

REINVENT ~~THE~~ TOILET CHALLENGE

# Expert Convening

Summary Report  
May 30, 2013



Reinvent the Toilet Challenge  
Expert Convening  
Summary report

May 30, 2013



This report is written by the  
Industrial Design Engineering (IDE) team:

Anne Jansen (a.m.jansen@tudelft.nl)  
Gerwin Jansen (g.j.jansen@tudelft.nl)  
Miguel Melgarejo (m.a.melgarejofuentes@tudelft.nl)

**BILL & MELINDA**  
GATES foundation

This is a special copy for the Bill & Melinda Gates Foundation.  
Another copy has been shared with the participating experts.

Pictures in this report are taken by the IDE team, unless otherwise stated.

# Design Challenges

On May 30, the "Reinvent the Toilet Challenge" team of Industrial Design Engineering held an expert convening during which the team's research findings and design proposals were validated. A summary of the discussions, held with the more than 30 experts, can be found in this document.

Based on this expert convening, the following items were identified as critical design challenges. The team will translate these into tangible results, which will be integrated in a concept that will be shown at the RTTC demonstration fair.

## User needs:

- How to provide a toilet that is hygienic, private and safe to both genders?
- How to stimulate responsible usage inside and around the toilet building?
- How to support women during their menstruation? (graduation project Mara Rosendahl)
- How to provide a toilet that suits the needs and wants of children?

## Product service system:

- How to design a toilet pan that diverts anal cleansing and flushing water?
- How to safely contain waste and avoid malodor?
- How to purify and recycle water at the toilet facilities?
- How to ensure public acceptance of reclaimed water?
- How to make a modular and adaptable toilet system?
- How to provide sufficient toilet availability during peak hours?

## Implementation:

- How to attract and retain users?
- How to provide adequate operation and maintenance?
- How to organize a safe, cost-efficient and dignifying distribution system within densely populated slums? (graduation project Tom Schakelaar)
- How to empower entrepreneurs to build toilet facilities?
- How to brand and communicate the new sanitation system among all stakeholders? (graduation project Spyridoula Oikonomou)

# Schedule



Introduction - Explanation of the project and its goals. Identification of target context and sanitation strategy developed by the RTTC team.

13:40



Student presentation - The Joint Master Project (JMP) team of five design students reports its field research and lessons learned in India.

13:50



Presentation theme 1 - Gerwin Jansen, Integrated Product Designer, introduces the topic of Waste and Water Management.

14:00



First discussion session - The first discussion session focused on three topics: transport of human waste, grey water treatment and defining the capacity of sanitation blocks.

14:30



Presentation theme 2 - Anne Jansen, User Centered Designer introduces the topic of User Experience and Engagement.

15:30



Second discussion session - The second discussion session focused on three topics: maintenance, opportunities, women and menstruation ritual.

15:50



Presentation theme 3 - Miguel Melgarejo, Strategic Product Designer introduces the topic of Branding and Business Modelling. Graduation student Spyridoula Oikonomou introduces the topic of her master thesis on Branding for Sanitation.

16:45



Third discussion session - The third discussion session focused on two topics: future scenario and business opportunities. The day ended with some authentic Indian treats and drinks.

17:00

# Table of content

## Introduction

8

## Participants

9

### 1. Waste & Water Management

10

1.1 Discussion: Transport Of Human Waste

11

1.2 Discussion: Wash Water Treatment

12

1.3 Discussion: Capacity Of Sanitation Blocks

13

### 2. User experience & Engagement

15

2.1 Discussion: Maintenance

16

2.2 Discussion: Opportunities

17

2.3 Discussion: Women And Menstruation Rituals

18

### 3. Branding & Business Modeling

20

3.1 Discussion: Future Scenario

21

3.2 Discussion: Commercial Opportunities

22





Photo credit: Chandrashekar (Shekar) Manalam



# Introduction

This report was written with the purpose of summarizing the discussions among experts on the proposal of the TU Delft for the “Reinventing the Toilet Challenge”. Since 2010, the TU Delft has been participating in this unique challenge that is initiated by the Bill & Melinda Gates Foundation. During the Expert Convening, the IDE team presented their research findings and strategies for the development and implementation of a sanitation solution based on Microwave Plasma Gasification.

