Exposure Risk Management from Faecal Pathogens for Workers in Container Based Sanitation Systems

Eve Mackinnon

March 2019

University College London

Department of Civil, Environmental and Geomatic Engineering

Dissertation Submitted for Degree of Doctor of Philosophy

Appendix 9: User Interface Sanitary Survey Format

	Sanitary Survey at the User Interface				
	Use a Single Sheet per HH				
	Unit number:				
	NAME OF ENUMERATOR				
	TIME AND DATE OF SURVEY				
	NOTE WEATHER				
	LAST RAIN EVENT				
A: Installation Information					
	1	Number of toilet units		__	Number
	2	What % of users are adults?		__	Number
	3	What % of users are children < 5?		__	Number
	4	Type of Walling (surrounding the toilet unit)	A	__	Concrete
			B	__	Plastic (PVC)
			C	__	Aluminum (APC)
			D	__	Corrugated sheet
			B	__	Bricks
			E	__	Other
	5	Type of Roofing (installed on the toilet unit)	A	__	Corrugated sheet (aluminum)
			B	__	Corrugated sheet (iron)
			C	__	Tiled (ceramic)
			D	__	Plastic (PVC)
			E	__	None
	6	Type of Flooring (inside the toilet unit)	A	__	Earth/Mud/Bare
			B	__	Concrete
			C	__	Tiled
			D	__	Plastic (PVC)
			E	__	Other
B: Environmental Risk Factors					
	7	Has the community reported any outbreaks/cases of diarrheal diseases	A	□	High
			B	□	Medium
			C	□	Low
			D	□	Unknown
	8	Are there highly vulnerable individuals served by the toilet units (tick those that apply)	A	□	Pregnant women
			B	□	Children <5
			C	□	Elderly > 60
			D	□	People living with HIV/disabilities
			E	□	Unknown
	9	Is the area in a flood risk / prone to flooding?	A	□	Frequently floods
			B	□	Sometimes floods
			C	□	Rarely / never floods
			D	□	Unknown
C: System Performance					

	10	Is there access to a hand washing facility for handwashing after defecation around the toilet?	A	□	No handwashing facility is available
			B	□	Handwashing available in the toilet
			C	□	Handwashing available in the household
			D	□	Handwashing available outside the toilet
			E	□	Not possible to observe/Unknown
	11	Is there soap or liquid soap available to users for handwashing after defecation around the toilet?	A	□	Yes soap is observed
			B	□	Yes soap is not observed but is reported to be available
			C	□	No soap is observed or reported to be available
			D	□	Not possible to observe/Unknown
	12	Do people practice handwashing after going to the toilet?	A	□	Yes
			B	□	No
			C	□	Not known
	12	Is handwashing observed or reported?	A	□	Observed
			B	□	Reported
			C	□	Not known
	13	Distance to the nearest water point from the toilet?		__	meters
	14	Are anal cleansing materials available for use after defecation (check bin for evidence of use)	A	□	None present
			B	□	Water observed
			C	□	Toilet paper observed
			D	□	Not possible to observe
	15	Cover material available for use after defecation (Sawdust, ash, coconut coir, etc.)	A	□	Plenty next to the toilet
			B	□	A small amount, close to toilet
			C	□	None observed
	16	What is the physical condition of the unit: sides and surfaces of toilet	A	□	Deteriorated: Cracks, corrosion, holes (water tightness compromised)
			B	□	Fair condition: A few minor cracks, scuffs, other marks on surfaces
			C	□	Brand new: Toilet appears in good physical condition
			D	□	Not possible to observe
	17	What is the physical condition of the lids, seats, sealing mechanism of the toilet	A	□	Deteriorated: Cracks, corrosion, holes (airtightness compromised)
			B	□	Fair condition: A few minor cracks, scuffs, other marks on surfaces
			C	□	Brand new: Toilet appears in good physical condition
			D	□	Not possible to observe
	18		A	□	Urine Diversion is blocked

		Is there any blockages in the urine diversion (mis-use, build-up of salts)	B	□	Some fecal matter or other material in Urine Diversion
			C	□	No fecal matter dirt visible
			D	□	Not possible to observe
	19	What is the status of the toilet service?	A	□	Toilet has overflowed
			B	□	Toilet is full
			C	□	Toilet is regularly serviced
			D	□	Not possible to observe
	20	Is the toilet unit clean, free of fecal smudges (not mud/dirt)	A	□	Very Clean
			B	□	Sufficient
			C	□	Inadequate
			D	□	Not possible to observe
	21	Is the floor surfaces around the toilet area clean and free of fecal smudges?	A	□	Very Clean
			B	□	Sufficient
			C	□	Inadequate
			D	□	Not possible to observe
	22	When the toilet was last cleaned?	A	□	Today
			B	□	Yesterday
			C	□	Last Week
			D	□	Unknown
	23	Is the urine/waste water collected or disposed of on site?	A	□	Collected
			B	□	Disposed of on site
			C	□	Not possible to observe
	24	Is the urine soakaway in good condition	A	□	Yes, no visible blockages and no standing water
			B	□	No, visible blockages and standing water
			C	□	No soakaway constructed
			D	□	Not possible to observe
	25	Is the area around the liquid collection container dry without pools or standing water	A	□	Yes, no leakages and no standing water
			B	□	No, some leakages and standing water
			C	□	Not possible to observe
	26	Is there any odor / smell apparent nearby the toilet unit?	A	□	No smell, well ventilated
			B	□	Acceptable
			C	□	Unacceptable smell
			D	□	A very offensive smell
	27	Number of flies observed around the toilet area?	A	□	None
			B	□	Some (1-9)
			D	□	A lot (>10 or more)
	28	Is there visible risk information or communication to inform and remind users to follow best practices?	A	□	In the toilet unit
			B	□	Outside the toilet unit
			C	□	Not observed
	29	Typically, how frequently are the users sensitised about good practices?	A	□	Daily
			B	□	Weekly
			C	□	Monthly
			D	□	< 6 months
			E	□	> 6 months
			F	□	Not Known

	30	Typically, what methods are typically used for sensitization?	A	□	House to house
			B	□	Groups meetings
			C	□	Other
	31	Generally how well informed are users about the use and maintenance of the toilet unit?	A	□	Very well informed
			B	□	Well informed
			C	□	Quite well informed
			D	□	Not so well informed
			E	□	Not informed at all
			F	□	Not Known

