

Road to commercialising sanitation technologies:

Engineering Field Testing platform in Durban, South Africa

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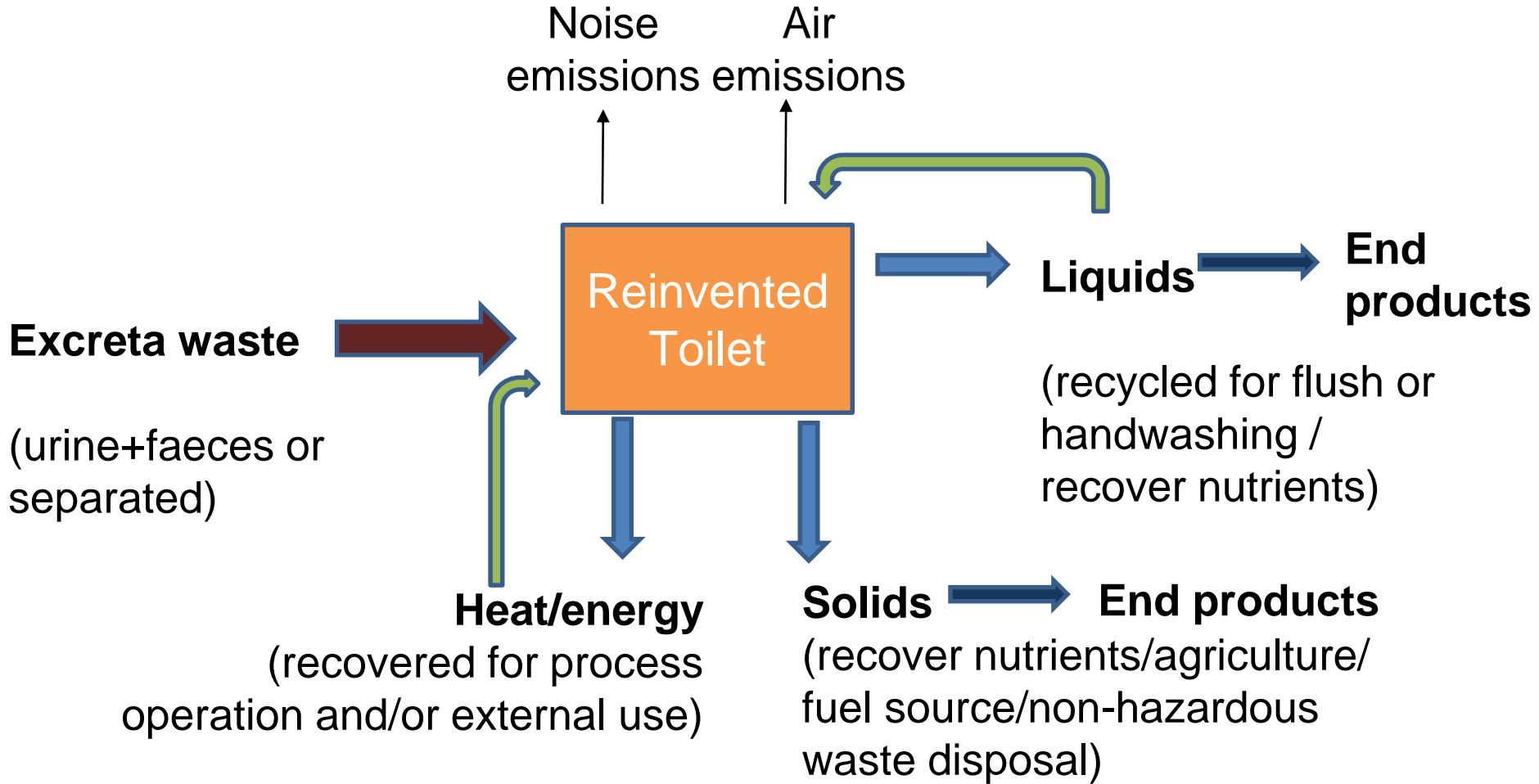