The event was structured in three main themes: Waste & Water Management, User Experience and Engagement, and Branding & Business Modelling. Every theme started with a presentation by a member of the IDE team, followed by intensive discussions in break-out groups. These discussions gave our team a chance to have different elements of our proposal validated by experts with different backgrounds. Besides that, new valuable ideas and directions were brought to daylight.

This report is structured in a similar manner, keeping the presentations as the main pillars for the discussions that took place. At the beginning of each chapter all considered topics are briefly explained, followed by a summary of what was said by the experts (ideas, insights, parallelisms, examples, etc).

We are very thankful to the more than 30 experts that attended the Expert Convening, giving us the confidence to bring our work to the next level. We would be happy to welcome all experts at our next convening in the autumn of this year.

# Participants

Anne Jansen	TU Delft/IDE (core team member)
Gerwin Jansen	TU Delft/IDE (core team member)
Miguel Melgarejo	TU Delft/IDE (core team member)
J.C. Diehl	TU Delft/IDE (team leader)
Johan Molenbroek	TU Delft/IDE (team leader)
Mara Rosendahl	TU Delft/IDE (graduate student)
Spyri(doula) Oikonomou	TU Delft/IDE (graduate student)
Tom Schakelaar	TU Delft/IDE (graduate student)
Aniol López	TU Delft/IDE (JMP student)
Imogen Chen	TU Delft/IDE (JMP student)
Paul Janssen	DHV Royal Haskoning (project manager)
Leon Korving	Aiforo (consultant)
Wiebren de Jong	TU Delft/3ME
Aravind Aravind	TU Delft/3ME
Eva Promes	TU Delft/3ME
Ming Liu	TU Delft/3ME
Xiang Mei Meng	TU Delft/3ME
Sandra Yamile Restrepo	TU Delft/3ME
Marian Loth	TU Delft/IDE
Annemarie Mink	TU Delft/IDE
Annemiek van Boeijen	TU Delft/IDE
Daniel Perez	TU Delft/IDE
Shannon Chang	TU Delft/IDE
Wouter Kersten	TU Delft/Enviu
Nick van der Velde	TU Delft/Enviu
Abhigyan Singh	TU Delft/EWI
Lucia Hernandez	Wetsus
Mariska Ronteltap	Unesco IHE, Delft
Peter Mawioo	Unesco IHE, Delft
Joy Riungu	Unesco IHE, Delft
Hester Foppen	Aqua4all
Cees Keetelaar	Independent consultant
Elbirch Spijksma	Simavi

# 1. Waste & Water Management

## Presentation >



14:00

The first theme of the Expert Convening covered the issues of waste and water management. The main aspects that were covered in the presentation and the following discussions were what to do with poo, pee and water that is collected at the toilet facilities. Poo and pee are contained and transported to the Microwave Plasma Gasification plant, where nutrients are recovered and dried feces is converted into electricity. Water is treated and recycled at the toilet facilities, using a sand filter and solar UV disinfection system, to reduce the pressure on local water resources. In order to recover anal cleansing and flushing water, a special water diverting toilet is developed. Quantifying the amount of waste and water is important for the dimensioning of the system. An important part of the discussion is how to anticipate to peak hours when most of the waste and soiled water is produced. Another major technical and social challenge presented and discussed is the transport of human waste from the toilet facilities to the Gasification plant.