Appendix 10: Collection and Conveyance Sanitary Survey Format

	Sanitary Survey at the Collection and Conveyance				
	Use a Single Sheet per HH				
	Unit ID				
	NAME OF ENUMERATOR				
	TIME AND DATE OF SURVEY				
	NOTE WEATHER				
	LAST RAIN EVENT				
A: Environmental Risk Factors					
	3	What is the state of the road condition used for route collection? (Deteriorated, potholes, or uneven road surfaces)	A	□	Good condition and dry
			B	□	Good condition and wet
			C	□	Deteriorated and dry
			D	□	Deteriorated and wet
			E	□	Unknown
	4	What is the condition of the collection vehicle?	A	□	Very good (brand new)
			B	□	Fair Condition
			C	□	Deteriorated
			D	□	Unknown
	23	Does the vehicle have risk information signs to indicate hazardous material being transported?	A	□	Yes
			B	□	No
			D	□	Don't know
System Performance					
	1	What is the condition and state of the collection containers - water-tightness?			
		Urine	A	□	Deteriorated: cracks, breakages and/or major cracks
			B	□	Fair condition: minor cracks, scuffs, other marks on surfaces
			C	□	Brand New
			D	□	Not possible to observe
		Solids	A	□	Deteriorated: cracks, breakages and/or major cracks
			B	□	Fair condition: minor cracks, scuffs, other marks on surfaces
			C	□	Brand New
			D	□	Not possible to observe
	2	What is the condition of seals/fittings/lids/caps of collection containers - air-tightness?			
		Urine	A	□	Deteriorated: lids missing, ill fitting
			B	□	Fair condition: wear and tear
			C	□	Brand New
			D	□	Not possible to observe
		Solids	A	□	Deteriorated: lids missing, ill fitting
			B	□	Fair condition: wear and tear

			C	□	Brand New
			D	□	Not possible to observe
	5	What overall condition is the PPE in?	A	□	Very Good (brand new)
			B	□	Satisfactory
			D	□	Deteriorated
			E	□	None observed
	6	How are containers secured to prevent being displaced while transported?	A	□	Containers are not secured
			B	□	Secured with physical restraints
			C	□	Not known
	7	Note the cleanliness of the floor in the vehicle	A	□	Visibly clean
			B	□	Sufficient
			C	□	Inadequate (fecal smudges)
	8	Cleanliness of the fecal collection containers? (Select a sample of 10%)	A	□	Visibly clean
			B	□	Sufficient
			C	□	Inadequate (fecal smudges)
	9	Is there a spillage disinfection kit on board the collection vehicle?	A	□	Visibly clean
			B	□	Sufficient
			C	□	Inadequate (fecal smudges)
	10	How many collections from units are made per day?	A	□	Low levels (10-20 toilets/day)
			B	□	Medium (20-30 toilets/day)
			C	□	High (30 + toilets/day)
			D	□	Not known
	11	Observation of spillages or accidents	A	□	Zero
			B	□	1
			C	□	2 or more
			D	□	Unknown
	12	Are there flies observed around the vehicle?	A	□	None
			B	□	Some (1 or more)
			C	□	A lot (>10 or more)
Operational Capacity					
	13	Which items of PPE are available for operators during collection and conveyance?	A	□	Latex (medical) gloves
			B	□	PVC (work wear) gloves
			C	□	Mask
			D	□	Overalls
			E	□	Safety Helmet
	14	What vaccinations have staff received?	B	□	Tetanus
			C	□	Hepatitis A and B
			D	□	Polio
			E	□	Cholera
			F	□	Rota Virus

Appendix 11: Waste Treatment Facility Sanitary Survey Format

Sanitary Survey at the Waste Transfer and/or Transfer Stations					
Use a Single Sheet per site visit					
Unit ID					
NAME					
TIME AND DATE OF SURVEY					
NOTE WEATHER					
LAST RAIN EVENT					
CONDITION OF HARDWARE					
	1	Physical integrity of storage containers - consider air and watertightness?			
	i	Urine storage containers	A	□	Deteriorated: cracks, breakage and/or major cracks
			B	□	Fair condition: minor cracks, scuffs, other marks on surfaces
			C	□	Brand New
			D	□	Not possible to observe
			E	□	Other _____
	ii	Solids	A	□	Deteriorated: cracks, breakage and/or major cracks
			B	□	Fair condition: minor cracks, scuffs, other marks on surfaces
			C	□	Brand New
			D	□	Not possible to observe
			E	□	Other _____
	2	Condition of treatment equipment - if applicable?			
	i	Urine treatment equipment	A	□	Deteriorated: lids missing, ill fitting
			B	□	Fair condition: wear and tear
			C	□	Brand New
			D	□	Not possible to observe
	ii	Solids treatment equipment	A	□	Deteriorated: lids missing, ill fitting
			B	□	Fair condition: wear and tear
			C	□	Brand New
			D	□	Not possible to observe
	3		A	□	100%

		What proportion of treatment equipment and machines is on a regular maintenance schedule?	B	□	>90%
			C	□	>50%
			D	□	n/a
	4	What proportion of treatment equipment and machines is on a regular cleaning schedule?	A	□	100%
			B	□	>90%
			C	□	>50%
			D	□	Unknown
	5	What is the cleanliness in high risk areas?	A	□	Good
			B	□	Fair
			C	□	Inadequate
			E	□	Unknown
	6	What is the cleanliness in low risk areas?	A	□	Good
			B	□	Fair
			C	□	Inadequate
			E	□	Unknown
OPERATIONAL CAPACITY AT TREATMENT FACILITY					
	7	Which items of PPE are available for operators during collection and conveyance?	A	□	Latex (medical) gloves
			B	□	PVC (workwear) gloves
			C	□	Mask
			D	□	Overalls
			E	□	Safety Helmet
			F	□	Googles
			G	□	Torch
			H	□	Boots
			I	□	Not possible to observe
	8	What overall condition is the PPE in?	A	□	Very Good
			B	□	Satisfactory
			C	□	Poor
			D	□	Very Poor
			E	□	None observed
	9	Functionality of handwashing/hygiene device for operators?	A	□	Soap and water available
			B	□	Alcohol hand rub available
			C	□	No soap and water available
			D	□	Not possible to observe
	10	How many spillage disinfection kits on site?	A	__	number
	11	How is waste transferred from collection containers to treatment containers?	A	□	Mechanised process
			B	□	Partially mechanised/manual
			C	□	Manually (low number of steps <5)
			D	□	Manually (high number of steps >5)
	12	Is type of waste treatment is observed			
	13	Solids (fecal wastes)	A	□	pasteurisation >70 degrees Celsius
			B	□	thermophilic aerobic composting (windrows)

