

The Sanitation Technology Filtering Tool

Identifying appropriate technologies for sanitation and fecal sludge management

WEDC Capacity Development Workshop

July 27, 2017

Jennifer Foster, PhD
Chelsea Schiller
Alec Wollen



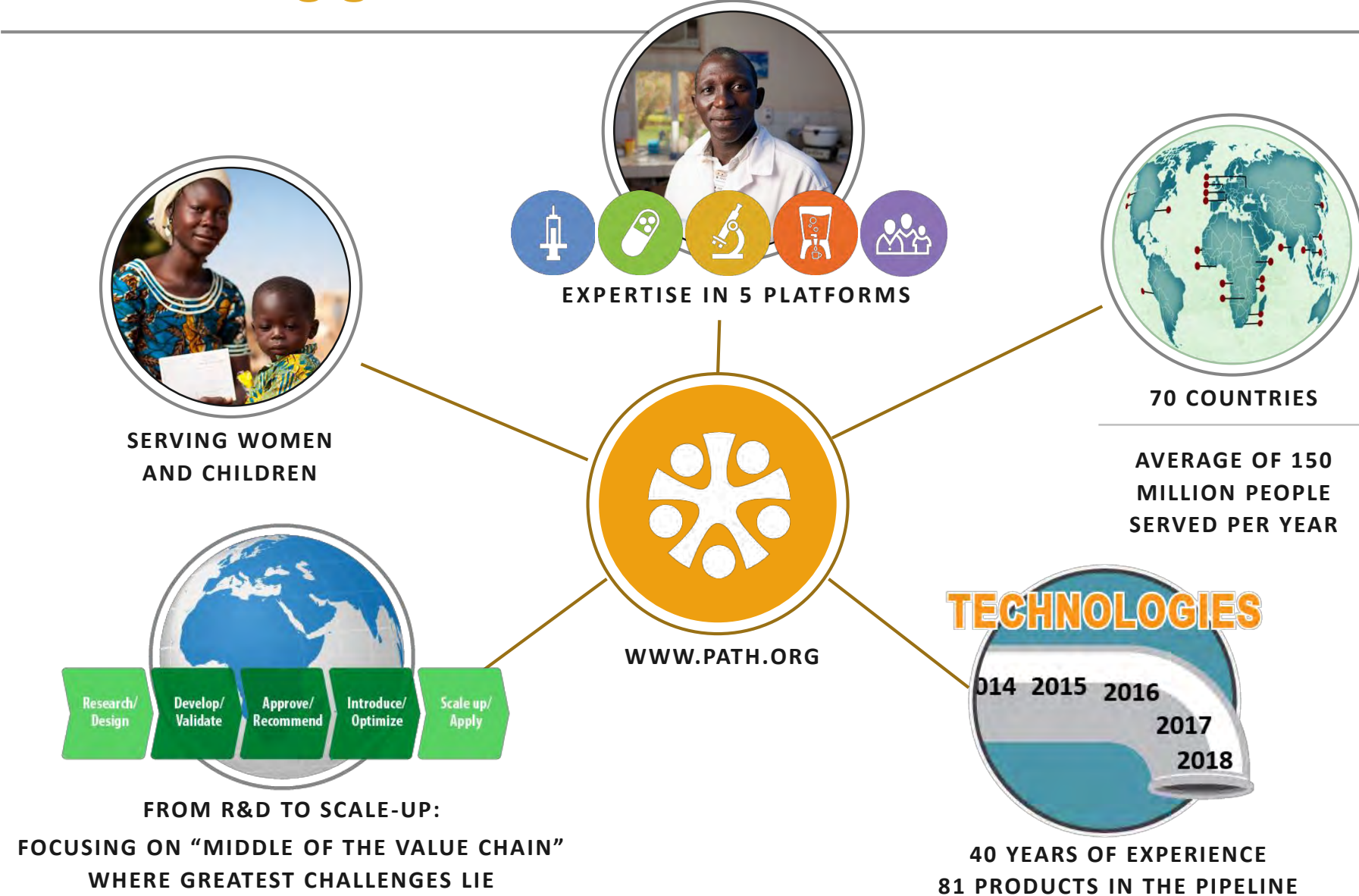
PATH/Robyn Wilmoth



Photos: Population Services International

Background

PATH: Accelerating global health innovation



USAID/West Africa Sanitation Service Delivery (SSD) Project

Project partners: Population Services International (prime), WSUP, and PATH

Project goal

Improve sanitation outcomes in Ghana, Benin, and Côte d'Ivoire through developing and testing scalable, market-based models that contribute to structural change within the region's sanitation sector.

