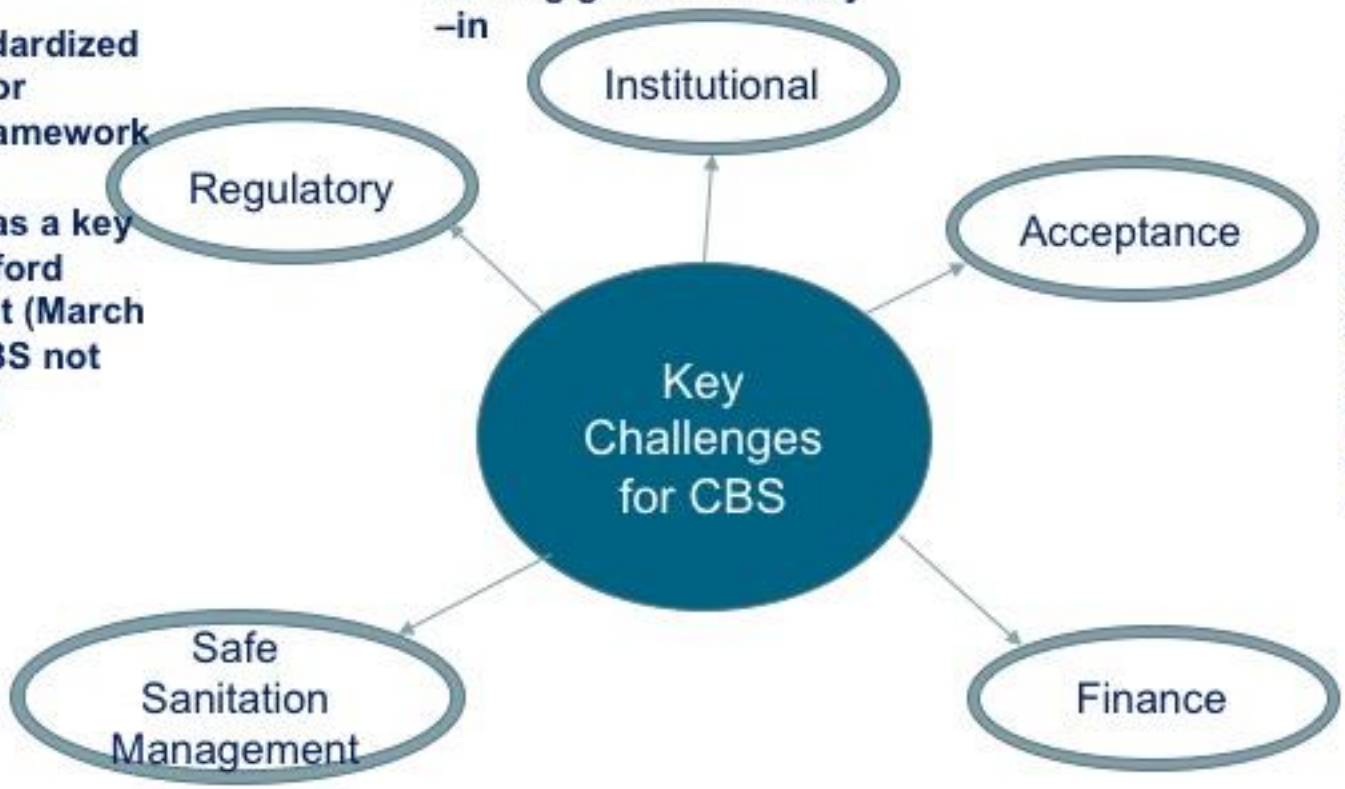
LOOWATT

SANERGY

Images from Google

Challenges for CBS

To go to scale CBS needs to overcome some key challenges identified



Getting government buy –in

Lack of standardized approaches or regulatory framework

Recognized as a key barrier at Oxford Toilet Summit (March 2016) that CBS not an 'improved sanitation' technology

Users and households acceptance - considerable behaviour change required Men are often more reluctant to adopt

Management across the entire sanitation chains
Little research indicating health risks from CBS in particular for occupational exposures