## 1.1 Discussion: Transport Of Human Waste >

- The first thing that was mentioned concerning the transportation was related to the smell that such waste has. The constraint of not having a sewerage system involved in the project development was pointed out to be a key problem of the whole transportation issue.
- Cultural perceptions were involved in the discussion. There are some countries in which garbage collection is not considered as a disqualifying job (they take good money and they enjoy a certain kind of freedom and free-time). On the other hand, in some countries such as Bangladesh and India, religious habits often connect this kind of profession (and related interactions and materials) with impurity and uncleanness.
- Hand picking with such devices was considered, but some issues raised regarding the topics of “image” and “cultural perception”.
- If labelled as “dirt collection”, this job might evoke remembrances of the old cast system that is not likely to be pleasantly remembered by locals. In order to cope with “image” issues an entrepreneurial connotation could be given to the discussed activity, promoting it as a positive and useful way to make money.
- As slums are characterized by a lack of space and narrow streets, a bicycle transportation system may be considered; this kind of solution could guarantee flexibility, logistic dynamism and spaces for eventual advertisements (enhancing entrepreneurial connotation given by such a service).
- During the discussion alternatives and “out of the box” solution were proposed, for example a “flying” system which would have waste transported above the slum and not through it.
- Given that the overall system would bring a considerable amount of energy, part of the energy itself could be carried around by “collectors”. While executing their primary function, those mobile units could be used as a “mobile battery”, where people can charge their mobile phones. In such a way, the primary function (transportation of waste) could pass unnoticed.

*“It is not a shame to carry your waste from your van to the deposit area”*

• A quick parallelism was made between transporting waste in Indian slums and transporting waste on camp sites. Acceptation of this task has been achieved and nowadays it is not a shame to carry your waste from your van to the deposit area. From this consideration the discussion steered to transportation devices.

• Different shapes of containers were named: buckets, plastic bags, unspecified packets, all relating to the “camping” models. How do they transport waste there? Generally there is a removable compartment in the van.

1



- A dominant topic throughout the whole discussion was the rhetorical connotation of the whole transportation service. Linguistic tricks are needed to modify and positively “manipulate” people’s perception towards such an issue: as explained above, tactical naming could be an interesting option to avoid words as “poo” and “collector”, substituting them with, for instance, “energy” and “entrepreneur”.

- An alternative role was considered for the transportation service. What if the space available on these “boxes” or “containers” was used to educate and sensitize people towards the topic? In this way the toilet experience could be considered as an educational process, bringing knowledge and awareness as an extra output.

## 1.2 Discussion: Wash Water Treatment >

The discussion on wash water treatment was structured around three main topics: technical feasibility, economic feasibility and acceptance from the user.

- According to the sanitation experts at the convening, “the system seems to be technically quite ok”. However, since the precise entity of contamination and concentration are unknown, it is hard to say how safe and effective the outcome will be. Some experts pointed out that the term grey water might not be appropriate for this kind of heavily contaminated water.

- The first technical problem is related to ensuring effective separation of urine and feces from the water that is used for cleansing and flushing.

*“Effective diversion of water from waste is essential to reduce volume for treatment”*

- A second problem is related to retention time in the septic tank before sand filtration: a residence time of one day might not be long enough to let suspended solids drop to the bottom of the tank. The same problem occurs during filtration: if water is pushed too fast through the filter the decontamination process might be compromised.

- At the moment water is cheap and abundant in Indian slums, which makes it hard to compete with such an on-site water treatment system. The economic feasibility, however, seems to be more encouraging in the future as “in India water is getting less available and therefore more expensive”. This can be an important economic

- Holistically rethinking the whole structure of the slum has been considered as an option, integrating the system in a wider and more complex organization.

*“Avoid words as poo and waste collector, use energy and entrepreneur instead.”*

driver for the implementation of a closed system that allows recycling of all water, especially in drier regions.

- The economic value should be made visible to the users as well as various stakeholders (e.g. governments) involved in the project.

- Everyone agrees that user acceptance is of utmost importance when further developing the system. The water is heavily contaminated and people might feel disgust when re-using it. According to an Indian expert, the locals would accept to use reclaimed water to flush the toilet but not to clean their hands or anal region. This issue is particularly relevant for Muslims, who have strict cultural costumes with regard to personal hygiene. It was suggested that the best way to approach this problem could be to interview the locals in order to get their direct opinion on the issue. If public acceptance turns out to be problematic, a separate system can be considered that only reuses hand washing water for toilet flushing, while the flushing and anal cleansing water is safely discharged after treatment.

*“User acceptance should be guaranteed before further developing the system”*

## 1.3 Discussion: Capacity Of Sanitation Blocks >

- The first topic of this discussion was about validating the numbers presented by the IDE team, starting with the proximity, which was set to a maximum of 100 meters. One expert suggested that the distance currently walked should be measured first. On average, a slum dweller walks up to 1km to get to a toilet or defecation field.