			C	□	thermophilic aerobic composting (in-vessel composting)
			D	□	mesophilic anaerobic composting
			E	□	Other _____
	14	Urine	A	□	direct disposal
			B	□	soakaway pit
			C	□	drainage field
			D	□	slow sand filtration
			E	□	Other _____
	15	Waste Water (black/contaminated from washing process)	A	□	direct disposal
			B	□	soakaway pit
			C	□	drainage field
			D		slow sand filtration
			E	□	Other _____
	16	Other solids (plastics)	A	□	incineration
			B	□	landfill
			C	□	municipal
			D	□	other _____
	17	How many failures in waste treatment in the last week? (pathogen reduction not achieved)	A	□	Zero
			B	□	<10
			C	□	>10
			D	□	Unknown
	18	Is movement of people controlled from high risk (red) areas well defined from low risk (green) areas in treatment facility?	A	□	Well maintained and defined high and low risk areas
			B	□	
			C	□	Poor definition between high and low risk areas
	19	Number of flies observed around the treatment site?	A	□	None
			B	□	Some (1 or more)
			C	□	A lot (>10 or more)
	20	Has there been any spillages or accidents reported in the last week?	A	□	Zero
			B	□	<10
			C	□	>10
			D	□	Unknown
	21	Is there an accident reporting format for operators	A	□	Yes
			B	□	No
			C	□	Not known
	22	Is there visible and appropriate risk information or communication to inform and remind operators to use hand hygiene?	A	□	Yes
			B	□	No
			C	□	Don't know
	23	Is there water available on site?	A	□	Yes
			B	□	No

			C	□	Not observed
HUMAN PERFORMANCE: HANDWASHING BEHAVIOUR AND USER BEHAVIOUR					
	24	When the operators were last trained in hand hygiene compliance and protocols?	A	□	> 6 months
			B	□	< 6 months
			C	□	Don't know
	25	Have the operators been sensitised in hand hygiene (in the last 6 months)?	A	□	> 6 months
			B	□	< 6 months
			C	□	Don't know
MANAGEMENT AND SAFETY CULTURE					
	26	When was the last emergency scenario scheduled carried out?	A	__	days
			B	__	weeks
			C	__	months
	27	Are SOPs available for the following:	A	□	Disinfection and Cleaning Protocols
			B	□	Glove Wearing and Hand Hygiene Protocols
			C	□	Hand Washing Protocols
			D	□	Loading Protocols
			E	□	Glove Wearing and Hand Hygiene Protocols
			F	□	Don't know
	28	Do operators have up-to-date vaccination records against the following diseases (tick which apply)	A	□	Typhoid
			B	□	Tetanus
			C	□	Hepatitis A and B
			D	□	Polio
			E	□	Cholera
			F	□	Rota Virus
	29	Are the treatment operators on de-wormed regularly?	A	□	Yes
			B	□	No
			D	□	Don't know
	30	Are the treatment operators given regular health checks?	A	□	Yes
			B	□	No
			D	□	Don't know

Appendix 12: Behavioural Survey

Compost Toilets in London Canal Boats

Section A
Location
Date
Do you agree to participate in the survey (y/n)
Generally, how would you describe your status as a canal boater?
❑ a. Constant Cruiser
❑ b. Residential Mooring
❑ c. Other (*please write below*)

How many people are on board?

What type of toilet are you currently using on board?
❑ a. Compost toilet
❑ b. Cassette toilet
❑ d. No toilet/won't say

Regarding your composting toilet: which specific type of compost toilet do you own?
❑ a. Kildwick
❑ b. Simploo
❑ c. Separett
❑ d. Envirolet
❑ e. Other
❑ c. Self-build

Typically, how do you dispose of or manage the solid waste?
❑ a. Bagging and binning
❑ b. Composting
❑ c. Burying
❑ d. Burning
❑ e. Doing something else
❑ c. Prefer not to say

Typically how frequently do you empty the toilet (mainly solids)?
❑ a. Once a week
❑ b. Fortnightly
❑ c. Monthly
❑ d. Twice a month
❑ e. Don't know

Typically how frequently do you clean the toilet surfaces?
❑ a. Daily or more
❑ b. Few time a weeks

❑ c. Once a week
❑ d. Fortnightly
❑ e. Monthly

Normally do you wear gloves when emptying of the contents of the containers waste?
❑ a. yes
❑ b. no
❑ c. don't participate in disposing of waste

Do you wash your hands after emptying contents of the containers?
❑ a. Yes
❑ b. No

Have you had any spillages when you empty it?
❑ a. Everytime you empty it
❑ b. A few time a years
❑ c. Once or twice per year
❑ d. Less than once a year
❑ e. Don't know

Risks
We wish to ask you some questions about the impact of human poop and wee on human health and the environment and to what extent you agree or disagree:

My toilet has not adversely affected my health:
❑ a. Strongly agree
❑ b. Generally agree
❑ c. Generally disagree
❑ d. Strongly disagree

If I touching or contact with raw faeces poop it may harm my health:
❑ a. Strongly agree
❑ b. Generally agree
❑ c. Generally disagree
❑ d. Strongly disagree

If raw or untreated sewage escapes it can harm the health of local environment:
❑ a. Strongly agree
❑ b. Generally agree
❑ c. Generally disagree
❑ d. Strongly disagree

What are the ways that illnesses like diarrhoea are transmitted to people?
❑ a. Drinking dirty or contaminated water
❑ b. Through bad, unhygienic food preparation
❑ c. By touching contaminated objects in the environment
❑ d. From ingesting dirty soil
❑ e. Through a lack of proper personal hygiene

How does untreated poop enter the local environment?
❑ a. Lack of proper collection (collective or individual) - illegal dumping of sewage
❑ b. Lack of proper treatment or disposal systems
❑ c. Not using a toilet
❑ d. Other

From my personal experience, the risk of catching diarrhoea is high?
❑ a. Strongly agree
❑ b. Generally agree
❑ c. Generally disagree
❑ d. Strongly disagree

Thinking back to a time I last had diarrhoea, the impact on my daily life was severe
❑ a. Strongly agree
❑ b. Generally agree
❑ c. Generally disagree
❑ d. Strongly disagree

Attitudes
This section is about how your attitude to your toilet in terms of the costs and benefits (i.e the time you spend managing with your toilet, your health, your financial resources, money etc

Using and managing my toilet (i.e. cleaning, emptying your toilet) takes up a lot of time?
❑ a. Strongly agree
❑ b. Generally agree
❑ c. Generally disagree
❑ d. Strongly disagree

Compared to other toilet facilities you may use – what is the best thing about your toilet?
❑ a. _____

Compared to other toilet facilities you may use – what is the worst thing about your toilet?
❑ a. _____

What was the cost of your toilet?
❑ a. >£1000
❑ b. £800- 1000
❑ c. £500 -799
❑ d. £200 - 399
❑ e. <£200
❑ f. prefer not to say

