IT enabled FSSM monitoring at scale in Maharashtra

Center for Water and Sanitation – CRDF – CEPT University
Aditi Dwivedi, Dhruv Bhavsar, Aasim Mansuri, Meera Mehta, Dinesh Mehta, Jay Shah
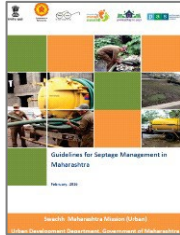
inspiring change

In India, Maharashtra state has taken up FSSM in a big way

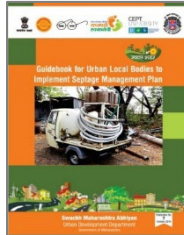Increased focus on moving cities towards ODF+/++ (FSSM) after declaring Urban Maharashtra ODF on 2nd Oct. 2017
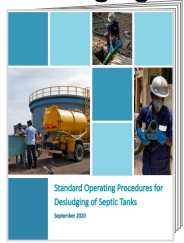
Septage Management Guidelines

Step by Step Guide for ODF+

O&M of treatment plants

SOP for scheduled desludging

| Co-treatment at own/near by STP Cities - 71		Independent FSTP Cities - 323
Category A cities: ULBs with STPs	**Category B cities: Co-treatment at nearby STPs**	**Category C cities: Independent FSTPs**
Co-treatment at own STP and accept FS from nearby cities	Co-treatment at nearby STPs within 20 km	Remaining ULBs will treat septage at FSTPs
Functional STPs **35 cities**	Co-treat at nearby STPs **36 cities**	Independent FSTP **323 cities**

State level policy for taking up scheduled desludging across all 390 + cities . . .
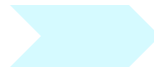
Ideas demonstrated in these pioneer cities have become models for FSSM

Wai, Sinnar, Kolhapur, Satara, Khopoli
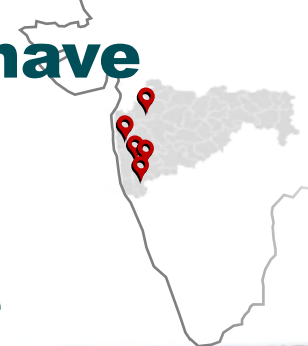
Comprehensive City Sanitation planning → **Pioneer cities in India to implement citywide scheduled emptying of septic tanks** → **City Wide Inclusive Sanitation**

Scheduled emptying of septic tanks

Faecal Sludge and Septage treatment facility (FSTP)

Online monitoring systems for emptying and treatment

Involvement of SHGs

Involving Private sector for emptying operations

Use of Own (DBO) / Philanthropy funds for FSTPs

Municipal council commitment and leadership

San Workers training

Levying a Sanitation tax to support operations

Reuse of treated wastewater

Gender inclusivity in sanitation

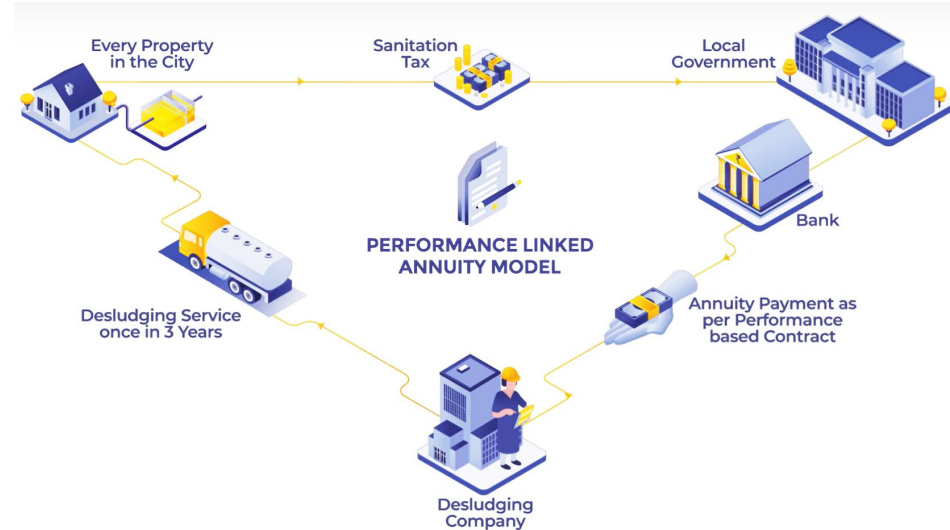Equitable Services for Slums and Vulnerable areas

Unique model for desludging in these cities

Scheduled desludging

All septic tanks in the city are visited...

once during a **fixed cycle** according to

a **predetermined schedule / route**

by the **service provider**...

who collects and transport feacal waste safely to a
designated site for treatment and reuse

Performance linked annuity model

Every Property in the City

Sanitation Tax

Local Government

Bank

PERFORMANCE LINKED ANNUITY MODEL

Desludging Service once in 3 Years

Annuity Payment as per Performance based Contract

Desludging Company

Need monitoring systems for FSSM !

1 All tanks are covered in 3 year cycle

2 Safe protocol is followed in withdrawal of sludge by service provider

3 Sludge is unloaded at designated treatment site only

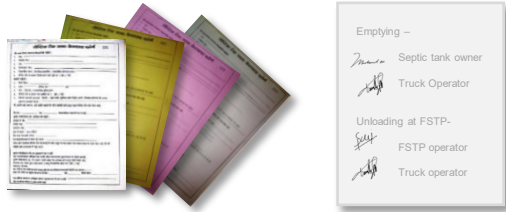**4** Making decisions on "performance linked payments"

5 Collect data on amount of sludge, number of trips etc

6 Collect data on status of onsite systems for future decisions

Monitoring - from paper to digital

Originally - Paper based monitoring for Scheduled desludging under Performance Linked Annuity Model

- Successful desludging = signature of the customer on a paper form at collection as well as signature of FSTP operator at unloading.