- The matter of convenience came into discussion. Slum dwellers now carry buckets of water when they go to the toilet, which can be rather difficult when it comes to long distances. 100 m is a compromise solution that was chosen during the research. Would the perception of distance change if people do not have to carry a heavy water bucket?

- The issue of the bucket that the people carry with them to the toilet was shortly analysed. On average 2 liters of water is used for anal cleansing and flushing. It was suggested that another device could be used instead of the bucket. This could be an interesting direction for research, for example because of the problem of the stigma about carrying the bucket: when the people are walking through the slum with the bucket, it is obvious for everyone where they are heading. This might be inconvenient, especially for women.

- It was suggested that people in slums should be asked about their preference. It was stated that it is important to ask their opinion as they might have a completely different view on this problem. For example, they may wish not to live next to a toilet facility.

*“If a toilet is clean and safe, people are willing to walk a longer distance”*

- According to the experts, the proximity to the toilet should not be the first criteria. The focus of the project should be on making something desirable, not necessary close. Again, it was stated that the people should be asked about this issue, in order to find out if the problem of distance is a real issue that should be targeted. It might be more helpful to give people two toilet facility options and observe which one they prefer.

- Hygiene is identified as an important focus point. People are used to walking long distances in the morning to get to the toilet. Their bodies are thus trained in this manner. The problem that should be focused on is having the toilets clean, and how to keep them clean. The conclusion of this part of the discussion is that having a clean toilet seems to be more important than the distance of the facility: if the toilet is good people will be willing to use it, even if it means walking a longer distance.

- The second question in this discussion was if involving a better sense of ownership would be valuable to persuade. It was suggested that a way of assuring the hygiene can be involving the sense of ownership. People will be more willing to keep the toilets clean if they feel they belong to them.

This statement, however, raised an intense discussion. Many participants were sceptical about this and wondered: How can you increase a sense of ownership within such a big community?

- It was stated that if the toilet is clean and going to the toilet is safe for both men and women, they would be willing to walk even more than 100 meters. It was again explained that they actually need a good incentive, and having a shorter distance is not an incentive enough. This is why hygiene and safety should be the main focus of the project.

- Experts suggested to have people from the slums contribute to the construction of the toilet facility, rather than go there as external providers and leaving them a toilet facility. If they feel part of the design and construction, they will be more willing to keep the toilet facility clean. One expert gave the example of an experiment done with students: when students were asked to paint and decorate their own bikes, they would use and maintain them more carefully.

- A whole different point was brought to attention by one expert. In order to build so many toilet facilities in the slums, many people will have to move. This will create a lot of disturbance. It might be better to build less toilets.

- The next topic of discussion was related to how many toilets should there be in a facility. The IDE team suggested between five and ten, after which an expert asked what this number is based on. He suggested that the best way of setting this number would be asking the toilet keepers in India. The number of toilets also has a lot to do with the amount of time people need to spend in the toilet.

- It was suggested to look into the people’s daily rituals and habits. The timing is very important: women and men go to the toilet facilities at different hours of the day and they have different rituals. Women go to the toilets in big groups before sunrise, while men go after sunrise, just before going to work. For a woman going to the toilet is a delicate ritual, yet it gives them the chance to discuss about their problems and socialize. The gender aspect should be taken into account when analysing the toilets in India: it is important that there are separate spaces for men and women because of safety considerations and differences in demands.





Fig.1 - The design team introduces the project



Fig.2 - The student team presents their findings from their field research



Fig.3 - Design team presents theme 1. Waste & Water management



OS-PO-MHA PO-HA

2



## 2. User Experience & Engagement

### Presentation >



15:30

The second theme covered the aspects of User Experience and Engagement. The presentation started with a detailed explanation of the current situation of toilets in slums and the mind-set of slum dwellers regarding sanitation. Using the insights offered by the research the design team created a generic slums and personas, set a design vision and defined the major challenges and opportunities of the project. The team focuses on the design of an easy, pleasant and well functioning toilet, by concentrating on a clean experience and increase the sense of ownership as much as possible. The biggest challenges identified are related to the location of the toilet facilities, the unreliable water supply and poor waste management, the management of operation and maintenance, gender issues and the community involvement. Besides challenges, several opportunities were defined like connecting toilets to "self beauty", change the position of sanitation from a dirty subordinate function to a pleasant and attractive place and to offer extra services besides toileting.