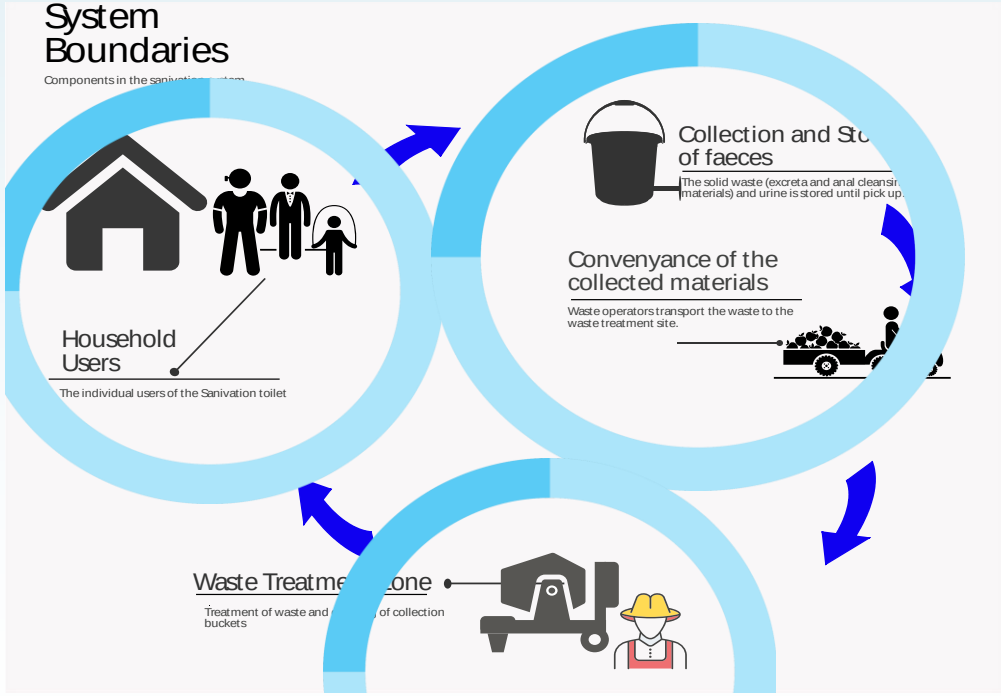
Service charges does not cover O and M
Affordability
Scale and piloting
How will commercialization address inequality in service provision?

Slide courtesy:
Eve Mackinnon

Opportunities for CBS

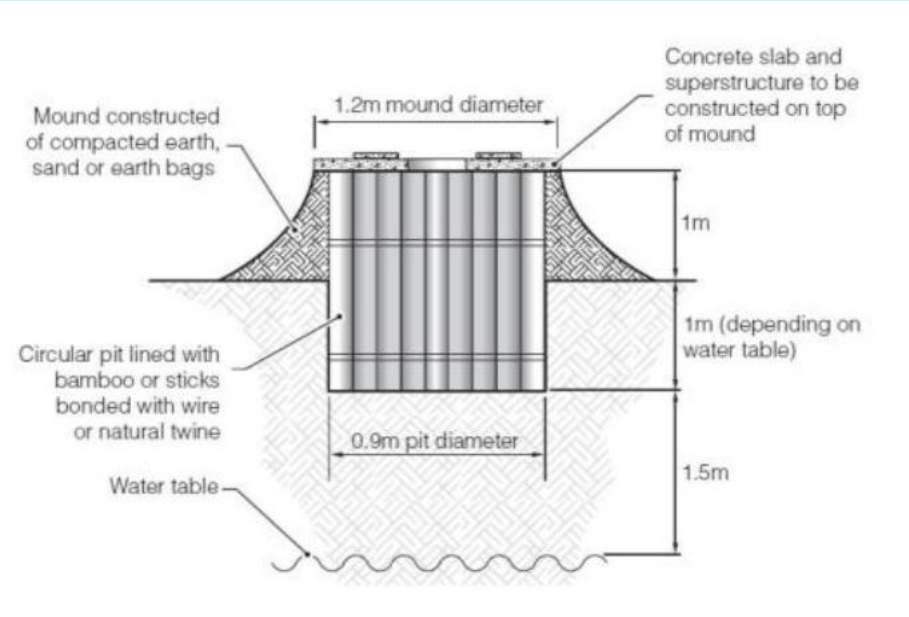
- High population density
- Limited/lack of open space
- Inability to excavate (concrete cover/lack permission)
- Insecurity (night time for women, children and even men)
- Poor access for latrine emptying
- Land tenure issues
- Flood risk areas
- High water table areas
- Low infiltration rate areas
- Rocky ground areas
- Collapsing soil areas

Image from E. Mackinnon



Is CBS the solution to achieve the SDGs?