- Submission of required number of such forms is mandatory for municipality to approve monthly payment

- For issues like manual scavenging, illegal dumping, spillage, damage to septic tanks – only option is to complain by phone

- Forms only record basic data such as amount of sludge, date and time – No way to visualize geographical coverage and other performance metrics

- Not capturing post-commencement issues like customer readiness (septic tank covers not open), refusals and rescheduling, high trip ratio

Benefits of going digital

"Real time" monitoring No need to process data for results

Easy to Operate, Reduce paperwork, Minimize human error
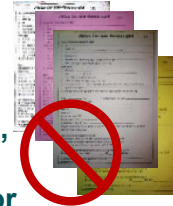
Integrated monitoring system – Across FSM service chain

Inclusive – support vernacular language

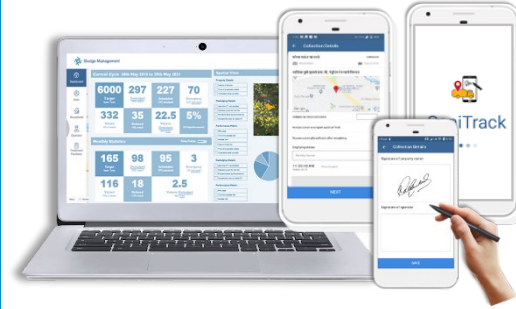**Can view progress easily and process payments**

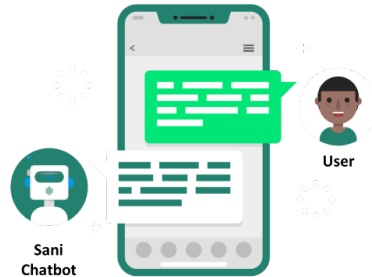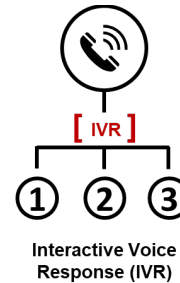# Digital monitoring systems for WASH Service Delivery at local level

SaniTab

SaniTrack

SaniChatBot

User

Sani Chatbot

IVR feedback
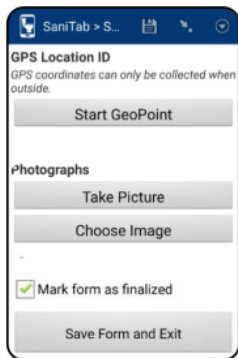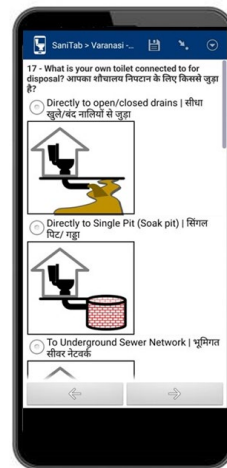

[IVR]

① ② ③

Interactive Voice
Response (IVR)

1 SaniTab - Mobile App for Sanitation Survey

- Create and deploy surveys in local languages

- Allows response-based branching/looping and segmentation in survey forms

- Geo-tagging, timestamping, integrated photo taking

- Downloadable MIS results

In 2015: > 10,000 properties surveyed in Wai for sanitation baseline assessment

✓ **Citywide survey on :**

- Toilet availability
- Type of disposal system
- Size and shape of septic tank
- Location of septic tanks
- Accessibility of septic tanks
- Last time septic tank was emptied

✓ **Online dashboard for analysis of data**

Dashboard generated from SaniTab
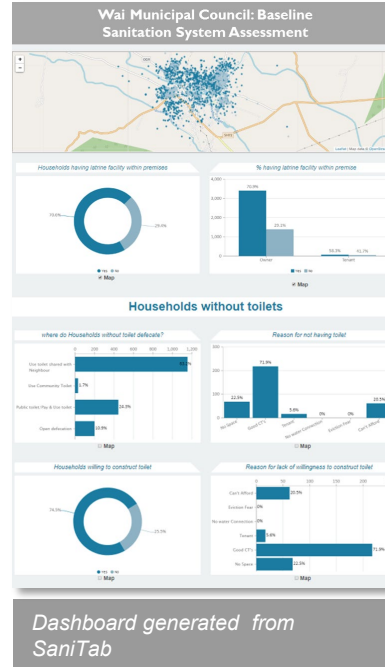
Spatial distribution of properties with and without access to individual toilets in Wai (2015).
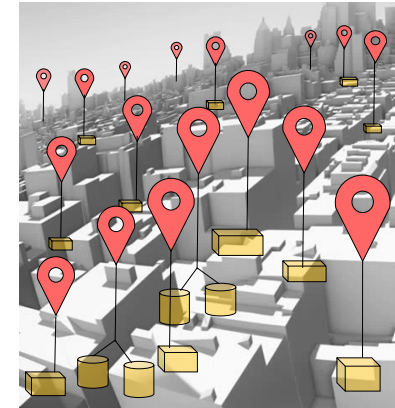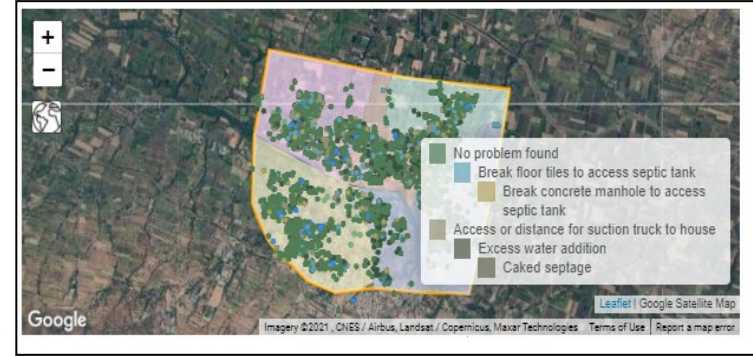