### 2.1 Discussion: Maintenance >

- The main focus of the discussion about toilet maintenance was built around organizational and responsibility issues. How is the toilet organized? How to prevent stealing? Who sets the rules? And how to ensure that these rules are respected?
- A general opinion was reached on the fact that users and caretakers should be responsible together. The best way to tackle organizational issues would be an integrated approach where the private and the public sector are simultaneously involved through a partnership.
- A franchise model could be a viable option, where caretakers would be responsible for daily maintenance whereas the government or a third party will supervise monthly maintenance.
- An idea brought by an expert was to create different price categories for low, normal and premium service. According to the expert, "this solution has already proven to be effective in Ghana, where people seem to be willing to pay for luxury and good service".
- The same goal could also be reached by introducing extra complimentary services such as embedding a sanitary shop in the public toilet.
- A second key issue related to maintenance is how to prevent stealing, especially water. Regulatory measures should be designed in order to provide the caretakers the necessary institutional authority to make sure that rules are respected.
- Before concluding, complete consensus was reached on the fact that "the only way to guarantee effective maintenance is to ensure that the toilet generates revenues".

*"A key issue related to maintenance is the sense of ownership."*

- Creating competition among different sanitation boxes and introducing reward models could stimulate the franchises to increase the quality of the service.

- In addition, a key issue related to maintenance is the sense of ownership for the users. That could for example be achieved by introducing monthly memberships instead of a pay-per-use model.

*"The only way to guarantee effective maintenance is to ensure that the toilet generates revenues"*

### 2.2 Discussion: Opportunities >

- A switch of mind-set was considered to be one of the main opportunities. The idea was raised to give a clear identity and positive image to the sanitation system; the facility and all structures that belong to it.
- Examples concerning toilets in stores were made. They are cleaner than the public toilets you find in the street, because people relate a proprietor to them. Moreover, people feel less anonymous at in-store toilets compared to public toilets on the street. This relation was compared with participants' behaviour towards their own toilet and the toilet of their friends. Their attitude is completely different; participants confirmed that they care more about their friends' toilet than about their own. The same principle seems to be valid in slums, where private toilets are really clean while public situations, where the sense of anonymity is higher, are dirty and degraded.
- The role of the caretaker was intensively discussed; field examples evidently show that his (generally the caretaker is a man) salary has no connection with the condition of the workplace. The salary as an only incentive does not seem to be motivating enough to keep the facility clean and in good condition. The relation between his responsibility and the user's duty was questioned; how to define the border between the two?
- It was proposed to have thorough cleaning done once in a while by an external company while the caretaker takes care of the daily maintenance.
- To increase the feeling of ownership a "competition" element between different locations could be introduced. "With a Cleanest-toilet-of-the-neighbourhood price!"
- Providing a clean and hygienic toilet ensures a higher rate of customers. Cleanliness is one of the first issues mentioned by the end-user to be improved when talking about sanitation, together with the provision of (gender) privacy. Moreover, end-users indicated to be willing to pay for an hygienic toilet.
- As the value of money appears in the conversation, an idea for a business opportunity was put forward. The possibility to include an extra service or good in the entrance fee was linked with discounts in a shop or a bar.
- Related to the educational component of the problem, an example of an HIV project was given. In this project hairstylists were educated about the topic and afterwards spread the word in their barbershops and beauty saloons.

*"Give a clear identity and positive image to the sanitation system; the facility and all structures that belong to it."*

- Statistics were given about the level of "degradation" of a good and people's willingness to respect it (an example was made concerning busses: if the bus is tagged or broken for more than 10%, the rate of vandalism is plausible to grow faster). In a nutshell, the dirtier the toilet is when entering, the less motivated people will be to keep it clean. A good starting condition, if constantly maintained, will surely result in better conditions for the public toilet.