Key project objectives

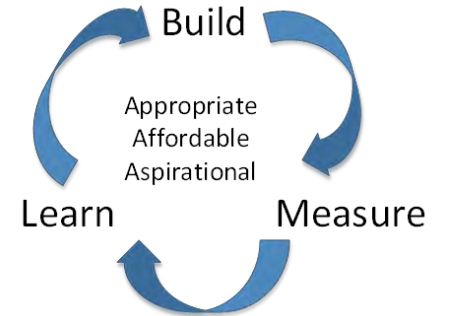
- Increase the use of improved sanitation.
- Increase safe disposal and/or reuse of fecal waste.
- Disseminate learnings throughout West Africa.



PATH/Robyn Wilmouth

SSD Challenge: Identifying appropriate technologies to support scale up of improved sanitation and fecal sludge management (FSM)

- **Phase 1: Formative research and product scans**
 - Understand local context (social, technical, environmental)
 - Identify existing technologies, gaps, and early opportunities
- **Phase 2: Technology evaluations and pilot testing**
 - Identify opportunities to improve existing technologies
 - Evaluate new or innovative sanitation and FSM technologies



PATH/Robyn Wilmouth

PATH's global landscape on sanitation technologies

Landscape identified 200+ sanitation technologies across the sanitation service chain

Global Sanitation Service Chain Technology Profiles

BACK TO USER INTERFACE

Global Sanitation Service Chain Technology Profile
Storage & Containment
September 2015

CONTINUE TO CONVEYANCE

Storage and containment: What facility or method is used to collect and store waste generated at the user interface?

Page organization: By storage method – Container Based Solution, Above Ground Chamber, Below Ground Pit, Other, and Protot

Technology	Product Picture	Description	Recommended user size (Household)	Development stage
Airhead Composting Toilet		This looks like a typical western style sit toilet, except that it's a dry toilet where solids and liquids are separated into different chambers and need to be removed when the chambers fill.	1 Household	Commercialized
Seperett Toilets		This is solid waste		
Ecosan PR Toilets - VIP 450 VIP 200		A stan should		
X-Runner		This is chamt ground sandu		
Ecological Latrine		Seper: is colli Desigr later b Susan		

BACK TO USER INTERFACE

Global Sanitation Service Chain Technology Filter
Storage & Containment
September 2015

CONTINUE TO CONVEYANCE

Storage and containment: The technologies listed here are used as collection receptacles.

Question category >>>

Question number >>>	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9
2	1	2	3	4	5	6	7	8	9
3	1	2	3	4	5	6	7	8	9
4	1	2	3	4	5	6	7	8	9
5	1	2	3	4	5	6	7	8	9
6	1	2	3	4	5	6	7	8	9
7	1	2	3	4	5	6	7	8	9
8	1	2	3	4	5	6	7	8	9
9	1	2	3	4	5	6	7	8	9

USAID

psi

PATH

WSUP

Technology	Sit	Portable	Fixed	Outside
Airhead Composting Toilet	Sit	Portable	Fixed	Outside
Aqua Privy	Fixed	Portable	Fixed	Outside
Aquatrane Toilet	Sit	Portable	Fixed	Outside
Arborloo	Fixed	Portable	Fixed	Outside
Banos Mejorados Secos Design	Fixed	Portable	Fixed	Outside
Biold Digestor	Fixed	Portable	Fixed	Outside
Biorbanas Toilet and Biogas System	Sit	Fixed	Fixed	Outside

Global Sanitation Service Chain Technology Filter



Global Sanitation Service Chain Technology Manual

An analysis of sanitation technology innovations

INTRODUCTION TO THE SANITATION SERVICE DELIVERY PROGRAM

The Sanitation Service Delivery (SSD) Program in West Africa is a USAID-funded five-year cooperative agreement with Population Services International (PSI), PATH, and Water & Sanitation for the Urban Poor (WSUP). The goal of the SSD project is to improve urban sanitation outcomes through developing viable, market-based models that contribute to structural change within the region's sanitation sector with an initial focus on the cities of Conakry (Guinea), Abidjan (Cote d'Ivoire), and Accra and Kumasi (Ghana).

PATH's role in the SSD project is to apply its expertise in product development and finance to accelerate market-based solutions and build partner capacity. PATH's product development activities are designed to support the development of new business models and the scaling of appropriate and affordable sanitation solutions in Benin, Cote d'Ivoire, and Ghana.

PURPOSE OF THE GLOBAL SANITATION SERVICE CHAIN TECHNOLOGY TOOLS

The Global Sanitation Service Chain Technology tools include the Technology Filter and Technology Profile. Both tools contain the same list of technologies, although each tool has a distinct functional purpose. The Technology Filter is interactive and used to identify a list of appropriate technologies. The Technology Profile can be used to gather more information on the technologies.