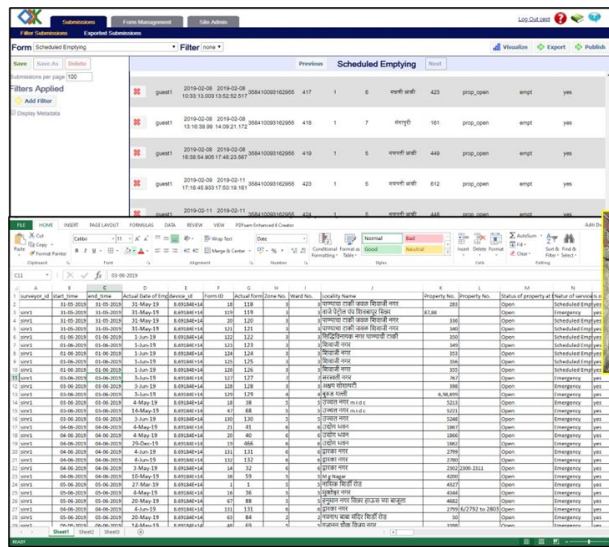On-field surveyors conducting surveys using SaniTab

Currently – developing a database of onsite systems

- Customizable - not only as a data collection tool but also as a **monitoring system**

- **Desludging monitoring form** for monitoring performance of the desludging services the private sector service provider and the ULB truck

- **Dashboard**

- If all tanks are to be visited in 3 years – use this opportunity to create a database!

- Creating a **unique database of onsite systems** – Added questions about septic tanks
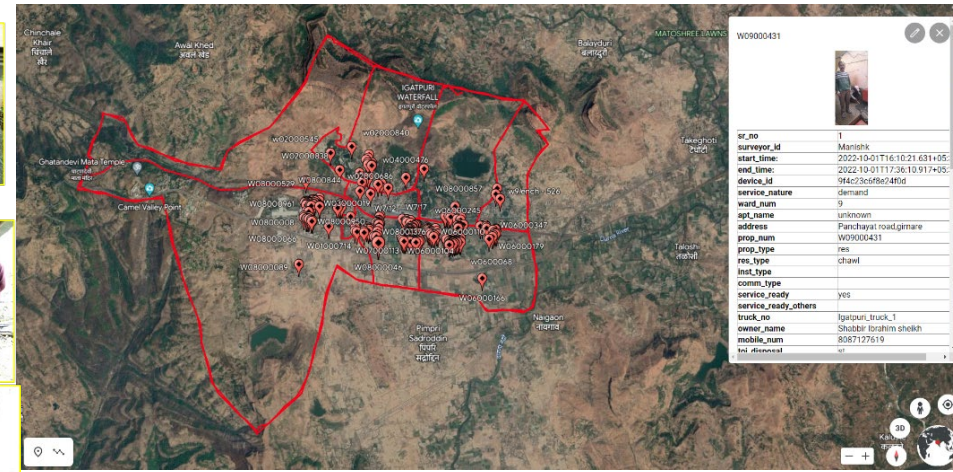
Example of downloaded results from Wai/Sinnar

Example of Igatpuri Scheduled Desludging Operations

- ✓ Size and shape of septic tanks
- ✓ Last desludging date
- ✓ Property owner details
- ✓ GPS location
- ✓ Road access and type of covering

Training and monitoring by city officials

Support to partners in Varanasi For FSSM survey

One step further -

2

SaniTrack

- Ready to use monitoring app specific to desludging

- Separate modules for truck operator, scheduler, city officials

- Simple click and select questions. Minimizing manual effort

- Lessons from piloting in Sinnar, Wai, Kolhapur, Satara

- Support all models of data availability - Pre-upload property list / register and desludge en-route / call center model

- Real time results on dashboards – indicators and maps,

- Printable receipt reports

Components and modules

Mobile app:
Scheduling
Assign daily schedule in mobile app

Mobile app:
Desludging operations for properties
• Collect signatures as proof of successful desludging and conveyance to FSTP
• Collect data about operations

Mobile app:
Desludging operations for CT/PT

Web:
City admin
• Assign user roles, login ids
• Manage database

Web:
Dashboards and reports
• Real-time numbers
• Spatial and time data
• Auto generated reports
• Downloadable excel data

How does it work?

1 System set up – one time
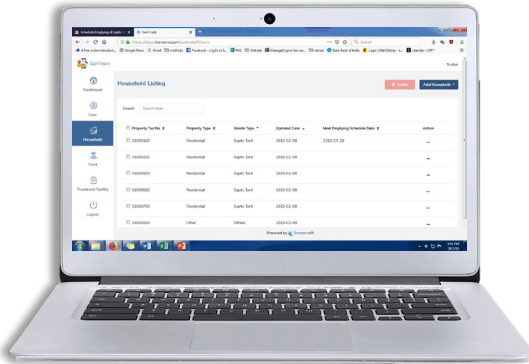
2 Supervisor creates daily schedule in app - periodically
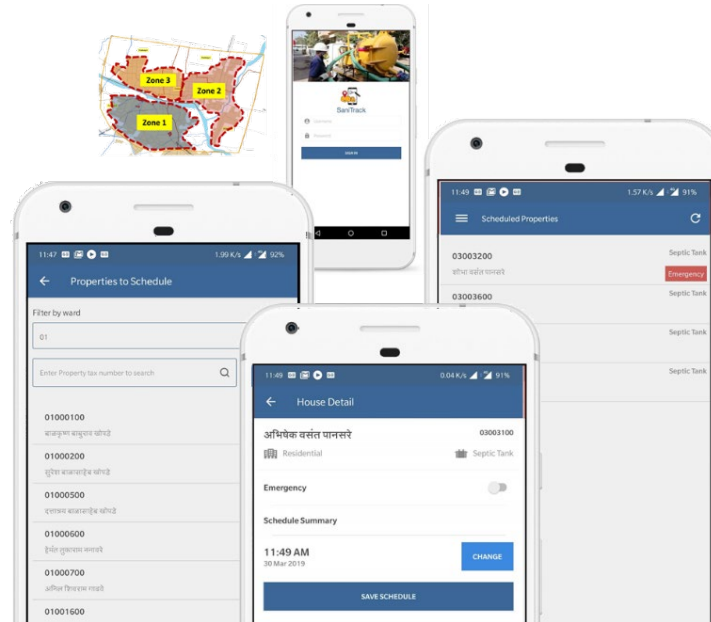
3 Desludger records operations and signatures on app - daily
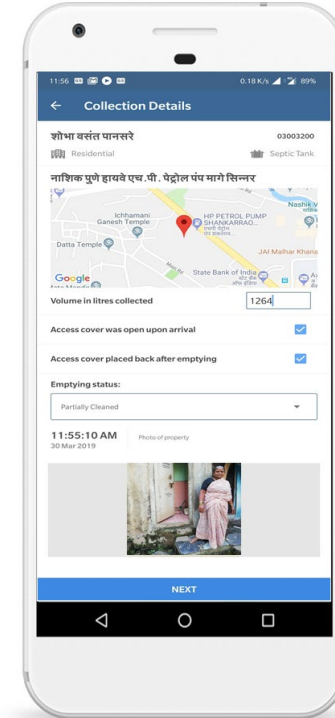
Validation checks at various points!