The cost of the toilet was the most important consideration when buying it
❑ Strongly agree
❑ Generally agree
❑ Generally disagree

❑ Strongly disagree

It is very important to me is that toilet waste is re-used
❑ a. Strongly agree
❑ b. Generally agree
❑ c. Generally disagree
❑ d. Strongly disagree

It is very important is to me that toilet waste is properly treated and contained from the aquatic environment
❑ a. Strongly agree
❑ b. Generally agree
❑ c. Generally disagree
❑ d. Strongly disagree

As far as you're aware: how many people in your community have the same type of toilet as you?
❑ a. (Almost) all of them (100%)
❑ b. Over half of them >50%
❑ d. Less than half <50%
❑ e. (Almost) nobody 0%

Visitors and guests like the toilet
❑ a. Strongly agree
❑ b. Generally agree
❑ c. Generally disagree
❑ d. Strongly disagree

I find it simple and easy to clean the toilet
❑ a. Strongly agree
❑ b. Generally agree
❑ c. Generally disagree
❑ d. Strongly disagree

I find it simple and easy to empty the toilet
❑ a. Strongly agree
❑ b. Generally agree
❑ c. Generally disagree
❑ d. Strongly disagree

I am confident in the performance of the toilet; especially in it being able to deal with issues like blockage and leakage?
❑ a. Strongly agree
❑ b. Generally agree
❑ c. Generally disagree
❑ d. Strongly disagree

I have a set of routines for emptying the toilet

❑ a. Strongly agree
❑ b. Generally agree
❑ c. Generally disagree
❑ d. Strongly disagree

I often forget to empty the toilet
❑ a. Strongly agree
❑ b. Generally agree
❑ c. Generally disagree
❑ d. Strongly disagree

I have strategies to remind me to empty the toilet
❑ a. Strongly agree
❑ b. Generally agree
❑ c. Generally disagree
❑ d. Strongly disagree

I have a plan for what to do if my toilet stops working?
❑ a. Strongly agree
❑ b. Generally agree
❑ c. Generally disagree
❑ d. Strongly disagree

Appendix 13: Colilert protocol and surface swabbing

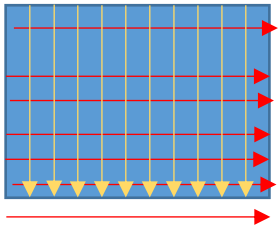
We will collect swabs from surfaces in the toilet/bathroom area to test for presence of *Escherichia coli* (abbreviated as *E. coli*) tested for as a faecal indicator bacteria (FIB). *E. coli* indicate presence of bacteria found in the environment, foods, and intestines of people and animals.

Material Required

PBS solution (15ml per swab to be collected) Sterile deionized water (90ml per sample) Sample vials – 15ml (one per swab) Sample bottles for preparing samples – 100ml (one per sample) Quanti-trays and Colilert powder Iron UV light

- Sterilise swabs are sterilised and keep sealed until ready for use in field
- Prepare enough PBS solution for sample collection (14ml for each swab)
- Mix one tablet of PBS with correct volume of distilled water (according to the size of the tablet)
- Sterilise PBS solution and distilled water
- Prepare sterile 15ml sample vials with 7ml of sterilised PBS solution
- Prepare data labels for sample vials
- Environmental Data collection
- Select areas to be swabbed
- Put on gloves
- Select a representative 10cm^2 surface area to be swabbed
- Take out swab and use the swabbing technique describe below to collect microbiological specimen

Swabbing technique: Using one side of the swab, move the swab one direction following the red arrows. Then flip the swab and move the swab following the yellows arrows



- After swabbing put the swab into the 15ml vial – use scissors to break the end and secure lid
- Label the collection vial with sample ID and date
- Put into cool box and transport back to lab
- Colilert Protocol
- Vortexed all sample vials for 30 secs

- Added another 7ml of PBS to vials (total 14ml in vials)
- Vortex for another 30 secs
- Leave until ready for processing
- Prepare 100ml sterile sample bottles
- Preparing a 1:10 dilution
- Added 90ml sterile distilled water in 100ml sterile sample bottle
- Added 10ml of sample elute from vial
- Add one sachet of Colilert powder as directed
- Shake for10 secs and allow reagent powder to dissolve >5 mins
- Label sample bottle with sample ID and dilution
- Preparing negative control
- Added 10ml PBS to 90ml sterile distilled water
- Prepare Quanti-tray
- Holding the tray open according to the directions in Quanti-tray information sheet, tip entire 100ml contents into Quanti-tray
- Seal the tray using the iron on a flat surface. Start at the base of the tray and move the iron up the tray to direct liquid into all the cells
- Check all the cells are filled
- Label the Quanti-tray with sample ID and time of entry into incubator
- Place in incubator cells facing up
- Incubated at 35 ^{0}C for 18–22 hours
- Count wells according to Colilert sample sheets

Appendix 14: First Person Videography protocol

Protocol for the First Person Videography (FPV) for Collection of Activity Data for Servicing and Emptying of Onsite Sanitation

Equipment needed

- Micro action camera (e.g. DRIFT Stealth 2) including SD card (16GB for storing camera data and accessories like batteries or charger for video camera
- Headband (Nike sports band or similar)
- Smartphone with app for real time viewing of the video (desirable)
- Linking App and Video Software (see user manual for further details)

Process

- Download camera software onto the smartphone (e.g. DRIFT APP)
- Update firmware for SD card if required
- Mounting the video camera for use (see user manual for further details)
- The micro action camera may come with fixtures to be mounted to a helmet.
- Remove mounting fixtures and attach to headband (or attach to a helmet)
- Mount the camera forwards and downwards, onto a headband around the head; to the side of the head
- Recording activity data
- Ensure all consent forms and information sheets have been signed and accepted
- Ensure the person is comfortable with the video recording experience and positioning
- Make any necessary physical adjustments to the headband to make sure it comfortable for the wearer
- Do 2–3 tests runs letting the person wear the camera and encourage the person to carry on their activities as normal
- Play back the video to the person (or share the real time view on smartphone) to share the activity data recorded on the camera
- Make any adjustments to the position of the camera to ensure it is capturing hand activity for both hands so that hand–mouth and hand–objects contacts can be viewed
- Ensure the battery is 100% and that the expected video data will not exceed battery length (approx. 2 hours)
- Ensure SD card has sufficient capacity
- Ensure the video camera is set to green for recording
- Turn off when finished recording
- When returned from field download the data onto a computer using the USB cable and save with date/time and location and any other information
- Back up the video data in a second location in case of loss of data on hard drive

Site Selection – Location and Number

1. If the emptying locations are varied and highly heterogeneous, for examples in terms of physical environment, housing density and toilet structures ensure the sample for data collection accounts for the spatial diversity.

