

Digital Monitoring Systems for FSSM

September 30, 2021

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CWAS CENTER FOR WATER AND SANITATION

CRDF CEPT RESEARCH AND DEVELOPMENT FOUNDATION

CEPT UNIVERSITY



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Support to Government of Maharashtra for FSSM

Scaling up FSSM and urban sanitation under Swachh Maharashtra Mission



Policy, guidelines and strategic support for implementation



FSSM strategy and scale up plan for safe sanitation



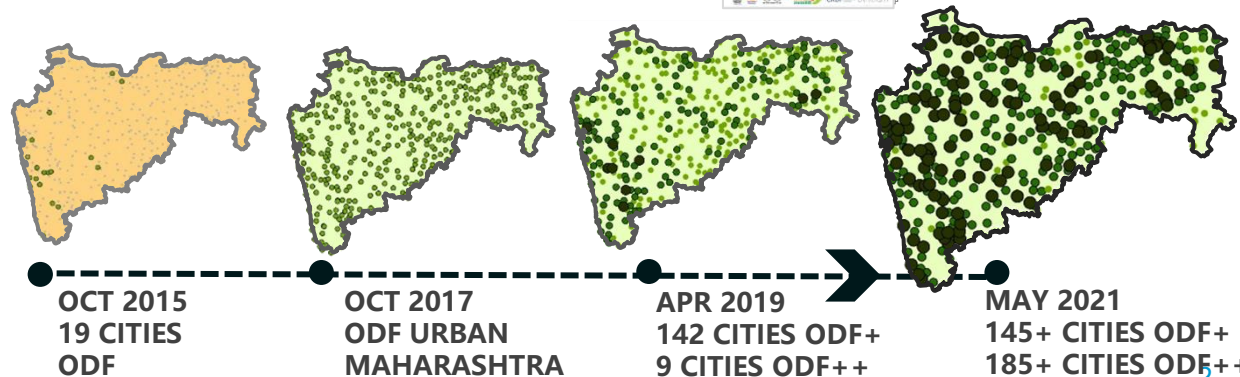
Technical support in day to day operations



Strengthening local government capacity for ODF, ODF+ and ODF++



State become ODF on 1st Oct 2017 and now aspires to become ODF+/++ with 311 FSTPs under implementation



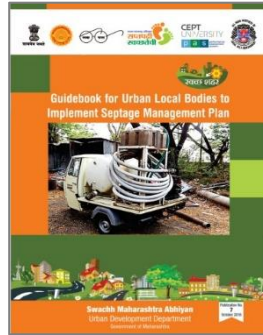
Maharashtra has taken up FSSM in a big way . . .

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+



Government Resolutions

ODF, ODF+ and ODF++ framework

Utilizing Incentive grants and 14th FC funds for sanitation/ ODF+/++ activities

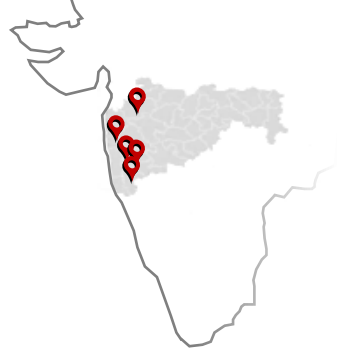
70+ cities Co-treating of FS at own or nearby STP

311 independent FSTPs Construction

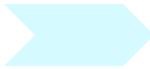


Support to cities for sanitation improvement

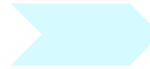
Wai, Sinnar, Kolhapur, Satara, Khopoli



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



Involving Private sector for emptying operations



Levying a Sanitation tax to support operations



Faecal Sludge and Septage treatment facility (FSTP)



Use of Own (DBO) / Philanthropy funds for FSTPs



Reuse of treated wastewater



Online monitoring systems for emptying and treatment



Municipal council commitment and leadership



Gender inclusivity in sanitation



Involvement of SHGs



San Workers training

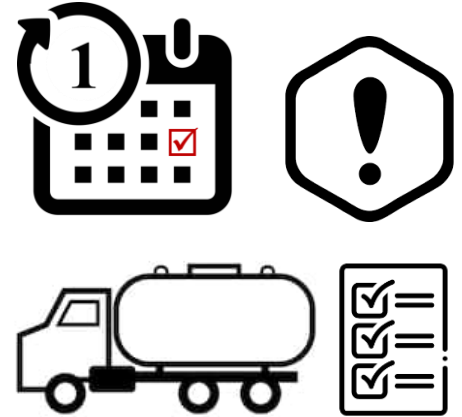


Equitable Services for Slums and Vulnerable areas



Scheduled desludging service

- Current practice of septic tank owners is to call desludging operators only when tanks overflow
- Under a scheduled desludging service...
 - all septic tanks** in the city are visited...
 - once** during a **fixed cycle** according to a **predetermined schedule**...
 - by one or more **service providers**...
 - who collect and transport fecal waste safely to a **designated site for treatment and reuse**
 - paid through **annuity payment** linked with tax collection systems