Truck operator knows the daily schedule	Owners are ready with access covers open	Signature proofs and photo for safe collection
Tanks are fully emptied – multiple trips if needed	Correct protective equipment is used	Truck capacity is not exceeded by load
Access covers placed back	Correct GPS location for unload	Signature proofs for safe disposal
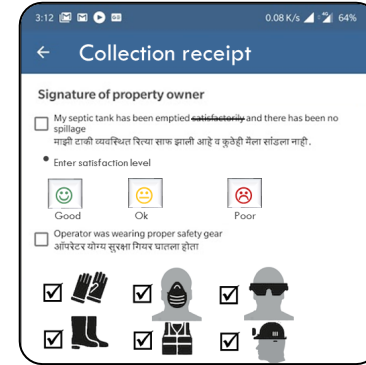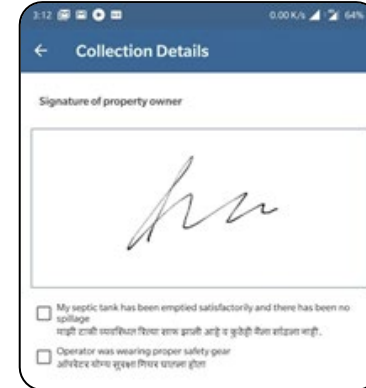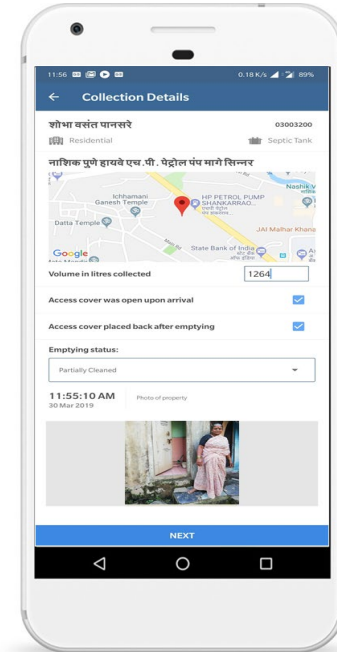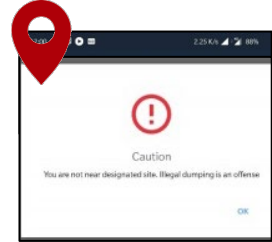
Dashboard, database and reports

A **two-pronged approach** taken up by Government of Maharashtra for the coverage of statewide faecal sludge and septage management efforts

Legend
- ⬤ STP Cities
- ⬤ Co-treatment Cities
- ▪ Operational FSTP
- ▪ Proposed FSTP
- ▲ No Treatment facility
- ▫ District_Boundary_Maharashtra
- ▫ Maharashtra boundary

Proposed Co-treatment at own/near by STPs		Proposed Independent FSTPs
Category A cities: ULBs with STPs	Category B cities: Co-treatment at near by STPs	Category C cities: Independent FSTPs
Functional/ proposed/under construction STPs **38** ULBs	Co-treat at nearby STPs **56** ULBs	Independent FSTPs **311** ULBs
94 ULBs		**311** ULBs

36 ML
Faecal Sludge co-treated at STPs

Status of Faecal Sludge treatment plants across Maharashtra, India

311	**211**	**22**	**70**	**250** ML
Proposed	Operational	Under Construction	Bidding & Land Issue	Faecal Sludge treated at FSTPs

A single- window approval system to curtail the conventional complex and lengthy sanction processes

Scaling up across Maharashtra - MahaSaniTrack

- Multi-city model

- State and city dashboards

- City admin can build city profile, set user roles and begin operations

- Improve and integrate with familiar systems – welcome emails, OTPs, pop up explanations