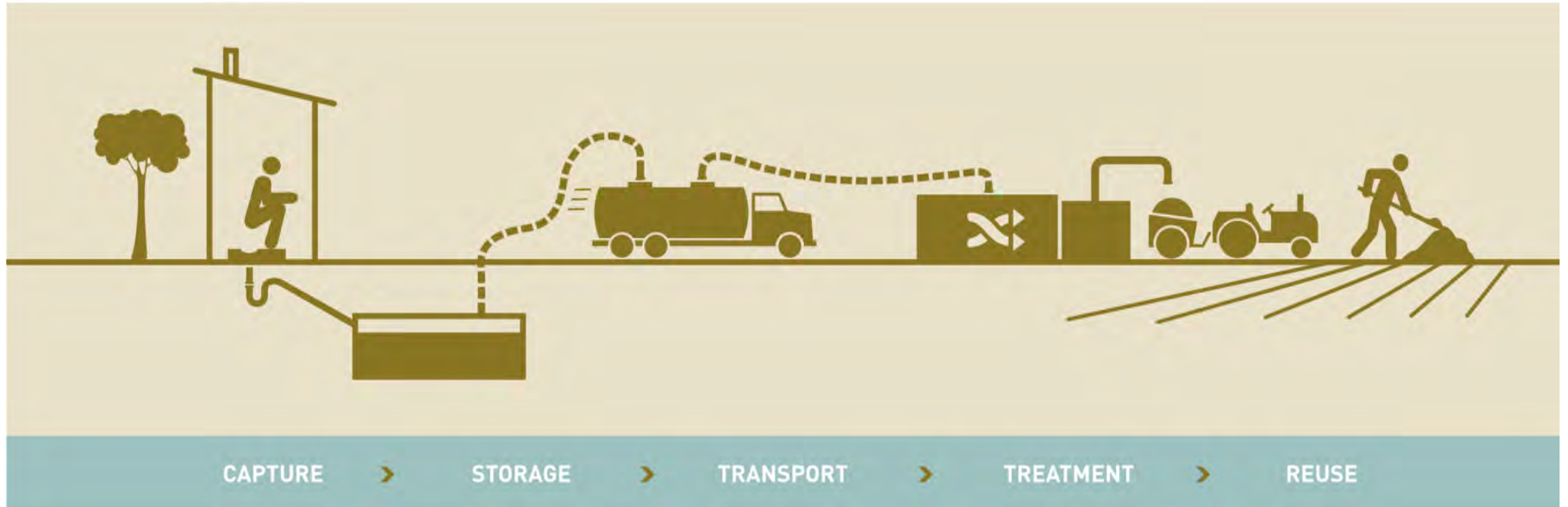
Global Sanitation Service Chain Manual



Workshop objectives

Participants will learn how...

- To *effectively use* the Sanitation Technology Filtering Tool.
- To *compare sanitation technologies* along each phase of the sanitation service chain—user interface, storage and containment, conveyance, treatment, and use and/or disposal.
- To *down select* sanitation technologies for a specific context and/or need.
- The Sanitation Technology Filtering Tool can be used to *support decision-making*.



Bill & Melinda Gates Foundation

Introducing the Sanitation Technology Filtering Tool

Introducing the Sanitation Technology Filtering Tool



- **Compare**—sanitation technologies across the sanitation service chain
- **Connects**—technology options to build a full sanitation system
- **User-driven**—down-select technologies based on specific context and/or need
- **Flexible**—start anywhere along the sanitation service chain

When to use the Sanitation Technology Filtering Tool

initial **needs assessment**, gap analysis, or problem identification

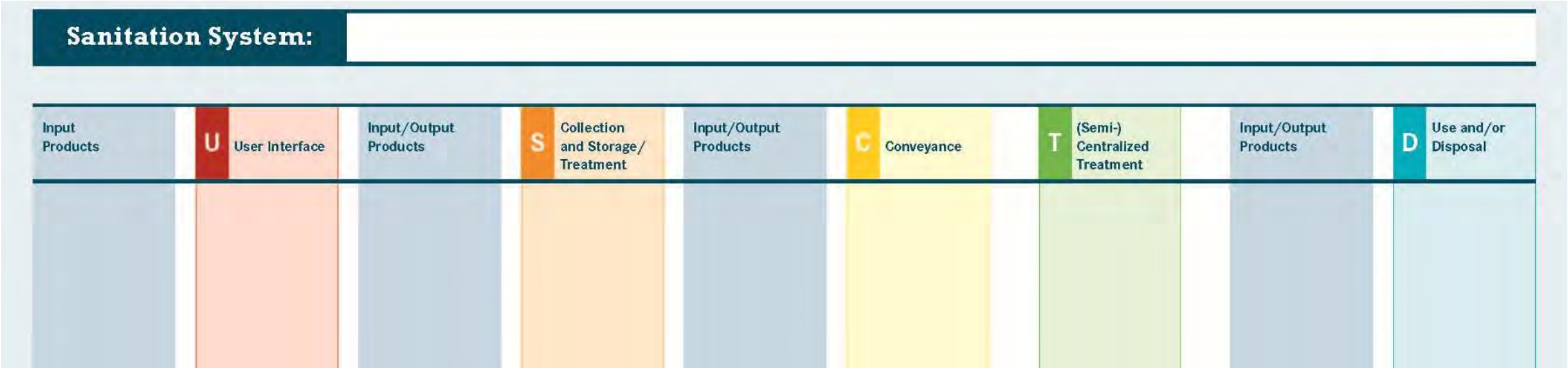
Conduct **landscape** of potential products & technologies