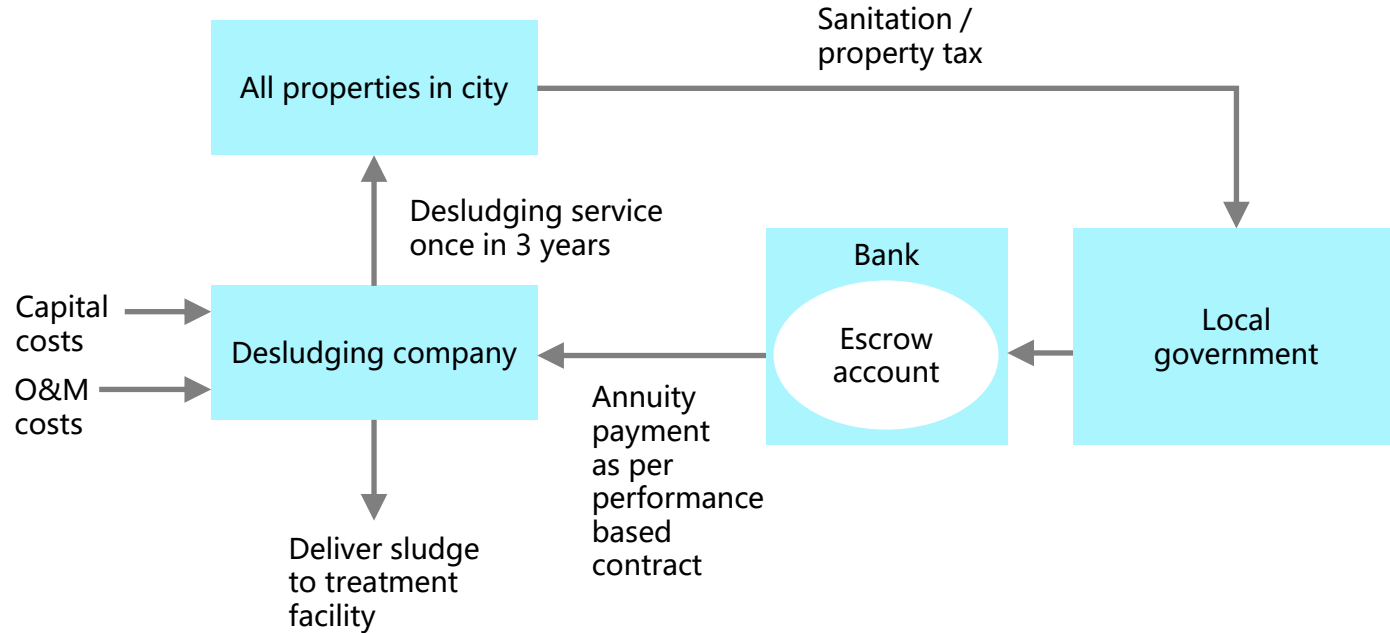
PLAM - Performance linked annuity model for scheduled desludging



Involving Private sector for emptying operations



Performance linked payments



Need monitoring systems!

Monitoring needs for FSSM



1 Ensure desludging at regular intervals.

2 Safe withdrawal of sludge by following necessary protocol

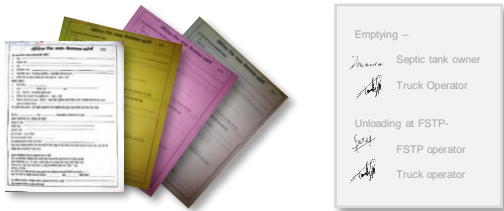
3 Safe conveyance to designated treatment site

4 Indicators for making decisions on “performance linked payments”

5 Collect data on onsite systems

Why use digital monitoring tools?

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

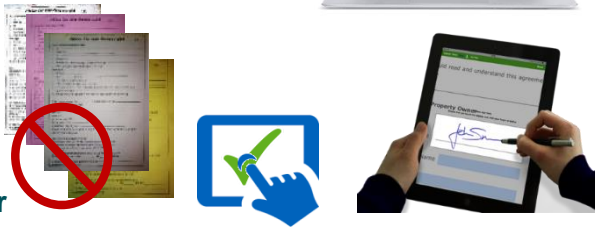


- Successful desludging = signature of the customer on a paper form at collection as well as signature of FSTP operator at unloading.
- Submission of required number of such forms is mandatory for municipality to approve monthly payment
- Four copies for the forms are made, one each for customer, FSTP, private desludger and municipality
- 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 a 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