- Can integrate – demand desludging, scheduled desludging, co-treatment
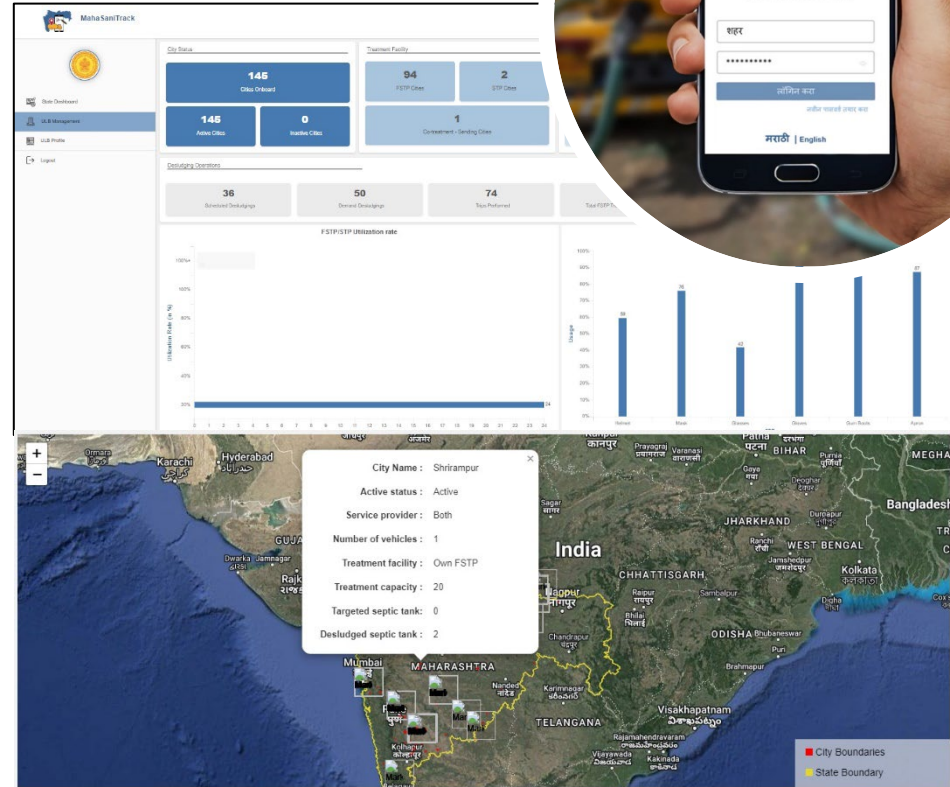
Training support for scaling up

MahaSaniTrack
System for monitoring septic tank desludging
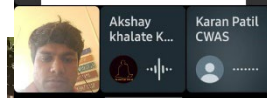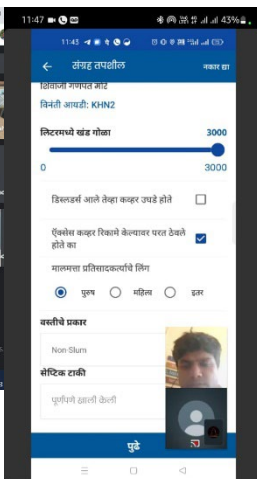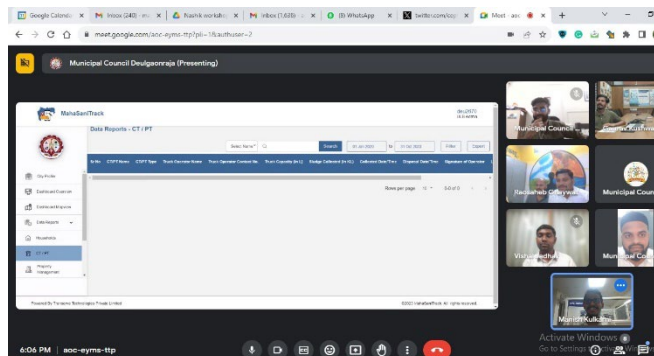
MahaSaniTrack is a mobile application for tracking septic tank desludging operations. It assists ULBs to monitor safe disposal of faecal sludge from septic tanks to treatment plants, which is key to achieve the ICT goal under SBM 2.0, Swachh Sarvekshan and Safai Mitra Surakshit Sheher. Chief officers / sanitation engineers / supervisors are provided with web dashboards which show real-time information on city coverage, household readiness, safe disposal, use of personal protective equipment etc.

Step by step onboarding of cities

Step 1	Each city will assign a nodal officer for handling the portal as a city admin for MahaSaniTrack. For this, ULB should submit an official email id and phone number of this admin user.
Step 2	Each city admin will receive an onboarding email from state admin containing login details. Using the OTP, city admin can set new password and activate the city's MahaSaniTrack portal.
Step 3	Within two days of receiving onboarding email, city should login and start creating its profile using information from the checklist below.
Step 4	The state admin will contact each city to assess their onboarding progress and provide training on use of the app and dashboards for daily monitoring.

Readiness checklist for cities

Before onboarding
- Assign nodal officer as city admin for MahaSaniTrack
- Share official email id and phone number of this admin user with mission office team

Details required for creating city profile
- Logo of ULB (png or jpg)
- Demographic details - population, households, slum households, number of septic tanks etc.
- KML file of municipal boundary (kml or kmz)

Define user roles and responsibilities
- City admin – Who will create the city profile and do initial set-up? (HOD / Sanitation Inspector / city engineer)
- Scheduler – Who will make daily schedule in app/web ? (Sanitation Inspector / supervisor / private desludger)
- Desludger – Who will operate the app for recording daily operations? (truck operator / supervisor)