**eThekweni Water and Sanitation, Khanyisa Projects,
Pollution Research Group - University of KwaZulu-Natal**

The Reinvented Toilet

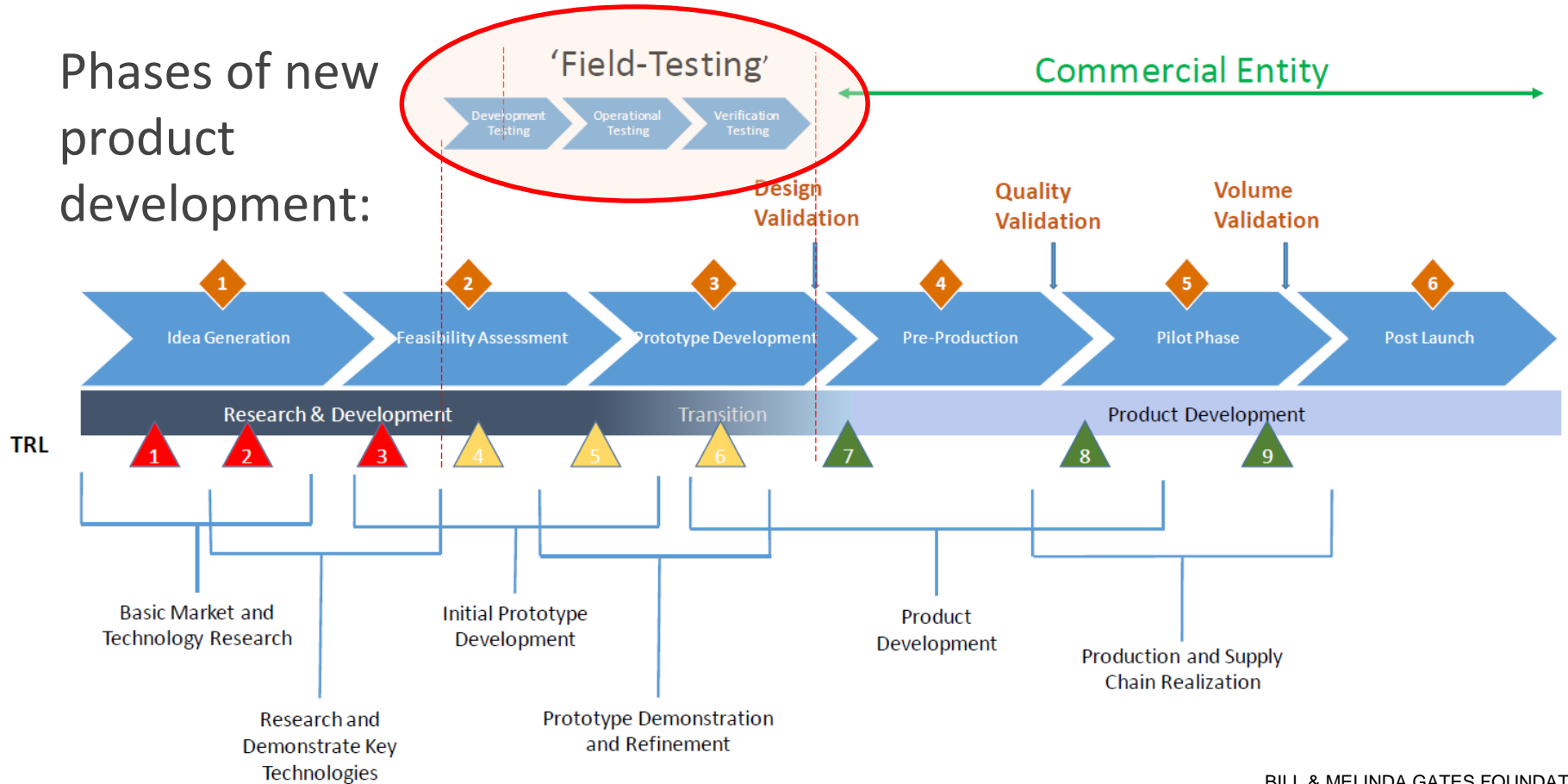
- Is desirable to use
- Removes pathogens
- Recovers energy, clean water and nutrients in situ
- Operates off the grid
- Costs less than US\$ 0.05 (5 cents) per user per day