Identify and **down-select** based on specific need and local context

Prioritize technologies based on additional information

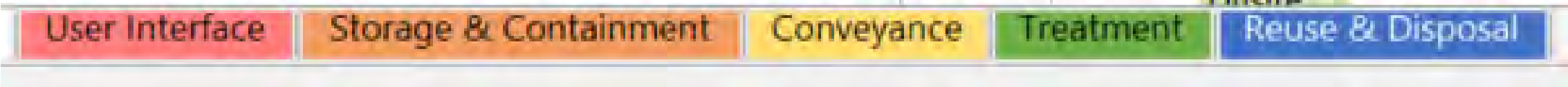
Conduct **evaluation or pilot** test of selected technologies

Format: Using the Sanitation Service Chain



Source: Tilley E, Ulrich L, Lüthi C, Reymond Ph, Zurbrügg C. *of Sanitation Systems and Technologies*. 2nd Revised Edition. Dübendorf, Switzerland: Swiss Federal Institute of Aquatic Science and Technology; 2014, p. 17. Available at <http://www.sandec.ch/compendium>.

Compendium



The Sanitation Technology Filtering Tool

Format: Sanitation Technology Filtering Tool



- Includes a **tab** with a list of technologies for each phase in the sanitation service chain.
- Each tab includes a **set of filters** to support down-selection.
- A **summary** will appear on the final tab.

User interface

The User Interface is the way by which the user accesses the sanitation system. Technologies include toilet bowls, pedestals, and pans.

Seated



PATH/Howard Lakougna

Squat



PATH/Robyn Wilmoth

Sample questions: User Interface

What technologies provide option for urine diversion?

It is most common for users to squat in my settings. What technologies could be appropriate?

I am interested in understanding what materials are aspiration to users in my area. What are my options?

Technology	Method of use	Urine diverting	Wash or wipe	Primary materials	Development stage
Container Based Toilets	Sit	Yes	Various	Various	Generic technology
Portable Urine Diverting Unit	Sit	Yes	Wash	Various	Commercialized
SaTo Pan	Sit	Yes	Wipe	Plastic	Commercialized

What user interface options have an integrated container?

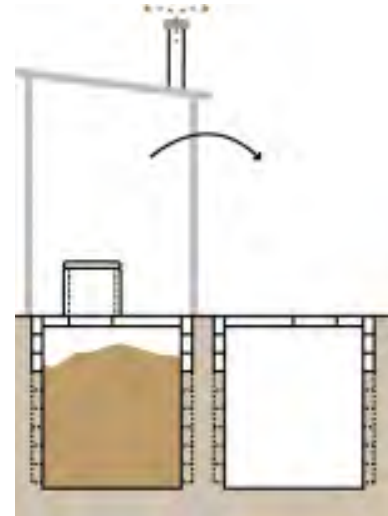
Storage and containment

Storage & Containment describes the system by which the waste generated at the User Interface is collected and stored. Technologies include above-ground, below-ground, and container-based solutions.

Above Ground



Below Ground



Container-based



Sample Questions: Storage and Containment

Method of use	Urine diverting	Number of users	Suitable for high w...	Containment system	Treatment
<div>Sit</div> <div>Sit/squat</div> <div>Squat</div>	<div>No</div> <div>Yes</div>	<div>1 Household</div> <div>Community</div>	<div>No</div> <div>Yes</div>	<div>Above ground</div> <div>Below ground</div> <div>Container based</div>	<div>Either</div> <div>Offsite</div> <div>Onsite</div>

How many households could use the system?

What technologies appropriate for flood prone areas?

What containment options are above ground or below ground?

Technology	Urine diverting	Number of users	Suitable for high water table or flood prone area	Containment system	Treatment	Removal system
Airhead Composting Toilet	Yes	1 Household	Yes	Container based	Offsite	Container
Aquatron Toilet	Yes	1 Household	No	Container based	Offsite	Manual
Crapper	Yes	1 Household	Yes	Container based	Offsite	Container

How much space is needed?