2. The quantity of activity data collected should be large enough to be representative of the types of contacts and activity that occurs under normal conditions.

3. The length of each unique emptying event will determine the number of events that may be collected. A large enough sample of unique emptying events should be recorded to capture variability; about 10 emptying events. In general, a period of recording the activity data would be a minimum 2 hours - maximum 10 hours (the time limitation is due to micro-level data translation).

4. Unless there is concern of contact during transport, only the servicing or emptying event of the onsite sanitation system (container/septic tank) needs to be recorded.

5. Notes should be taken to record any additional data associated with cleanliness and risk factors.

Appendix 15: Minimum Design Standards for CBS Components

Minimum Design Standards			
Toilet hardware – front end, collection container			Source
1	Design	Toilet is accessible for people living with disability when appropriate (height, size, steps)	
2		Toilet is accessible for children (height, size, steps, smaller seat and/or drop hole (<25cm) for child use)	
3		Normal use of the toilet doesn't involve hands going near excreta (i.e. lifting covers or changing containers)	
4		The separator design prevents fecal deposits landing on separator and facilitates separation of urine and faeces	
5		The urine pipe should be wide enough to not block easily, due to build-up of salts in urea (recommended > 32mm minimum diameter)	
6	Cleanability	Contact surfaces are smooth and non-porous, e.g. prefabricated plastic, wood (painted), coated concrete,	SEI
7		Floors are non-absorbent, easy to clean and washable (non-porous concrete or PVC plastic or other non-porous material)	
8		Toilet surfaces are easily available for cleaning (cleaned without disassembly)	ISO
11	Material durability	Materials from which the unit is constructed should be durable to prevent rapid deterioration	
13	Isolation and containment (SFW and LFW)	Design ensures any spillages contained within toilet unit	Kildwick
14		A soak away is installed for wastewater/urine if not collected	
15		Soak away not installed on rock/flooded ground	
16	Minimum dispersal through air	Sealed containers when full or not in use prevents dispersion through air	SEI
17		Toilet installed >10 m from food preparation areas	
18	Risk signage and communication	Appropriate IEC when toilet is in use (visible, relevant)	ISO
Transport equipment			Source
1	Cleanability	Contact surfaces are smooth, non-porous and easy to clean, e.g. prefabricated plastic, wood (painted), PVC plastic	
2	Durability	Equipment used for collection and conveyance are highly durable, durable	
3		Equipment has a maintenance schedule	

4	Usability	Solids containers are appropriately sized to enable safe handling (max. lifting weight per person 25kg)	OSHA
5		Handles/straps on containers to facilitate lifting	
6		Handling tools to prevent direct manual handling when required	
7	Isolation and containment (SFW)	The collection vehicle is covered and sealed	
8	Isolation and containment (LFW)	The collection vehicle has a watertight vehicle floor	
9	Risk signage and communication	The collection vehicle if fitted with speed restriction device or similar	
10		Appropriate IEC: biological hazard (signs) to inform public of biohazard	
11		Emergency response kit (spillage disinfection kit) on board	
Treatment facility			Source
1	Design	Facility is not sited in rocky ground/ground liable to flooding	
2	Cleanability	Contact surfaces are smooth, non-porous and easy to clean e.g. prefabricated plastic, wood (painted), PVC plastic	
3		Floors in high risk areas are non-permeable and washable; (cement, coated concrete, vinyl, ceramic tiles)	
4		Drainage adequate to allow flow of water (no standing water)	
2	Durability	Equipment is included within a maintenance schedule	
5	Usability	Handwashing stations and disinfection points are available	
6		Contaminated and non-contaminated areas are separated into high- and low-risk areas	
7		Standards operating procedures exist for facility management	
8		Cleaning and disinfection process does not result in splashing and direct ingestion of wastewater	
9		“Close-contact” manipulation by frontline staff of the fecal and urine waste materials is minimised	
10	Isolation and containment (SFW)	A physical fly barrier or adequate steps are taken to prevent vector transmission from high risk areas (raw fecal sludge)	
11		Stored waste is kept in sealed containers, until final disposal	
12	Isolation and containment (LFW)	An appropriate soak-away area or drainage system is installed for grey/wastewater	
13	Minimum dispersal through air	Adequate ventilation when handling waste to prevent concentration of dangerous particles	
14		All staff areas and eating areas are physically separate with hygiene controls to prevent cross-contamination	

15		Compost facility >100–250m from populated areas to prevent dispersal of hazardous particles	
16	Risk signage and communication	Appropriate IEC to address potential hazards associated with equipment	
17		The facility is securely fenced to prevent access to the public	
Liquid waste disposal facility – soakaway pits, drainage fields			Source
1	Design	The soakaway area has a length to width ratio > 2:1 to allow solids to settle	
2		The soakaway is installed over >30m from a potable water point	
3		The depth to the groundwater is >3m from the bottom of the soakaway pit	
4		The soakaway has sufficient capacity for the input	
		Soakaway not installed on rock/flooded ground	
5	Durability	Construction materials are durable, no cracks in concrete, mortar durable	
6	Usability	Grease trap is accessible for maintenance	
7	Isolation and containment (SFW)	Sludge is managed at end of final disposal	
8	Isolation and containment (LFW)	The treatment system can accommodate increases in discharge inputs/discharge rate is controlled	
9	Minimum dispersal through air	There is no odour from the pit	
10	Risk signage and communication	Fence and public access barriers are erected around the soakaway pit	
Solid waste disposal facility – incinerator, landfill			Source
1	Design	Chimney height above 4-5m	
2		Waste destruction efficiency >90%	WHO
3		Incinerator has a roof (walls and ventilated)	
4	Durability	Construction materials are durable	
5	Usability	Protocols for disposal procedures exist	
6		Facility/equipment has a maintenance schedule	
7		Manual handling of waste by frontline staff of the fecal and urine waste materials is minimised	
8		Solid waste prior to disposal is securely stored (in a sealed container)	

9	Minimum dispersal through air	incinerator sited >100 - 250m from populated areas to prevent dispersal of hazardous particles	
10	Risk signage and communication	Fence and public access barriers are erected around the incinerator site	

Appendix 16: Critical SOPs

Critical process and SOPs in CBS system	
1	Containment SOPs
2	User and maintenance at HH SOPs
3	Cleaning and disinfection SOPs (at toilet level, at ECU)
4	Collection and conveyance SOPs
5	Treatment specific protocols
6	Composting SOPs (organic solid fecal waste)
7	Slow sand filtration SOPs
8	Spillage scenarios SOPs
9	Emergency scenarios SOPs (relevant emergencies)
Specific health and safety guidelines	
	Glove use guidelines
	Hand hygiene guidelines
	Reuse and crop application guidelines

Annexes

Annex 1

WHO Sanitation Safety Planning Workshop for CBS

Workshop Notes – T. Keatman

Trainers and participants

Overview

SSP is a practical, iterative and modular risk assessment process which can be used to systematically understand and mitigate health-related hazards for each link of the sanitation chain. The WHO SSP workshop (11–14 September 2017) for CBS providers took place over the course of 4 days; with each day dedicated to working through modules of the SSP process. All participants appeared engaged and interested in learning about the process and developing organisational Sanitation Safety Plans once "home".