130+ cities trained

104 cities onboarded
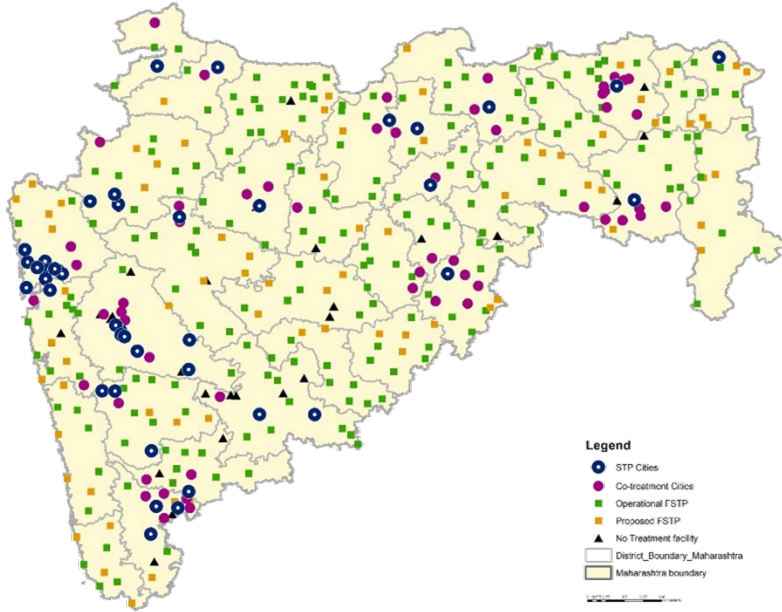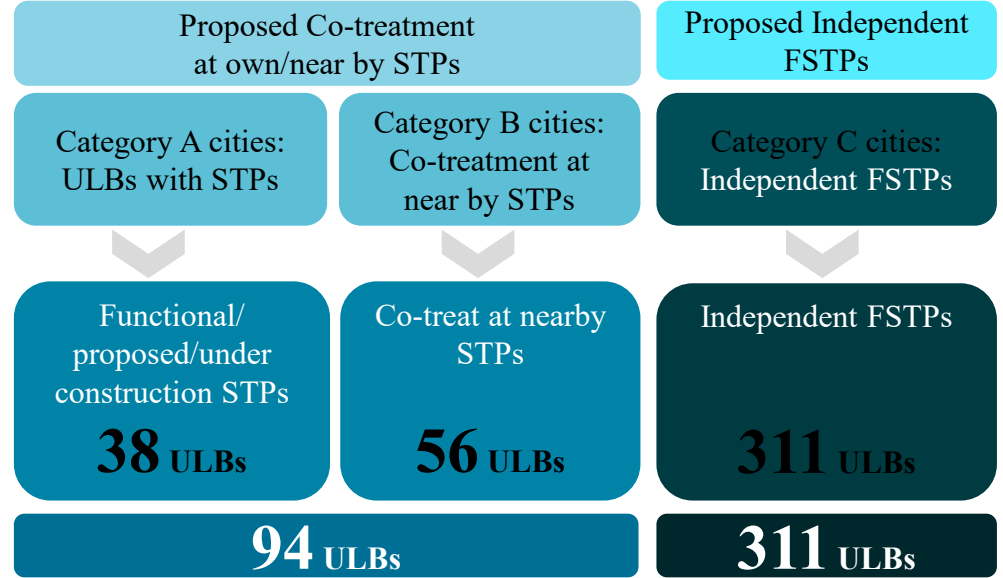
20

A two-pronged approach taken up by Government of Maharashtra for the coverage of statewide faecal sludge and septage management efforts

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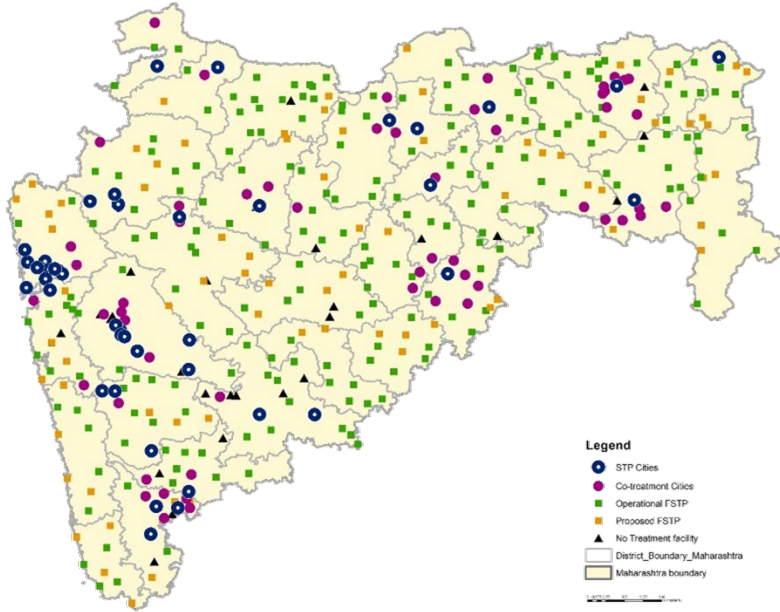
A single- window approval system to curtail the conventional complex and lengthy sanction processes

3 SaniChatbot System for FSTP Monitoring

- Automated Whatsapp based application designed to interact with FSTP operators

- Daily timed reporting initiation at large scale with no manual effort - Predefined Questions floated daily through WhatsApp chat at end of day's operation

- Response based looking and branching of questionnaire

- Respond anytime. Reminders to non-responders.

- Collection of responses on server system and building database to understand statewide FSTP efficiency and desludging operations

- Capture details of - Septic tanks emptied, Septage received at FSTP, Reasons for not receiving septage at FSTP
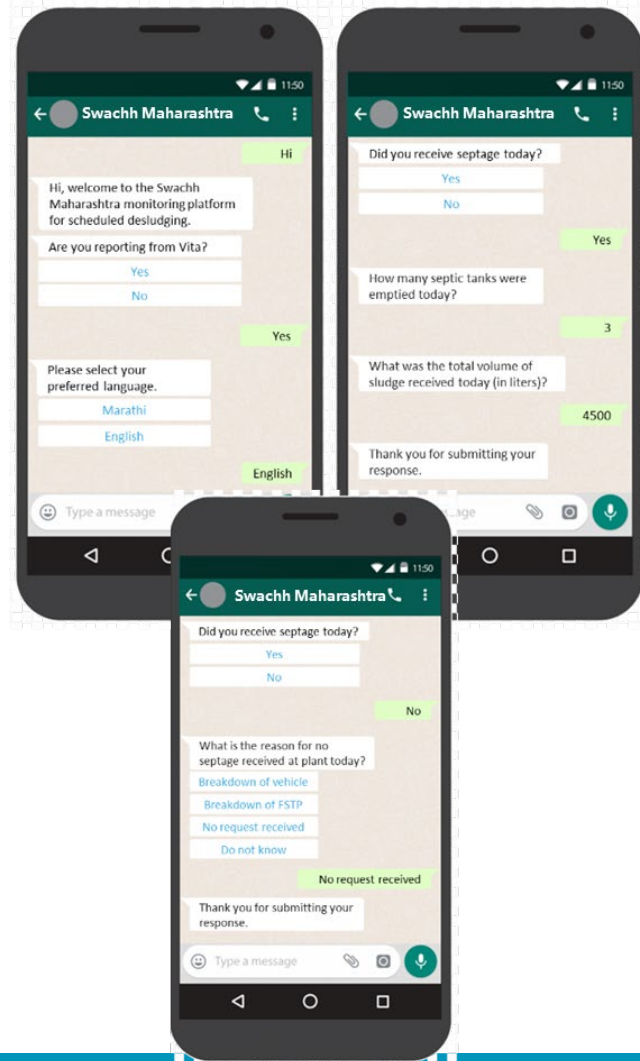
FSTP Monitoring Dashboard