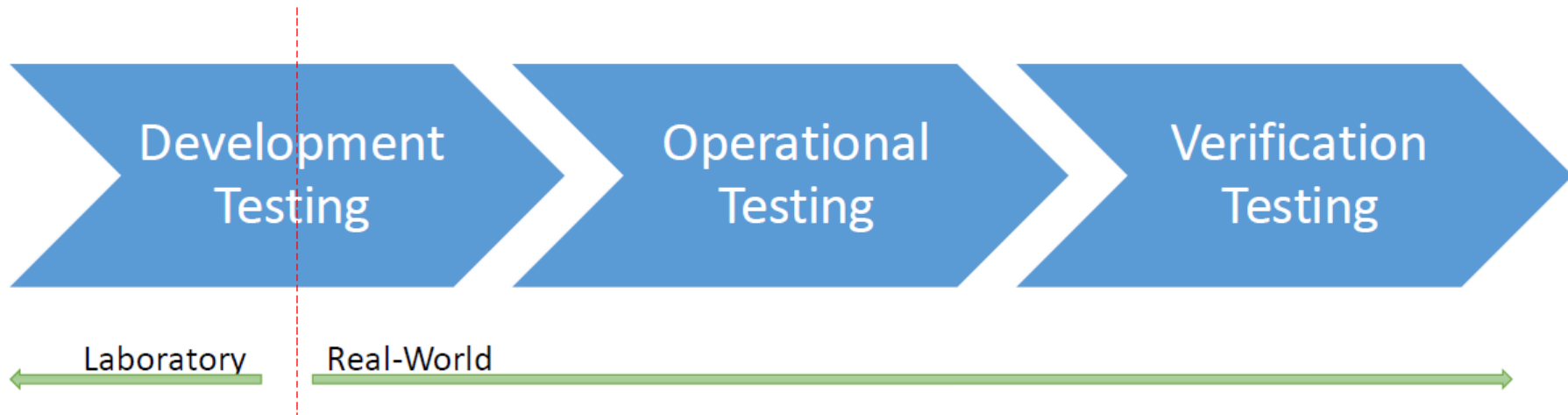


The EFT platform and product development

Phases of new product development:



Field Testing phase



The Engineering Field Testing (EFT) platform in Durban:

- Real world testing, many users
- Evaluates performance over an extended period
- Feedback from community on suitability and impact
- Uses the information and data generated to improve sanitation for all



How the EFT platform works:

SITE
SELECTION



COMMUNITY
ENGAGEMENT



SITE
PREPARATION



INSTALL &
COMMISSION



TESTING



DECOMMISSION



SHIPPING



TECHNOLOGY
CONSTRUCTION



FEEDBACK AT ALL STAGES TO:

- TECHNOLOGY DEVELOPERS
- DURBAN EFT TEAM
- FUNDERS

**SITE
SELECTION**



**COMMUNITY
ENGAGEMENT**



**SITE
PREPARATION**



**INSTALL &
COMMISSION**



TESTING



DECOMMISSION



SITE SELECTION



COMMUNITY ENGAGEMENT



SITE PREPARATION



INSTALL & COMMISSION



TESTING



DECOMMISSION



SITE SELECTION



COMMUNITY ENGAGEMENT



SITE PREPARATION



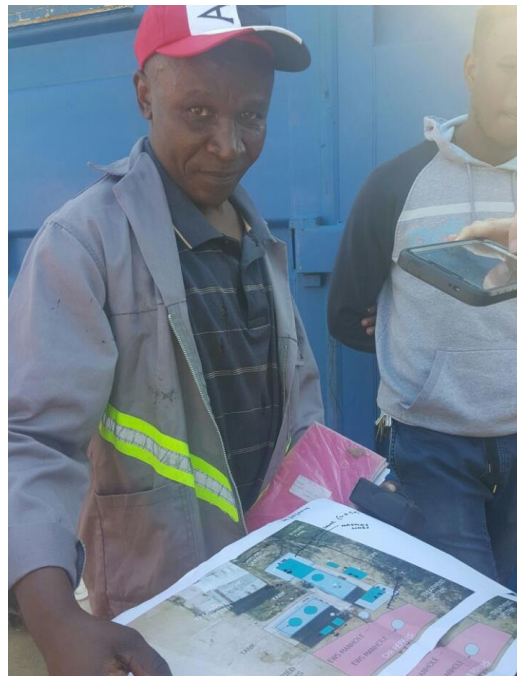
INSTALL & COMMISSION



TESTING



DECOMMISSION



**SITE
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COMMUNITY ENGAGEMENT



SITE PREPARATION



INSTALL & COMMISSION



TESTING



DECOMMISSION



Testing on the Durban EFT platform:

2017 – 2019, currently testing or confirmed for testing

10

TECHNOLOGY
DEVELOPERS

14

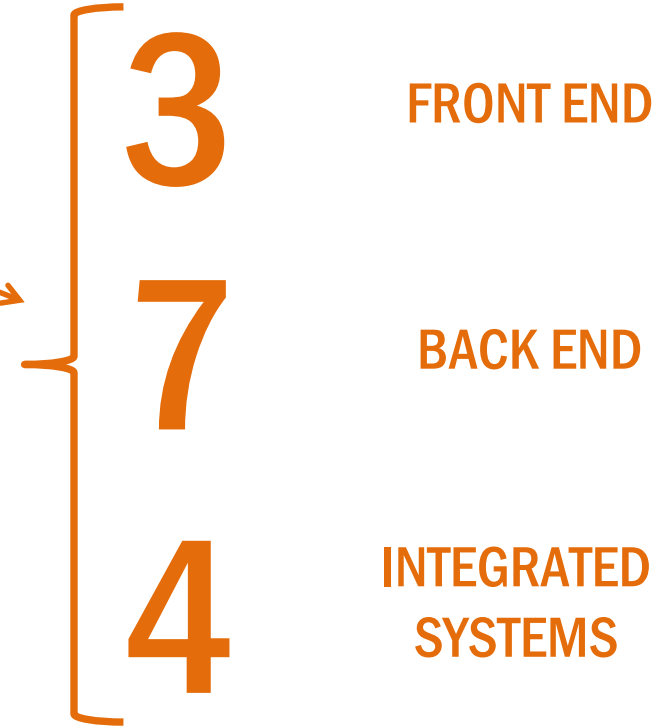
PROTOTYPES

23

TESTING
SITES

Testing on the Durban EFT platform:

14 prototypes:



(A few of) the lessons learned...

Testing on a platform = greater benefits than individual field tests

REGULATOR SEES
PERFORMANCE
UNDER LOCAL
CONDITIONS

KNOWLEDGE
SHARING

TECH DEVELOPERS
CAN FOCUS MORE ON
TECHNOLOGY, LESS
ON LOGISTICS

COMBINE
TECHNOLOGIES

FASTER
ESTABLISHMENT

SHARED
INFRASTRUCTURE



Site selection & preparation is challenging

- **Accessibility**
- Space
- Topography
- Shared use
- Illegal connections
- No as-built drawings
- Ground conditions
- **Speed vs. job creation**
- Lack of layout flexibility
- Unexpected issues



Community support more important than technical suitability

A group of approximately ten people, mostly men, are seated around a long wooden conference table in a meeting room. They appear to be in a discussion or meeting. A projector screen is visible in the background, displaying some text. The room has large windows with blue curtains. The overall atmosphere is professional and collaborative.

- **Political tensions**
- Security
- Community Liaison Officers
- Community can stop the project
- **Good community engagement is key to success of EFT**

Managing expectations



- **Setting precedents**
- **Testing has an end**
- **Local employment**
- **EFT can't solve all problems**
- **Timelines change a lot**
- **Working hours**

Testing



- **Product standards (e.g. recycled water quality) must be context-appropriate**
- New SOPs needed
- Agree up front on timelines

What does it cost – (1) Direct costs (indicative)

SITE PREPARATION & ESTABLISHMENT



Community site
US\$ 20,000



Household site
US\$ 1,800

TESTING

US\$ 35,000 to US\$ 100,00,
dependent on analyses
required



DECOMMISSIONING

US\$ 2,500

What does it cost – (2) Personnel

MUNICIPALITY



- US\$ 160,000/year in-kind contributions
- Management, engineering, community engagement lead, O&M, consumables

ENGINEERING & PROJECT MANAGEMENT COMPANY



- Management inputs
- Project manager
- Project engineer
- Community engagement inputs
- Community liaison officers
- Admin/finance

UNIVERSITY



- Principal investigator
- Project manager
- Ops manager
- 6 platform engineers
- Lab manager
- 4 Lab technicians
- Social research lead
- 4 social researchers
- Field workers
- Workshop manager
- Workshop assistant
- Admin/finance
- 9 Masters & 4 PhD students

Typical timelines

SITE PREPARATION & ESTABLISHMENT



Community site
2 to 5 months



Household site
1 to 3 months

Note: community engagement, ethics, contracts & utilities can be lengthy!

COMMISSIONING & TESTING

Variable – a few months to one year



DECOMMISSIONING

1 to 2 months

Recommendations



...for **technology developers**

- Don't test on the EFT too early
- **Decide on primary aim: testing technology or testing suitability for Durban**
- Community engagement can make or break project
- Communicate early about design (**visits are valuable**)
 - Flexibility
 - Local regulations
 - Security/vandalism
 - Local procurement
- Align expectations early (timeline, working hours, staffing...)
- Exit strategy

Recommendations



...for **setting up an EFT**

- Strength of municipality – private company – university partnership
- State minimum readiness level for technologies
- Resource planning is difficult!
- Get communication right (internal + external)
- Who is driving the programme?
- **Establish how EFT host city will benefit:**
 - Monitoring requirements
 - Structured knowledge sharing
 - Partner with local technologies

FSM5 Workshop



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KWAZULU-NATAL™
INYUVESI
YAKWAZULU-NATALI



Field Testing New Technologies

Friday 22 February 2019

Afternoon Session - 13:30 to 17:00

Acknowledgements



EFT platform funders & partners

- Technology developers
- The communities, households, schools and other sites hosting the field tests
- Bill & Melinda Gates Foundation
- South African Water Research Commission
- South African Department of Trade & Industry



Thank you!

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**Case study video of
EFT platform
available; also see
publicity from China
Reinvented Toilet
Expo**