Sanitation Options for High Water Table & Flood Prone Areas



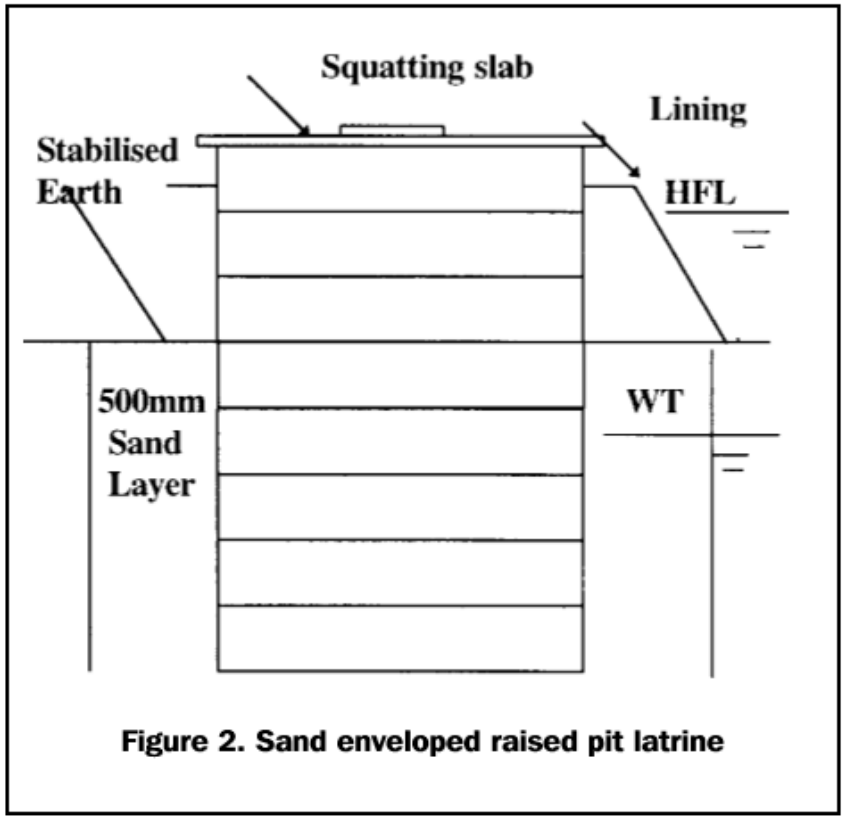
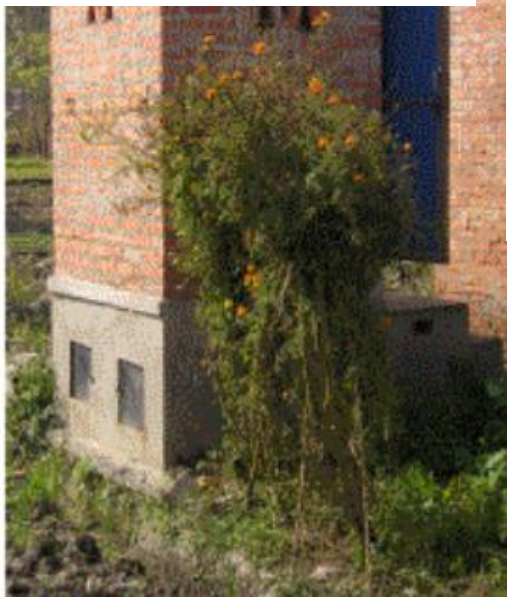


Figure 2. Sand enveloped raised pit latrine



But still a pollution source if not well maintained and operated!

Images from WEDC

What do we know about FSM and CBS in Dakar, Kisumu, and Lukaya?

- Pit latrines, Ecosan, and Septic tanks are common practices
- SANIVATION (Naivasha) and SANERGY (Nairobi) in Kenya
- CBS initiative in Kisumu ?
- EARTH AUGER Toilet in Dakar, and Pikine, Senegal
- ECOSAN in Lukaya, Uganda
- Bio Centre Facility in Kisumu, Kenya (Biogas production)
- Omni Digester and Biogas Reactor in Dakar
- Community Biogas Toilet in Uganda

Image: Umande Trust

Image: SSWARS

Image: L. Campos

Image: EarthAuger

Costs of CBS

	SOIL	SANIVATION	SANERGY	SANITATION FIRST	X-RUNNER
Unit ($)		$40	$200	$1,142	$120
Service ($ per household per month)	$14	$7			$39

Source: Various

Research Questions

1. How much pit latrines and septic tanks-soakaways contribute to pollution of groundwater in Dakar, Kisumu, and Lukaya?

2. Can CBS model in Dakar, Kisumu, and Lukaya **reduce the environment and groundwater contamination**?

3. What are the **most cost-effective CBS service models** for high dense and low dense cities in high water table areas?

4. What are the most adequate **FS treatment options** to Dakar, Kisumu, and Lukaya?

5. What are the **impacts** of CBS and other WASH interventions **on communicable and non-communicable diseases**?

6. How can we influence **behaviour change** to reduce waterborne diseases ?

7. Can CBS **reduce sanitation risks** associated to climate change impacts such as **flooding**?

Work Schedule:

Type of Project	Period	N. Students
Work Group	October-March	5-6 MSc students
MSc dissertation	May-Mid August	1 student
UG Research Project	October-March	A pair of students

Thank you for listening!

l.campos@ucl.ac.uk