The process is not complicated or technical – but does require time, ongoing engagement and potentially, pathogen/exposure risk data analysis at the local level. Once an SSP process has been completed and a plan agreed, it may also mean making incremental changes to improve CBS standard (technical) operating procedures and staff management practices.

- WHO is willing to continue supporting the workshop participants with some "small, doable and practical" actions to help maintain momentum. Ideas include:
- Helping facilitate discussions with government
- Linking each CBS group with one of their SSP trainers (e.g. Leonelha will be in Lima soon and may be able to visit X-Runner)
- Linking each CBS group (or everyone) with experts through webinars, through collating questions and responding, through research, etc.
- Jointly publishing a compendium of SSPs for CBS systems.
- The brief notes below follow the structure of the SSP process as outlined in the WHO SSP manual (2016) and as used during the workshop. UCL student, Eve (MacKinnon), whose PhD is focused on assessing and managing exposure risks along the CBS service chain, kindly provided examples for participants of how each step of the SSP process could be applied to the CBS-specific content

SSP modules and notes:

Participants all received the full WHO manual *Sanitation safety planning: manual for safe use and disposal of wastewater, greywater and excreta* (WHO 2016), PPT handouts, worksheets, and access to all reference/resource materials in a dedicated Dropbox (including an example full sanitation safety plan from The Philippines). These notes are only a brief snapshot of information shared during the training with some hints/tips from the trainers for CBS providers. The content below is drawn directly from the Manual and the teaching materials – please attribute WHO, 2016 and Eve (denoted Eve) if you reuse any of the content below!

Workshop objectives for CBS participants:

- Understand the SSP process, outputs and outcomes

- Gain confidence in applying SSP to your CBS system
- Know how to complete SSP for your system.

Purpose of SSP: To bring the health focus to the forefront of sanitation and reuse as well as identifying actual (as opposed to perceived) risks for health and safety across the sanitation system. (In this case, the CBS sanitation chain rather than, for example, a city-wide sanitation system.) SSP focuses on (hygiene and sanitation) behaviour change not just infrastructure.

SSP history: WHO's 2006 Guidelines for the safe use of wastewater, excreta and greywater are a "code of good practice for the safest possible use of wastes in agriculture and aquaculture, so that nutritional and household food security benefits can be shared widely" (Darryl's slides) – the SSP manual was developed to simplify the Guidelines for wider uptake and for use with other sectors also (e.g. FSM, public irrigation, CBS).

SSP structure: The SSP process includes two key phases: 1) a system assessment phase where disease pathways and affected people are identified and analysed for risks; 2) an operational monitoring and management phase where strategies are developed to reduce the highest risks and to incrementally address others.

SSP outcomes: Helps sanitation operators and the health sector to: target limited resources to the highest risks; develop a multi-sector team approach to identify and manage health of at-risk people; and, focus on simple operational monitoring and correction. The *process* of undertaking a multi-stakeholder SSP can also be helpful for local advocacy and raising the profile of sanitation/CBS with health sector colleagues.

SSP outputs: 1) a *prioritised*, *incremental* improvement plan; 2) an operational monitoring plan for regular monitoring and periodic verification.

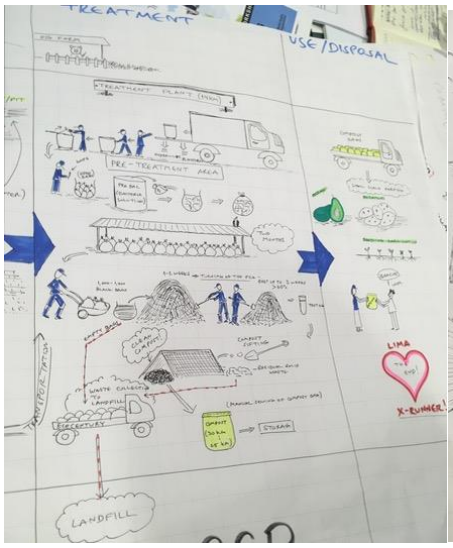
Module and intended outputs	Steps	CBS considerations for each step – hints and tips (not the whole process!)
Module 1: Prepare for SSP Outputs: Agreed priority areas, purpose, scope, boundaries and leadership for SSP	Establish priority areas or activities Set objectives (improved public health outcomes) Define the system boundary and lead organisation	Where to do SSP? Who to involve? **Priority areas** (i.e. activities that pose the greatest health risk) – for CBS, these are all the links in the sanitation chain, even if the CBS provider is not directly responsible for or operational in each. E.g. Clean Team work closely with Kumasi Metropolitan Assembly (KMA) and their local contractor on disposal/reuse. All relevant third parties should be included in the SSP process. Set up a Steering

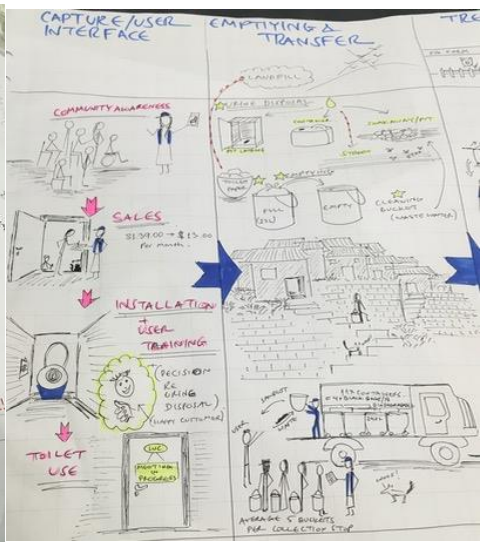
A multidisciplinary team representing the sanitation chain for development and implementation of SSP	Assemble the team Consider a local, multi-stakeholder SSP meeting to kick things off, to gain buy-in and to maintain momentum	Committee if you need one to convene/manage the various actors. **SSP objectives** – Examples for CBS: to safeguard human health, promote the safety of workers and users, and enhance environmental protection; to promote local/national discussion and influencing for policy and regulatory changes; to demonstrate CBS as a viable alternative. **System boundary** – CBS is a concise boundary system, so the scope of the SSP would be to focus on the operations of the CBS provider. **Lead organisation** – The CBS providers will lead the SSP process (in each context). **The team** – 8–10 people? What's nimble and simple in your context? Conduct a stakeholder analysis to assess who should be involved (for each chain link) and invite those with expertise/influence in each chain segment to contribute. One person can be elected to lead on the analysis for each chain link (or have sub-teams for each link) – allocate roles and responsibilities clearly. Community representatives can offer perspectives of exposure groups. E.g. farmers who may be exposed to reuse risks. Ensure that appropriate permissions/protocols are followed as individuals' contributions may require time and other resources. Select a team leader with authority and good project management skills. **Management/financial considerations** – discuss and agree in-kind and actual resources required to develop the plan. E.g. if the SSP process takes 6 months, how many meetings will you need? Who can provide what? Does time need to be