- Maintenance came up as a mayor point of discussion related to peoples attitude towards toilets. It is a big problem considering all stakeholders and users. Finding a functional and profitable logistic framework is a big challenge.

- An Indian participant suggested that the caretaker should be seen as an important authority, in order to cope with people's perception regarding sanitation. He could be seen as someone who brings value to the community. that has to be respected: "Give him nice gloves, and an important uniform!"

*"Maintenance and cleanliness are strongly related to peoples attitude towards toilets."*

*"The dirtier the toilet is when entering, the less motivated people will be to keep it clean."*



## 2.3 Discussion: Women and Menstruation rituals >

What should the priority be when focusing on women?  
A. disposing the sanitary towels, B. the possibility to wash and dry the towels or C. offering water to wash intimate body parts?

- Different opinions existed among the experts. It was stated that the first focus should be on providing fresh water for cleaning the body parts, and not on the towels. Other participants claimed that the focus should be on the disposal of the towels, since women currently leave their sanitation towels at undesired places. Moreover, if women throw the towels inside the toilets, the system gets clogged.

- The option of hand-operated incinerators for burning the disposable towels was put forward in the discussion - there are several options on the market that can be researched.

*“Cultural aspects should be well understood when approaching this delicate topic. Indian women should be involved in an early stage of the development to be sure about local habits, traditions and wishes concerning the menstruation ritual.”*

- Another option would be to provide a room inside the toilet facilities where women can incinerate their disposable towels. Or this room inside the toilet building could provide a place where women can wash their reusable towels. In the current situation women carry the used towels with them to their homes, where they wash them and dry them, trying to hide them as much as possible. This leads to towels that are not properly washed or dried.

- An expert explained that, because the context is so different, people shouldn't be encouraged to use things that they throw away afterwards. Many participants agreed that reusable solutions would be a better for this problem. The example of the Ruby Cup was brought into the discussion: would something similar work in this context and would women use it? Things like these should be tested in the field.

*“Women might like to take advantage of their ‘toilet time’ to talk about their concerns or neighbourhood gossips.”*

The second topic of discussion was about the best solution for women's hygiene - disposable or permanent towels?

- According to the field research, women in the slums are currently using both disposable towels and reusable ones, depending on their financial situation. The field observations showed that buying the disposable towels can be accompanied by problems, like women feeling embarrassed of asking these items from a male shop-keeper. The fact that menstruation is still a taboo subject, causes shame in between gender. Cultural aspects should be well understood when approaching this delicate topic.

- A problem with washing the disposable sanitary towels is the presence of a space where women can wash and dry the towels. If the drying process is not done in a proper way, they can be very unhygienic and can cause all sorts of infections.

- Some experts considered that privacy might not be a problem between the women in slums. Women might like to take advantage of their 'toilet time' to talk about their concerns or neighbourhood gossips.

- There are two kinds of approaches: 1. changing women's behaviour or 2. offering services around the rituals people already have.

- One expert stated that the focus of the project should not be to try to change the situation, but to support the habits and products people already have. "Rather than

*“There are two kinds of approaches: 1. changing women's behaviour or 2. offering services around the rituals people already have.”*

changing routines, the project should support current practices. First of all because of fast user adaptation, but most of all because the topic of female hygiene is too broad and complex to tackle within this project.”

- For all topics the experts concluded that Indian women should be involved in an early stage of the development to be sure about local habits, traditions and wishes concerning the menstruation ritual.