Does the system provide on-site processing and treatment?

Conveyance

Conveyance is how waste is transported from Storage & Containment to Treatment.

Mechanized



Container Service



Manual



Sample Questions: Conveyance

Vehicle access	Removal system	Removal method	Development stage
Smaller than truck	Container	Container	Commercialized
Manual	Manual	Hands	Generic system
	Sewer	Pump	

Roads are too narrow to accommodate vacuum trucks, are there smaller conveyance options available?

Municipal funds have invested in proven methods of fecal sludge removal. What truck pumps might be appropriate?

What technologies provide an alternative to manual emptying?

Technology	Vehicle access	Removal system	Removal method	Development stage
Arian Suction Latrine Emptying Technology (ASLET)	Smaller than truck	Manual	Hand pump	Commercialized
Container Based	Smaller than truck	Container	Container	Generic system
Gobbler	Smaller than truck	Manual	Hand pump	Commercialized
Gulper Toilet Pump	Truck	Manual	Pump	Commercialized

Treatment

Treatment refers to the process by which waste is processed. Treatment can occur onsite (point-of-use) or offsite (decentralized or centralized system).



Onsite



Offsite



Sample Questions: Treatment

What technologies provide onsite treatment?

I'm interested in Biogas as a byproduct, which storage and containment technologies could be used to complement my system?

What technologies provide onsite treatment?

I'm interested in Biogas as a byproduct, which storage and containment technologies could be used to complement my system?

What technologies are available for purchase?

Reuse and/or disposal

Reuse & Disposal refers to the end products generated at the end of the sanitation service chain, including deactivated fecal sludge (which can be disposed of) and biogas or compost (which can be reused).



Biogas



Fuel

Sample Questions: Reuse and/or Disposal

What technologies provide compost as an output?

Byproduct

Briquettes

Compost

Electricity

Fertilizer

NA

Water reuse

Potential application

Fertilizer for soil fertility, moisture retention, and increase in agricultural/horticultural productivity.

Potential to be removed and used for other end products listed.

I'm interested in Briquettes as a byproduct, which treatment technologies could be used?

I'm interested in building a business model to support my treatment costs.

What potential applications are there for reselling a byproduct?

End products	Byproduct	Potential application
Compost	Compost	Fertilizer for soil fertility, moisture retention, and increase in agricultural/hortic
Entombed waste	Compost	Potential to be removed and used for other end products listed.

Sample: Summary page

USER INTERFACE								
Technology	Method of use	Urine diverti	Wash or wipe	Primary materials	Development st	Proceed to		
Container Based Toilets	Sit	Yes	Various	Various	Generic technology	Storage and containment		
Portable Urine Diverting Unit	Sit	Yes	Wash	Various	Commercialized	Storage and containment		
SaTo Pan	Sit	Yes	Wash	Plastic	Commercialized	Storage and containment		
Seat Insert	Sit	Yes	Wash	Plastic	Generic technology	Storage and containment		
Seats	Sit	Yes	Wipe	Various	Generic technology	Storage and containment		
STORAGE & CONTAINMENT								
Technology	Method of use	Urine diverti	Number of use	Suitable for high water table or flood	Containment sy	Treatment	Removal sys	End products
Airhead Composting Toilet	Sit	Yes	1Household	Yes	Container based	Offsite	Container	Compost
Aquatron Toilet	Sit	Yes	1Household	No	Container based	Offsite	Manual	Compost, Deactivated sludge
Crapper	Sit	Yes	1Household	Yes	Container based	Offsite	Container	Compost
EcoSan Bucket (w/ Portable Urine Diverting	Sit	Yes	Community	Yes	Container based	Offsite	Container	Compost
EkoLakay	Sit	Yes	1Household	Yes	Container based	Offsite	Manual	Compost
Lovable Loo	Sit	Yes	1Household	Yes	Container based	Offsite	NA	Compost
MoSan Toilet	Sit	Yes	1Household	No	Container based	Offsite	Manual	Compost, Briquettes, Biogas, Deactivated
Perfect Privy	Sit	Yes	1Household	Yes	Container based	Offsite	Container	Compost
Sanivation Solutions Bucket Toilet	Sit	Yes	1Household	Yes	Container based	Offsite	Manual	Briquettes
Separate Toilets	Sit	Yes	1Household	Yes	Container based	Offsite	Container	Compost
SimSan BucketMate Toilet	Sit	Yes	1Household	Yes	Container based	Offsite	Manual	Compost
Tinkler	Sit	Yes	1Household	Yes	Container based	Offsite	Container	Compost
Uniloo	Sit	Yes	1Household	Yes	Container based	Offsite	Container	Controlled discharge, Deactivated sludge
WC der Zukunft	Sit	Yes	1Household	Yes	Container based	Offsite	Container	Compost
X-Runner	Sit	Yes	1Household	Yes	Container based	Offsite	Manual	Compost
CONVEYANCE								
Technology	Vehicle access	Removal sys	Removal metho	Development stage	Proceed to			
Arian Suction Latrine Emptying Technology	Smaller than tru	Manual	Hand pump	Commercialized	Treatment			
Container Based	Smaller than tru	Container	Container	Generic system	Treatment			
Gobbler	Smaller than tru	Manual	Hand pump	Commercialized	Treatment			
Gulper Toilet Pump	Truck	Manual	Pump	Commercialized	Treatment			
Manual desludging hand pump (MDHP)	Smaller than tru	Manual	Hand pump	Commercialized	Treatment			
Manual fecal sludge removal	Smaller than tru	Manual	Hands	Generic design	Treatment			
Manual pit emptying technology (MAPET)	Smaller than tru	Manual	Hand pump	Commercialized	Treatment			
Nibbler	Smaller than tru	Manual	Hand pump	Commercialized	Treatment			
TREATMENT								
Technology	Treatment	Byproduct	Development stage					
LaDePa (Latrine Dehydration and Pasturizat	Offsite	Compost	Commercialized					
REUSE & DISPOSAL								
End products	Byproduct	Potential application						
Compost	Compost	Fertilizer for soil fertility, moisture retention, and increase in agricultural/horticultural productivity.						
Entombed waste	Compost	Potential to be removed and used for other end products listed.						