		reimbursed? Can research agencies/universities assist with data collection? Should job descriptions be revised?
Module 2: Describe the sanitation system Outputs: A validated map and description of the system Potential exposure groups An understanding of the waste stream constituents and waste-related health hazards An understanding of the factors affecting the performance and vulnerability of the system A compilation of all other relevant technical, legal and regulatory information	2.1 Map the system 2.2 Characterise the waste fractions 2.3 Identify *potential* exposure groups 2.4 Gather compliance and contextual information 2.5 Validate the system description Module 2 needs a substantial time allocation. Take time to do it thoroughly! A system description could take at least 2–3 days for two people to complete Build in time for peer review of the system description. Use the same reviewer each time! Maybe a CBS colleague?	What is the system? Who's at risk? This module guides SSP planners on how to draw together sufficient information to support the risk assessments in module 3. Use the Guidance notes in the Manual! You may need to gather a lot of data for this step and it may take some time! **Map** – use system flow or process flow diagrams to show the interrelationships between sanitation chain links and describe it all through a narrative (include quantitative info about the quantity of waste streams, seasonal variations, chemicals, component capacities, different types of waste). Workshop participants mainly mapped the processes in each of their CBS cases for: capture/user interface; container emptying and transport; treatment; use and/or disposal. See an example below of X-Runner's (stunning!) map. The entire analysis can take time to complete fully, e.g. The Philippines case noted above split the work out over 2 months. **Waste fractions** – The map should show the path of *all* the solid and liquid waste fractions along each link of the sanitation chain – but keep/note the waste streams separately, e.g. highlight where each goes individually, such as urine, fecal sludge, blackwater used for container washing, toilet paper/anal cleansing materials, sanitary pads/rags, nappies, etc. **Identify and add *potential* exposure groups** (e.g. people affected or in contact with each waste stream) for each chain link, such as workers, users, local community members, product users, consumers (Eve – example CBS potential exposure groups). **Compliance/context info** – compile and summarize information about the context, such as local/national quality standards, demographics and land use patterns, seasonal conditions that may affect services, bacteriological data, KAP

		surveys, etc. You may need to work with health experts/ researchers to analyse each waste fraction and assess its associated *actual* health hazards (i.e. is it a biological, chemical or physical hazard?) **Validate as you go** – as information is gathered for the map and narrative, test your assumptions and data quality through focus group discussions with users and workers, field investigations and inspections, sample testing at labs, etc. In most cases, you probably won't need in-depth studies such as epidemiological surveys or environmental sampling.

X-runner System Maps





Module and intended outputs	Steps	CBS considerations for each step – hints and tips (not the whole process!)
Module 3: Identify hazardous events, assess existing control measures and exposure risks Outputs:	3.1 Identify hazards and hazardous events 3.2 Refine exposure groups and exposure routes	How significant are the risks? Module 3 ensure that efforts and investments in system monitoring and improvements respond to highest risks first. This is the risk assessment step. This step requires: desk-top analysis and field investigation; technical understanding; contamination pathway knowledge; inquisitiveness!

A risk assessment table which includes a comprehensive list of hazards, and summarises hazardous events, exposure groups and routes, existing control measures and their effectiveness A prioritised list of hazardous events to guide system improvements	3.3 Identify and assess existing control measures 3.4 Assess and prioritise the exposure risk Module 3 requires a lot of detailed work, but an intensive half-day workshop would be very useful – you could do each other step/module in smaller/shorter meetings with relevant people only	**Hazards** – the actual and identified biological, chemical and physical hazards. **Hazardous events –** the events/actions which expose people to hazards (the story). *A well-described hazardous event will include a brief comment on the circumstances or case under which the event occurs* – e.g. exposure to excreta during removal of a damaged container. Eve identified, for example, four categories of hazardous events in CBS systems: Person error – e.g. excreta or urine spills onto surfaces and floors due to overflow Equipment/technical failure – e.g. in an UDT, urine spills due to salt build-up of urea in urine diversion pipe Regulatory and system safety culture failure – e.g. individuals are exposed to urine/excreta due to redundant or ineffective personal protective equipment (PPE) protocols Physical/seasonal/environmental variables – e.g. wastewater/urine soakaways or other similar systems overflow due to extreme weather/flood events **Refine exposure groups** – identify in more detail who exactly may be at risk of exposure to the different hazards. Describe who is in which group in your plan – consider demographics, vulnerable groups, seasonal workers, informal settlements, etc. E.g. Workers = person engaged by the CBS entity who maintains, cleans, operates or empties the sanitation technology including treatment. (Eve) **Refine exposure routes** – describe the exposure and transmission routes that put specific groups of people into contact with the hazards that could affect their health. Routes include: ingestion; consumption (of contaminated produce); dermal contact; vector-borne; inhalation of particles. Eve provided several useful examples to draw on (these can be found in the Participants' Worksheets).

		Identify and assess existing control measures (i.e. an action / barrier that can prevent, reduce or eliminate the hazard) – note down what measures are in place already to determine how well the existing system protects those at risk. E.g. use of PPE, treatment processes, crop selection. *Sanitation systems should provide more than one barrier against the different types of pathogens* – i.e. consider multiple barriers. Eve suggested some CBS control measures in relation to each hazardous event category: Person error – e.g. good food preparation practices Equipment/technical failure – e.g. strong sealing mechanism (lid/cap/bag/fastening) on collection containers Regulatory and system safety culture failure – e.g. agreed spillage protocol Physical/seasonal/environmental variables – e.g. flood event scenario planning **Assessing control measure effectiveness** – WHO uses reductions in *E. coli* as an indicator for risks of viral, protozoa and bacterial infections (in agricultural reuse contexts) as it shows definitively that water/wastewater is contaminated with faecal matter. This indicator can also be adopted by CBS entities. For helminths, WHO uses actual counts of helminth eggs Consider how effective the existing control measure *could* be, assuming it works well at all times (known as CM validation), and how effective it is *in practice*, considering actual conditions, regulations, operating practices, etc. **Assess and prioritise exposure risk** – In this step, each hazardous event (and each of its different hazards) is categorised through a typical risk analysis model e.g. where *likelihood* of the event happening and the *severity* of impact are considered or through a traffic light grading. See pages 52–53 of the SSP manual for details of grading/prioritising. Decide which risk assessment method you will use upfront – make sure all the team is happy with it!