Select Division **Division** ▾   Select District **District** ▾   Select Class **Class** ▾   Select City **City** ▾   Select Date Range **4 Sept 2023 - 10 Sept 202** ▾

Cities status map view

No. of septic tanks emptied
0.0 ———————— 40.0

Utilization Rate
0% • ● 153%

Volume of sludge received at the treatment facilities

— Volume of sludge received (in liters)

Cities data reporting status

Total Cities Onboard	Cities reported data	Cities not reported
30	26	4

Details of septage received cities

Cities Received Septage	No. of septic tanks emptied	Volume of sludge received (in L)
22	149	383.9K

Overall Avg. Utilization rate of treatment facilities   **30.98%**

31.0%

100.0%

Amravati 4.4%	Aurangabad 14.6%	Konkan 72.9%	Nagpur 19.7%	Nashik 16.4%	Pune 47.4%
100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Details of septage not received cities

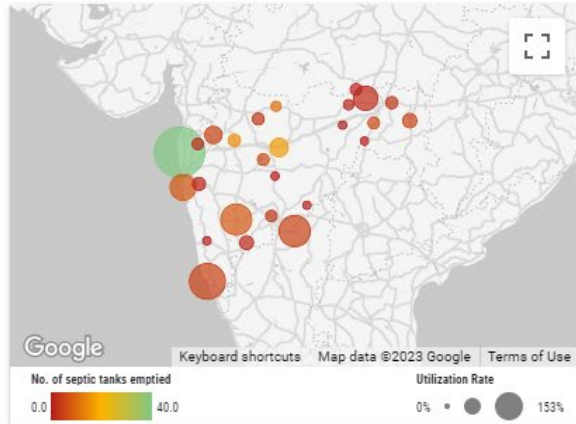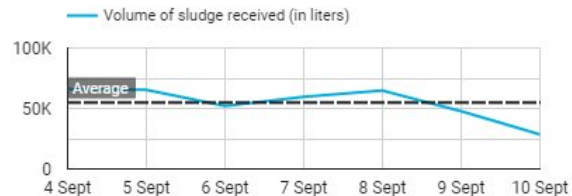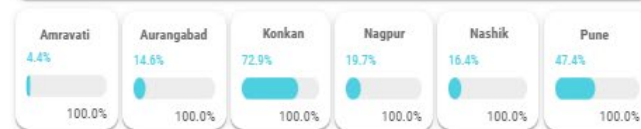| Cities not received septage |
|---|
| 4 |

60

● NRR .... (No request received)
● OR .... (FSTP Breakdown)
● V-BRD .... (Other Reason)
.... (Vehicle Breakdown)
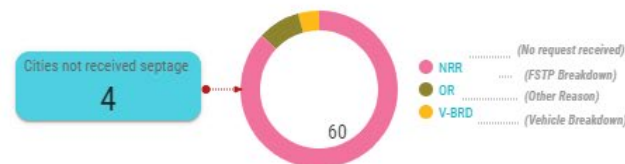
Cities faecal sludge management report

	City	Utilization Rate ▾	FSTP capacity	Sludge volume received in KL	No. of septic tanks emptied
1.	Palghar	153.33%	15	161	40
2.	Vengurla	100%	3	15	5
3.	Dudhani	83.33%	3	17.5	5
4.	Dahiwadi	82.38%	3	17.3	8
5.	Alibag	64%	5	12.8	8
6.	Katol	58%	10	5.8	2
7.	Jalna	36.43%	20	51	17
8.	Dindori	32.86%	5	11.5	5
9.	Desaiganj	21.43%	10	15	5
10.	Kavthe Mahakal	20%	5	6	2
11.	Khandala	17.33%	3	2.6	1
12.	Yevala	14.29%	15	15	15
13.	Mouda	14%	20	5.6	3
14.	Bhadgaon	12.86%	10	9	3
15.	Paithan	12.33%	10	3.7	6
16.	Hinganghat	12%	20	12	6
17.	Shendurjana	12%	5	3	1

4 Community platform to track satisfaction of WASH services, and provide plan inputs

Civil society

Youth Groups

Women Self Help Groups

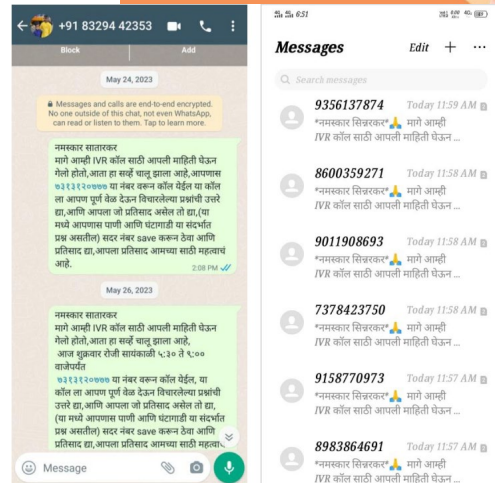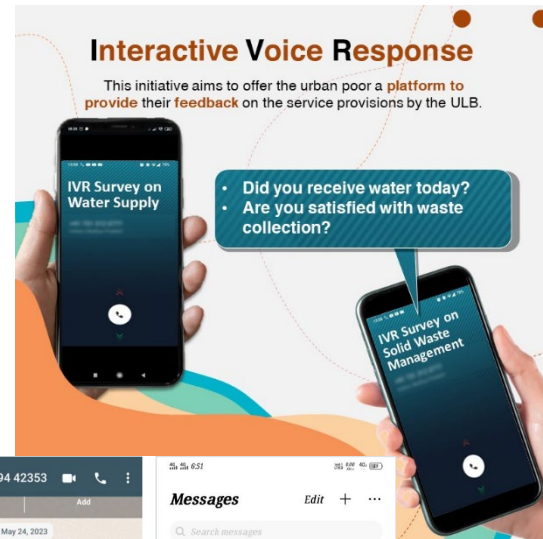Bring in citizen voices especially for the vulnerable population in slums.