Demonstration

SANITATION TECHNOLOGY FILTERING TOOL

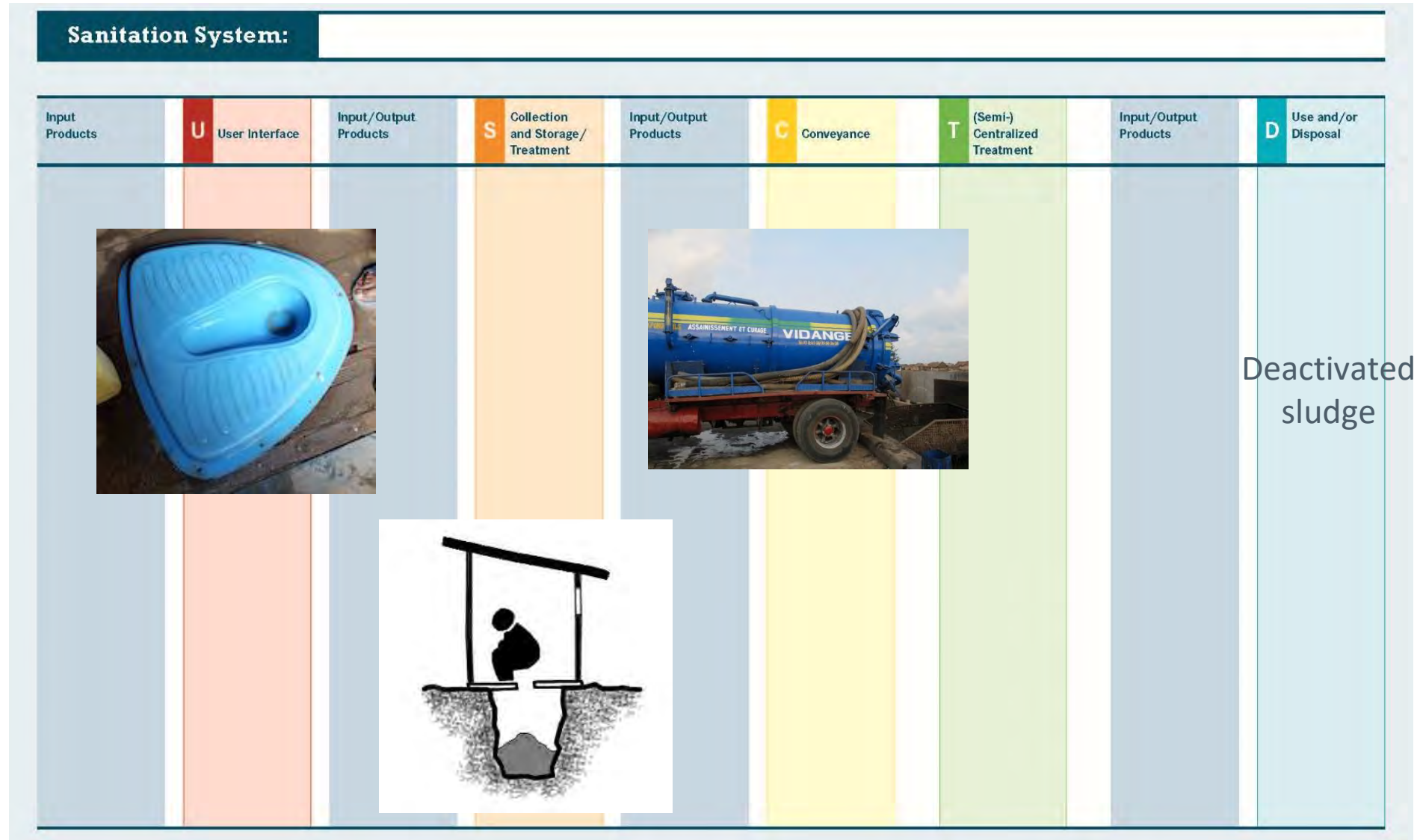


Photo: PATH/Robyn Wilmouth

In 2016, PATH conducted an in-depth global landscape on sanitation technologies. Over 200 sanitation technologies—including commercialized products—were compiled and categorized. Results from the landscape indicated that while information on specific global sanitation technologies is available, there is a lack of resources that provide comparative information across the sanitation service chain. The landscape highlighted the lack of decision support tools for technology selection in specific settings. As new

PATH used the widely-accepted sanitation service chain framework developed by the Swiss Federal Institute of Aquatic Science and Technology (Eawag), to organize the technologies into each of the five phases of the sanitation service chain: (1) user interface, (2) storage and containment, (3) conveyance, (4) treatment, and (5) reuse and/or disposal. For each phase, key filters are included to support in the user's down selection process.