Fig.4 - Experts brainstorming for solutions during the second discussion session

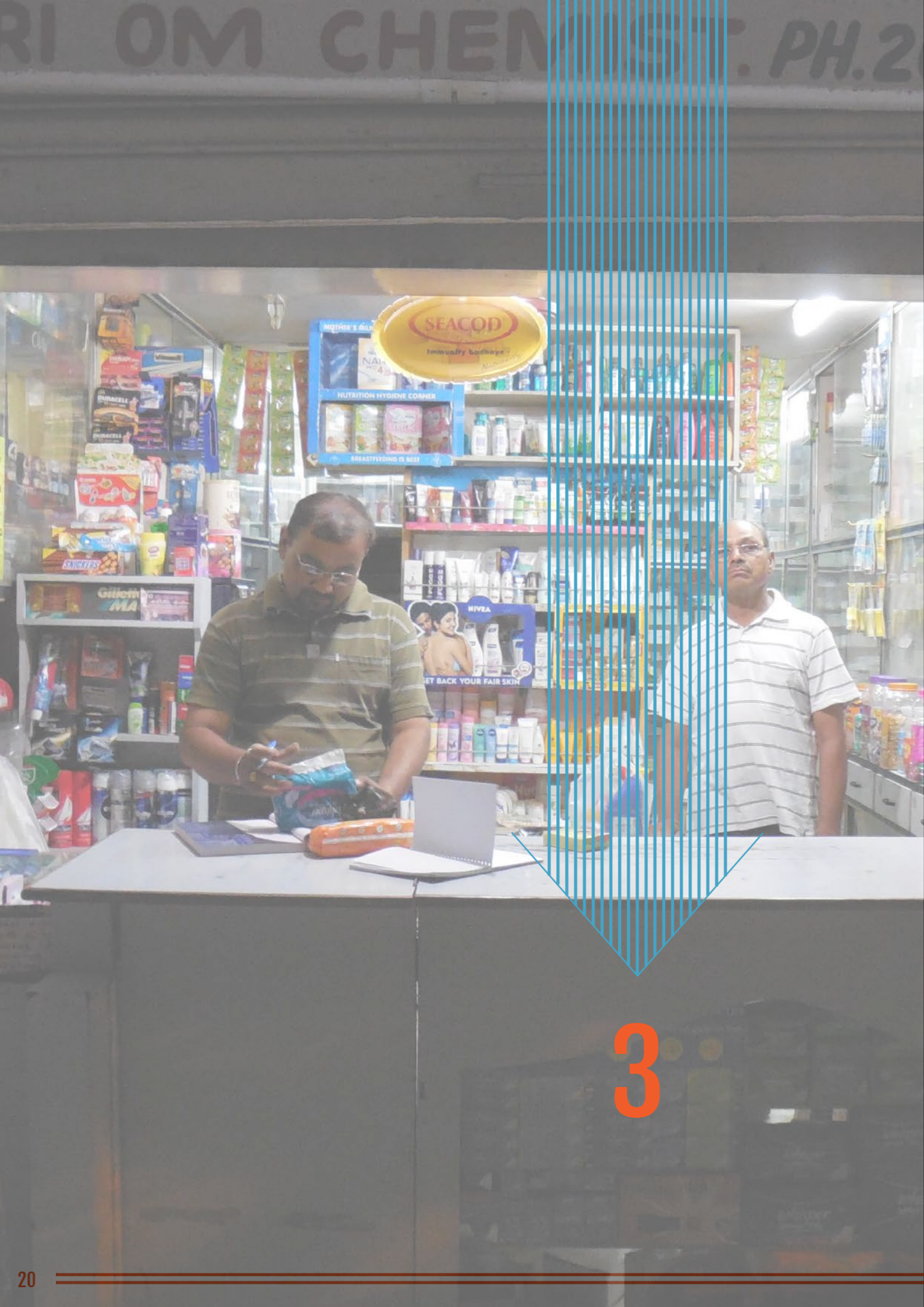


Fig.5 - Experts listening to the presentations



Fig.6 - Chocolate “poo” cakes





## 3. Branding & Business Modeling

### Presentation >



16:45

In the branding and business modelling presentation the utility and functionality of such a system was demonstrated. Different types of business models were discussed, from a “membership” model to a pay per use process. Stakeholders were identified - from people to brands that might be sponsoring the whole operation. Income sources were also analysed, including: Membership or pay per use fees, store sales, fertilizer sales and a possible exclusivity fee paid by plausible commercial partners. The importance of branding and its impact on sanitation was highlighted; the intended values for the brand and the research plan to find insights to complement it were presented and discussed with the experts.

### 3.1 Discussion: Future Scenario >

The first issue that was discussed was what a future slum might look like and what main opportunities arise for the development of sanitation systems.