Platform to enable citizen reporting on service indicators like coverage and quality – a *feedback platform*?

Feedback mechanism for local government: Performance improvement plan at local level to reduce disparities in service levels

- ULBs monitor municipal service delivery but knowledge regarding services in slum areas is limited.

- Reliability of services in slums requires greater attention and monitoring – need feedback of community

- IVR – interactive voice response – phone call based feedback questionnaires to overcome tech barriers with slum dwellers

- Pre-selected list of respondents for piloting in Sinnar and Satara

Questionnaire deployed on IVR

- Select preferred language

- Water received?

- Satisfied with quality and quantity of water?

- Water received for how duration

- Waste collection vehicle come?

- Satisfied with timing of waste collection?

- Waste collection vehicle stopped long enough?

- Where did you dispose your waste?

Admin and call scheduler

Downloadable results

Key Benefits - Digital Monitoring Systems for Sanitation Service delivery

Integrated monitoring system – Across FSSM service chain

"Real time" monitoring No need to process data

Easy to Operate, Reduce paper work, Minimize human error
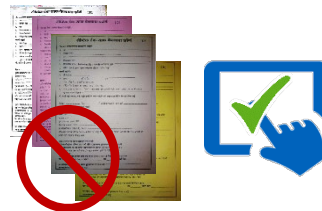
Can view progress easily and process payments

Citizen Feedback

Photo stamping, Geo stamping, Signatures

Unique database

Supports vernacular language

Thank you

cwas@cept.ac.in

aditi.dwivedi@cept.ac.in

cwas.org.in
pas.org.in

cwas@cept.ac.in
tiny.cc/pasenews

CEPT_CWAS

cwas.cept

cwas.cept

cwas.cept

What data are we collecting?

Property and owners
1. Property Tax number
2. Ward Number
3. Owner name and phone number
4. Address
5. GPS location
6. Type of property
7. Is it a shared system?
8. Prop. no of sharers
9. Readiness of owners to receive service
10. Ownership of Property – Owner or Tenant?

Onsite Sanitation System characteristics
1. Type of Disposal System
2. Is it a shared system?
3. Size & location of disposal system
4. Shape of disposal system
5. Accessibility from road
6. Type of access cover

27 data points for properties

7 data points for CT/PT

Service Delivery / Desludger Performance
1. Volume desludged in lts.
2. No. of Trips
3. Use of PPE
4. When was the last time the septic tanks was emptied
5. Problems faced during emptying?
6. Was there any septage spill?

CWIS Principles
1. Vulnerable Areas Covered – BPL Card Holder, width of road on which property is located, caste
2. Gender Aspect – gender of the person responding to the form and gender of the person supervising the emptying service

CT/PT emptying
1. Type of toilet – CT/PT/IHHL
2. Details of Property (if IHHL) or toilet (If CT or PT)
3. Problems faced during emptying
4. Volume desludged in litres.
5. Total no. of trips
6. Use of PPE
7. GPS location

Surveyor app + Monitoring Dashboard

SaniTab > Main Menu

SaniTab 1.0.2
Data collection made easier...

- Fill Blank Form
- Edit Saved Form (1)
- Send Finalized Form
- Get Blank Form
- Delete Saved Form

SaniTab > Fill Blank Form

Finished scanning. All forms loaded.

Monitoring Desludging in Sinnar
Version: 20190521
Added on Tue, Dec 03, 2019 at 13:05

Monitoring Desludging in Wai
Version: 20190531
Added on Fri, Nov 29, 2019 at 11:18

Monitoring Emptying Services by ULB in Sinnar
Version: 20190723
Added on Tue, Dec 03, 2019 at 13:05

Monitoring Emptying Services by ULB in Wai
Version: 20190723
Added on Tue, Dec 03, 2019 at 13:05

SaniTab > S...

GPS Location ID
GPS coordinates can only be collected when outside.

- Start GeoPoint

Photographs
- Take Picture
- Choose Image

-

☑ Mark form as finalized

- Save Form and Exit

SaniTab > Monitoring Desludging Sa...

1. Form id (should be same as the one used in emptying form)
2. Zone no. (as per schedule emptying plan)
3. Ward Number
4. What is the name of the locality?
5. Property number as per Council property tax records:
6. Status of property during the visit
   Open
7. Nature of service
8. Is owner ready to empty the septic tank/pit today?
10. Type of Property
14. Name of Apartment/Building/ Property
15. Name of the respondent/ building secretary
16. Contact no. of respondent/ building

| Go Up | Go To Start | Go To End |

Monitoring Scheduled Desludging in Wai

Logged in User: CEPT   Logout

CONSOLIDATED PROGRESS REPORT

3617	2383	2141	242
Septic Tanks Remaining To Be Desludged	Desludged	Scheduled	Emergency

2541	199	4855	7246 KL
Service Visits	Properties Refused	Properties Covered	Volume Desludged

MONTHLY PROGRESS REPORT   ● Daily ◉ Monthly

Time Frame 2021-09

1550	12	11	1
Target Septic Tanks	Desludged	Scheduled	Emergency

10	0	10	11 KLD
Service Visits	Properties Refused	Properties Covered	Volume Desludged

SPATIAL VIEW   ◉ Cumulative

Property Details   +

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