Sample: Visual summary of demonstration example



Overview: The Sanitation Technology Filtering Tool

What the Tool does NOT do...

- Substitute for a qualified engineer.
- Eliminate the need for field testing/evaluation of selected technologies or systems.
- Provide information on local regulations and codes.
- Make a final technology selection.
- Contain all possible sanitation solutions.
- Provide technical specifications and cost.

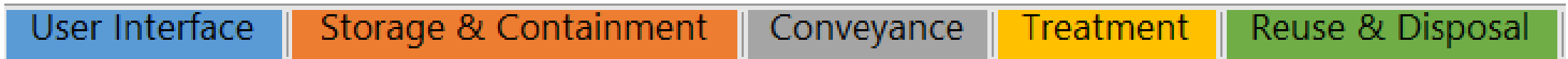
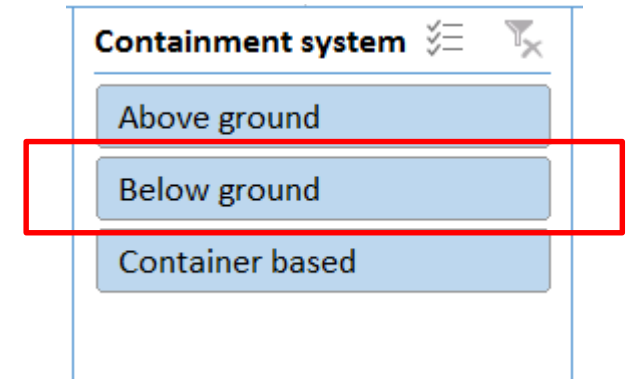


PSI/ Katharine McHugh

Orientation

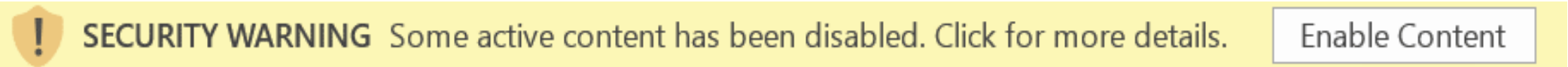
Orientation: Sanitation Technology Filtering Tool

- Includes a tab with a list of technologies for each phase in the sanitation service chain.
- Each tab includes a set of filters to support in the down-selection process.
- Filters connect technology options across the sanitation service chain.
- A summary will appear on the final tab to show technology options for a complete sanitation system.