		Remember: also consider what the grade would be without any existing mitigation measure in place at all. Maybe you can already see which measures have more impact than others. Also, describe why each risk has been assessed in the way it has (i.e. your justification of the grade)… you may need to refer back to this info when you revise your plan!

CBS worker health and hygiene – news and views

CBS staff protection		Hygiene for SDGs
Most CBS providers already have a package of health protection measures for their workers. During the workshop, health experts (Samuel Fuhrimann and Mirko Winkler) from the Swiss Tropical and Public Health Institute at the University of Basel suggested at least the following (but check with health professionals in your context): Vaccinations/immunisations – hepatitis A and B, polio, tetanus, typhoid, rotavirus (if available and relevant), and cholera (only when there's been recent/acute cholera outbreaks or following a local, seasonal outbreak pattern – its short-term impact, low efficacy and cost make it rather pointless the rest of the time). Regular health checks – consider a health check when a new staff member joins and then have them checked every 6–12 months (and treat them with anti-helminth drugs such as praziquantel, albendazole, metronidazole). See the *Oxford Handbook of Tropical Medicine* for more information.		Without handwashing facilities and the evidence of hand-washing with soap, we won't reach SDG target 6.2[12] – what can CBS providers do to support this? Ideas include: Include hygiene and hand-washing messages in all customer communications, e.g. the value of using/making soap and non-rinse soap, use of ash (not SDG-compliant but useful in water scarce settings), safe toilet cleaning and appropriate usage, etc. Offer an optional 'gold' health and hygiene package to customers on top of their emptying service – e.g. include soap, anal cleansing materials, PPE, non-chemical/non-toxic toilet cleaners and disinfectants (grapefruit, vinegar, baking soda, laundry soap don't need a sales licence in most contexts!) Consider an additional menstrual hygiene management package with information on disposal and bulk pad purchase opportunities CBS providers could bulk-buy hygiene consumables and sell the products with a minimal/zero mark-up. Or link with local companies who may sponsor such add-ons as part of their corporate social responsibility plans. Or link with government health campaigns and offer to be a communication/supply channel to customers!

[12] Indicator 6.2.1 = Proportion of population using safely managed sanitation services, including a hand-washing facility with soap and water.

Also, what about this tricky problem of getting people to use PPE consistently and to use it effectively? Do you know the barriers for non-usage already? Can you use a carrot (positive incentive) rather than a stick (compliance order)? Do workers dip their gloves in disinfectant at the end of each shift and leave them to dry overnight?		Check out PPPHW for more info and ideas for celebrating Global Handwashing Day on October 15.

Module and intended outputs	Steps	CBS considerations for each step – hints and tips (not the whole process!)
Module 4: Develop and implement an incremental improvement plan Outputs: An implemented plan with incremental improvements which protects all exposure groups along the sanitation chain	4.1 Consider options to control identified risks 4.2 Use selected options to develop an incremental improvement plan 4.3 Implement the improvement plan	What needs to be improved? Module 3 identified priority risks; module 4 focuses on selecting new control measures or other improvements that address these risks at the most effective places in the system. This means that funding and effort can both target the highest risks with greatest urgency. **Consider options** – consider: short and long-term plans; treatment, non-treatment and behaviour change options; where along the chain the control measure would have most impact; multiple barrier approaches. Improvements might include changes to facilities/assets (capital works), operational practices, staff and user behaviours or any combination thereof. Types of control measures for CBS systems (Eve): Substitute the hazardous equipment, e.g. modify toilet to remove dead spaces Improve treatment controls, e.g. heat or chemical inactivation; pH shocks Improve non-treatment controls, e.g. change collection timings; fly/vector control

		Use standard operating procedures, e.g. change operating or working procedures **Improvement plan** – *Use a step-wise approach to get incremental improvements.* Consolidate the options into a clear plan of action and… Prioritise changes based on the highest risks Identify who takes action for implementation (and when, how, etc.) Assess the cost of making changes – affordable interim control measures may be fine until more expensive options are feasible.
Module 5: Monitor control measures and verify performance Outputs: An operational monitoring plan A verification monitoring plan Independent assessment	5.1 Define and implement operational monitoring 5.2 Verify system performance 5.3 Audit the system Control measures have to be integrated into your operational procedures; how long might that take? What's realistic?	Is the system operating as planned? **Implementing monitoring** – Describe how, where, when and by whom each control measure is monitored – make sure the data collection methods you choose (for monitoring) are practical, feasible and cost-effective for your context (e.g. simple, visual checks, sampling and testing, or collecting usage info in log books, etc.). This is routine, day-to-day monitoring to show you that all is working as expected. It generates evidence to show that existing operations are sufficient; and if not, shows where changes need to be made. **Verification and audit** – Periodically verify whether your monitoring system meets your intended performance outcomes (such as quality reuse products). E.g. use microbial testing, health monitoring or KAP surveys for exposure groups, satisfaction surveys, etc. Check out the technical checklists in the SSP manual! (Page 75) E.g. monitor for E. coli and helminth eggs every 3–6 months at exposure points.

		External agencies may also want to independently audit your plan and approach, such as relevant local government authorities. You could choose to engage these authorities in your SSP process from the start to get their buy-in and support.
Module 6: Develop supporting programmes and review plans Outputs: Supporting programmes and management procedures that improve implementation of the SSP outputs Up-to-date SSP outputs responding to internal and external changes	6.1 Identify and implement supporting programmes and management procedures 6.2 Periodically review and update the SSP outputs	How can we adapt to changes? Module 6 offers ideas on how to support the development of people's skills and knowledge and an organisation's ability and capacity to meet SSP commitments. Questions to ask: Do you need new staff training programmes? Do standard operating procedures need updating? Do you need new educational and informational materials for users? E.g. on the importance of handwashing with soap, the use of PPE when cleaning, correct toilet usage, etc. Should new health communications protocols be developed for staff and customers? Is there a gap in knowledge that requires some research/analysis? Should you shift attention onto more policy influencing and lobbying on CBS SSP needs? Do you have (adequate) emergency management procedures in place? **Plan review** – an annual review (and update) of your plan is recommended.