- All the participants in the conversation agreed that the most important thing to achieve in the future would be having a “respectful upgrade”, taking in consideration the context. Most of the dwellers of the slums do not own their house and property, they rent it from self-assigned owners. It was suggested that a valid option was building flats for the people in the slums, however it was pointed out that an understanding of the culture and its dynamics is fundamental for the successful implementation of such housing projects. An expert explained that if you are going to upgrade the slums, you first have to find out who the actual owners are and how to contact them.

*“If the slums are going to be upgraded, will community toilets still be needed?”*

- To illustrate this, the Indian company TATA was brought into the discussion by one of the experts. TATA has a plan to build container living modules that will replace the current dwellings in the slums. A question was asked related to this issue: if the slums are going to be upgraded, will community toilets still be needed? A better understanding of how this upgrading will take place and the role of a new sanitation system needs to be worked out and complemented.

- It was suggested that the sanitation concept developed in this project should be sold as the “toilet of the future”, otherwise it could be received as an old-fashioned toilet that is adjusted for the Indian context.

- The participants in the discussion explained that the upgrading of slums depends a lot on the government’s intentions. The upgrading should be moderated, respecting the slum’s principles and should be done with the support of the government. Strategies need to be developed in order to have an efficient and valuable upgrading of the slums. In the same topic it was suggested that social media could be successfully used in order to promote this development.

The next topic of discussion was related to mobile technology and what involvement can it have in the slums. The experts observed that mobile phones are common and more and more people are starting to use smart phones.

- It was suggested that more research should be done in order to get a better overview of how slum dwellers are using their mobile phones and for what purposes. This might be very different from the common uses in Europe - for example women in Africa use the mobile phones for safety reasons. An expert explained that they are also very interested in the entertainment offered by mobile phones: music, light, games, etc.



- Many suggestions were offered on the issue of linking the smart phones with the “toilet of the future”. For example, during peak hours it can let people know the availability of toilets. Another application could be to show which toilet facilities are clean to create some competition. And, of course, a payment or membership system could be provided through mobile phone technology.

- It was also mentioned that putting Wi-Fi internet in the toilet facilities could attract more people.

### 3.2 Discussion: Commercial Opportunities >

The discussion on commercial opportunities comprised how to involve commercial partners, focusing mostly on the identification of possible partners.

- Health insurances could be possible partners interested in improving the health conditions of the local population in order to cut on their operative costs. It was suggested that these insurances could be issued together with a toilet membership, which could motivate slum dwellers to pay their fee. Moreover, it gives a more holistic approach to the sanitation solution. The difficulty of implementing this at the moment was pointed out by some experts. However, the medical insurance situation at the bottom of the pyramid might change in the future.

- Strategies connecting to phone companies could be effective ways to penetrate the slum: a micro-recharge system for payment could provide those companies the necessary economic profit to take part in the project.

- It was suggested that mobile phone signal towers could be placed in some sanitation facilities. At the moment, some companies already look for places in urban slums to place their towers and they pay a fee to do so. This development might represent a good opportunity for the facilities and processing plants as well.

*“A sanitary shop at the toilet facilities could provide an opportunity to MNC’s such as Unilever and P&G.”*

*“Many slum dwellers have mobile phones, which bring several opportunities for a future sanitation system”.*

- It was concluded that having a technological slum of the future is an actual possibility, as long as technologies are applied properly within the context. Technology does not bring a meaningful improvement if not applied properly.

- Another collaborative effort, which was mentioned often throughout the day, would be to provide a complimentary sanitary shop inside or next to the toilet facility. At this shop sanitary products from big multinational companies such as Unilever and P&G could be sold.

*“Governmental approval is essential for sustainable implementation”*

- The idea of branding certain aspects of the sanitation experience was also discussed. The concept of using a certain brand of soap inside the facility as both a commercial exercise and attraction for the user group was approved by the experts that attended the discussion.

- The main point discussed about funding was that government approval is essential.



Fig. 7 - Picture of the entire workshop room



Fig. 8 - Discussion groups



Fig. 9 - One of the experts writing down discussion findings





The IDE team would like to thank Brian Baldassare, Nicolò Micciche and Sandra Laura Lup for making notes during the discussions.