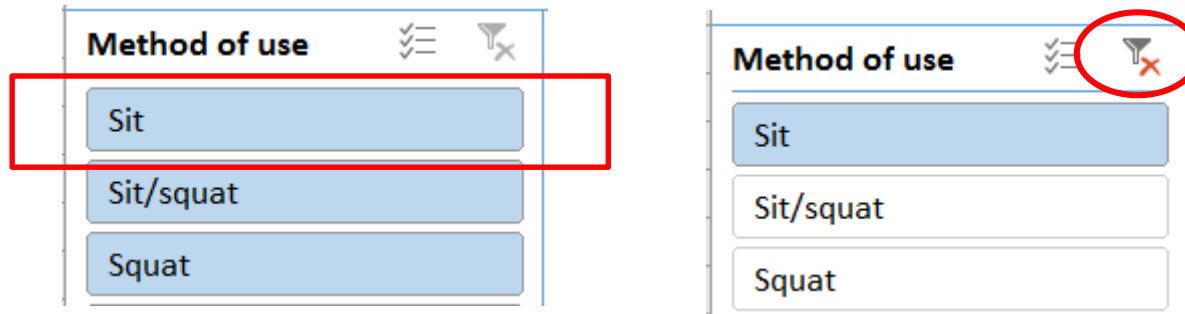


Orientation: Sanitation Technology Filtering Tool

1. Open Tool.
2. Enable macros.



3. Practice filtering.



4. Filters connect across tabs.

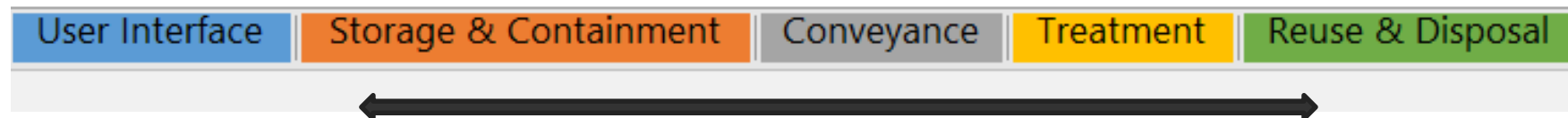




Photo: PATH/Robyn Wilmouth

The Technical Assistance Team

WHO: A non-governmental or academic partner responsible for landscaping and recommending sanitation technologies for evaluation.

CONTEXT: You are a partner on a large-scale project that has received funding to provide improved sanitation and fecal sludge management in a country with low coverage of improved sanitation and fecal sludge management. As the technical assistance team/researcher, your role is to identify sanitation and FSM technologies that might be appropriate for households and communities in the project area.

PROBLEM: Formative research has identified that improving sanitation and FSM in urban and peri-urban areas is particularly challenging. Improving sanitation is particularly challenging in urban slums/informal settlements where there is limited space and lack of formal infrastructure. FSM is also a challenge. Recent shit flow diagrams developed for two of the key cities in the project area, show that only a small percentage of fecal waste is safely treated, and the single treatment plant has already exceeded its capacity.

INSTRUCTIONS: Using the Sanitation Technology Filtering Tool, work through the following challenges. Prior to moving on to the next challenge, please clear all filters from the previous challenge.



Photo: Population Services International

The Field Engineer

WHO: Sanitation engineer/WASH technical expert working for an NGO field office.

CONTEXT: Your organization received funding to improve sanitation for households in your service area. As the sanitation engineer, you have been tasked with identifying three new or improved sanitation technologies that could meet the needs of different populations and could be evaluated for user acceptability and technical feasibility in three different contexts.

PROBLEM: Formative research in your service area has identified existing challenges in the current sanitation system.

INSTRUCTIONS: Using the Sanitation Technology Filtering Tool, work through the following challenges. Prior to moving on to the next challenge, please clear all filters from the previous challenge.

Challenge 1: Space constraints

Many households in your service area are renters and live in compounds with limited space. The project lead is interested in testing a container-based sanitation solution that provides an end-to-end service model (from user interface and storage/containment to conveyance, treatment, and disposal).

- Please use the Sanitation Technology Filtering tool to identify two or three technologies that may be appropriate in your area. (NOTE: please review and make selections for each phase of the Sanitation Service Chain.)
- Please use the Summary page and the Sanitation Service Chain template to describe your proposed solutions and to identify three to five questions to consider when piloting a container-based system.

Case Studies

Contact information

SANITATION TECHNOLOGY FILTERING TOOL



Photo: PATH/Robyn Wilmouth

In 2016, PATH conducted an in-depth global landscape on sanitation technologies. Over 200 sanitation technologies—including commercialized products—were compiled and categorized. Results from the landscape indicated that while information on specific global sanitation technologies is available, there is a lack of resources that provide comparative information across the sanitation service chain. The landscape highlighted the lack of decision support tools for technology selection in specific settings. As new

PATH used the widely-accepted sanitation service chain framework developed by the Swiss Federal Institute of Aquatic Science and Technology (Eawag), to organize the technologies into each of the five phases of the sanitation service chain: (1) user interface, (2) storage and containment, (3) conveyance, (4) treatment, and (5) reuse and/or disposal. For each phase, key filters are included to support in the user's down selection process.

... Introduction Instructions User Interface Storage & Containment Conveyance Treatment Reuse & Disposal Summary +

Chelsea Schiller
cschiller@path.org

Acknowledgments

This presentation is made possible by the support of the American people through the United States Agency for International Development (USAID). The contents are the sole responsibility of PATH and do not necessarily reflect the views of USAID or the United States government.



USAID
FROM THE AMERICAN PEOPLE



WSUP
Water & Sanitation
for the Urban Poor