FROM RESEARCH & DEVELOPMENT TO COMMERCIALISATION: LESSONS FROM THE WRC LOW & POUR FLUSH SYSTEM

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It all starts with a problem
And...
Creating an opportunity
Current Binary Model

Conventional WWTW
- FLUSH-&-FORGET
- Considered “gold standard”
- Resource intensive (Capital, Sewers, Water, Energy, etc.)
- Challenge to meet urbanisation & population growth
- Expensive & beyond reach of developing countries
- Established technologies (discharge regulations, guidelines, policies, etc.)

On-Site Sanitation
- DROP-&-STORE
- Most prevalent tech in SSA
- Little / no water
- 5-50% cheaper (than activated sludge)
- Can be scaled at urbanisation rates
- Faecal Sludge Management – lack of policies & standards, disposal routes, O&M overlooked.
- Viewed as “temporary” solution

SOLUTION??
The VIP (Ventilated Improved Pit)

- Design to reduce disease transmission and smells
- Improve on stability of pit latrine structure
- Has concrete slab and vent pipe
- Nearly 10% of South African population serviced by VIP toilets
Limpopo boy drowns in pit toilet

Johannesburg - A 4-year-old boy drowned in a pit toilet in Limpopo on Thursday, police said.

He was one of three boys who drowned in the province on Thursday, police spokesperson Moatshe Ngoepe said.

The boy, Samuel Matshua, had been playing with his friends near the pit, in Mugwaza village, Letaba.

It was filled with rain water and he fell in and drowned.

In Mzamba village, Bolobedu, Botsope Ramabogela and Tshego Siphiwe, both aged 12, drowned in the Mokolowa River while swimming.

All three bodies had been recovered.

Matshua was at least the third boy to die in a pit toilet since January last year.

Three-year-old Hlumela Makhazi drowned in a pit toilet in France township on the outskirts of Driefontein, KwaZulu-Natal, in December last year.

In January last year, 6-year-old Michael Komape drowned in a pit toilet at the Mahlodumela Primary School in Chebeng village, outside Polokwane, Limpopo.

He was found in a pool of human excrement in January last year, his body infested with maggots and froth coming out of his mouth.

This was the gruesome picture painted in court papers by public interest law centre Section 27 to describe the death of six-year-old Michael Komape, who drowned in a pit latrine at his primary school in Chebeng village, Limpopo.

Section 27 is now assisting his parents to sue the Limpopo education department for R3 million because of alleged rights violations that led to the drowning.

All the boy wanted to do was use the toilet at his school, Mahlodumela Lower Primary, in Limpopo, last year in January. But what passed for a toilet at the school was merely a dilapidated corrugated iron structure with a loose seat that could not sustain little Michael’s body weight.

He drowned in human excrement and, according to papers filed late last month at the South Gauteng High Court by Section 27, Michael died as a result of inhaling excrement, urine and other putrid substances.

The papers read: “The body was infested with maggots … bloody froth was coming from the mouth … there was severe oedema [build-up of fluid] in the brain and the lungs were enlarged.”

According to Michael’s mother, Rosina Komape, the school principal called her, asking her where the little boy was because he had not come back after...
Research Report K5/1745 “Tackling the Challenges of Full Pit Latrines”

- Study area: Ethekwini Municipality
- Expansion of municipal boundaries
- Inheritance of many VIP toilets
- 30,000 VIPs nearly full
- Pits filling faster than design rate
- Research was required to better understand the nature of faecal sludge, pit filling rates, the efficiency of additives, pathogen survival rates, etc.
- Research partnership between municipality, donors, university & WRC
- Other studies: lightweight VIP structures, franchising O&M services, new pedestal designs
THE CHALLENGE

- Establish past / previous experiences of pour / low flush in South Africa
  - Why did similar tech fail?
  - Identify source of failures
- Adapt Pour Flush principle in South Africa
  - Sitters not squatters
  - Wipers not washers
- Monitor technical, operation and social viability
PEDESTAL DESIGN & TESTED
INTERNATIONAL FLUSHING PROTOCOLS
This pilot was commissioned on 1 Sept 2010. The sewer is over 17 metres long and the first section falls at only 1%. Only one blockage in that time, when kids flushed a plastic bag. This was removed at one of the inspection chambers.
Completed installation – note no cistern, no water connection = no 24/7 leakage

Leach pit – easy access for emptying

Splitter box to enable usage of two leach pits
Leach pits after installation either side of tree – no visible sign on surface
This pilot pour flush has been in operation since January 2011. In that time the users have had no problems and are delighted with the toilet. Here the mother demonstrates its use.
WESTERN CAPE PILOT — retrofit in HIGH density settlements
Sludge characterisation by UKZN (PRG) and UKZN (PMB)

- Similar physico-chemical characteristics but significantly less trash
- Pollution plume largely localised
KEY FINDINGS

• No problems with flushing toilet paper but even newspaper ok (sometimes needs an extra flush)
• Sludge accumulation 20 litres/c/yr, about half of VIP rate
• Less trash in sludge
• Negligible leaching of contaminants – same as VIP
• Typical water use 1 – 2 litres per flush
• Sewers flow without blockage at gradients at ≥ 1 in 100
• Participants extremely enthusiastic about technology
• Increased interest to install inside the home.
• Reduced hydraulic load complements Biogas Systems
TRANSVERSING THE VALLEY OF DEATH

[Diagram showing the lifecycle of a product with stages including Basic Research, Applied Research, Proof of Concept, Target Market, Business Plan, Working Prototypes, Founding Team, Engineering Prototypes, Supplier Contracts, Production Prototypes, Product Introduction, and Revenue Growth. The diagram highlights the "Valley of Death" period between the end of early-stage development and the beginning of revenue generation.]
Strategic Partnerships
Prefab and Block – Quick Installation
Pushing boundaries of research and innovation – 1 l and below....
New P-Trap Designs
The sanitation achilles

- Low to no water for flushing
- We have to deal with moisture, not the solids - which is 5%
- Moisture means energy
- Low to no water use means smaller reactors and more smarter reactors – incinerators, pyrolysis, electrocatalytic etc.etc.
- This is the future for offgrid, non-sewered future.