“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

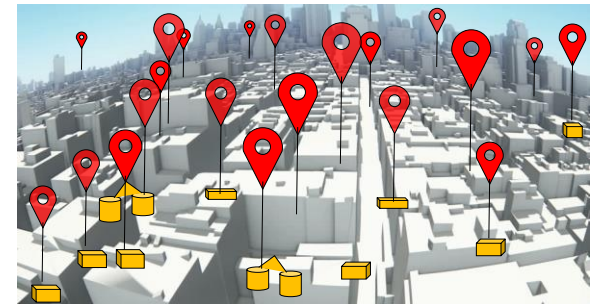


SaniTab - Mobile App for Sanitation Survey



Key Features of SaniTab application: -

- Citywide digital data collection
- Custom survey forms
- Also capture location and photos
- Supports local languages



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

✓ Citywide survey on :

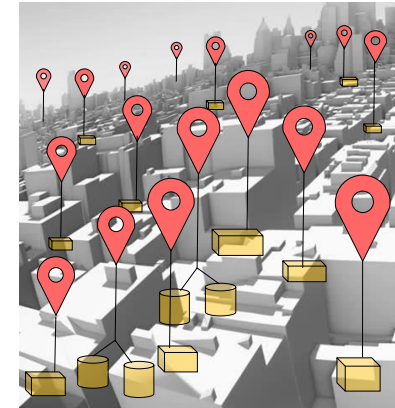
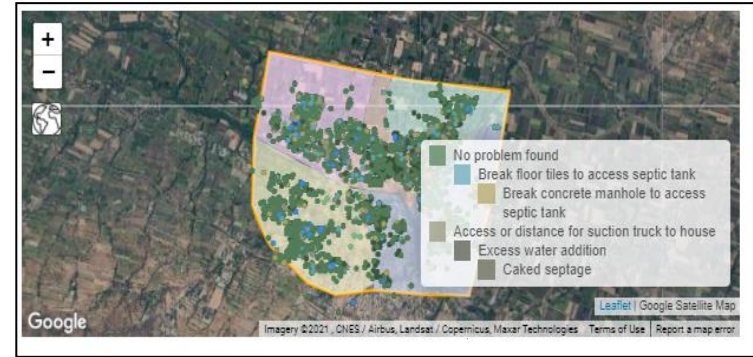
- Toilet availability
- Type of disposal system
- Size and shape of septic tank
- Location of septic tanks
- Accessibility of septic tanks
- Last time septic tank was emptied

✓ Online dashboard for analysis of data

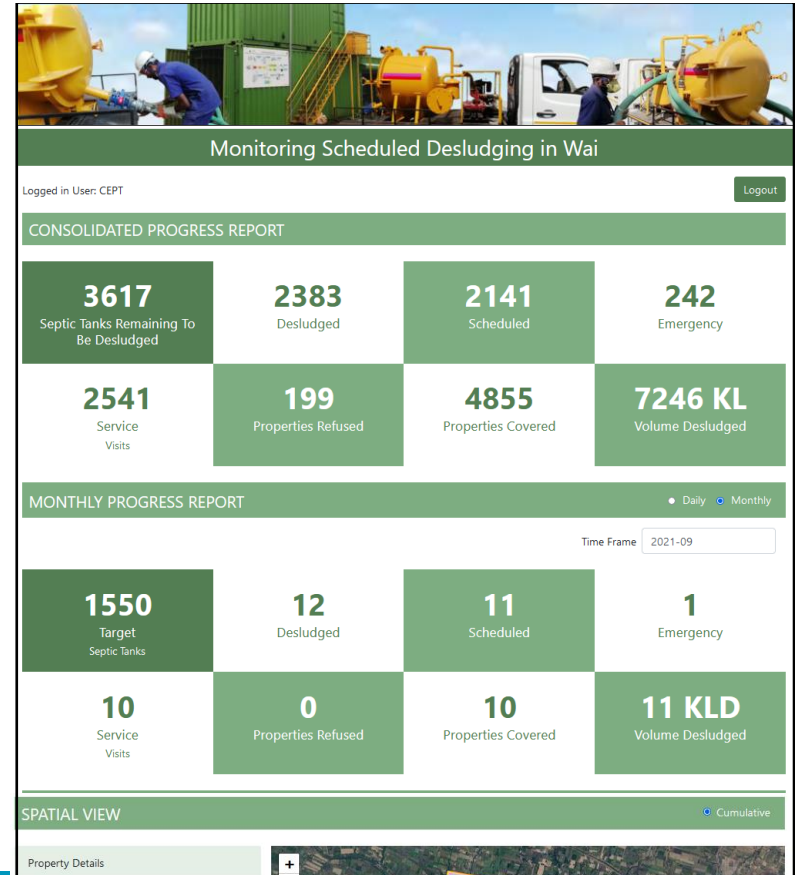
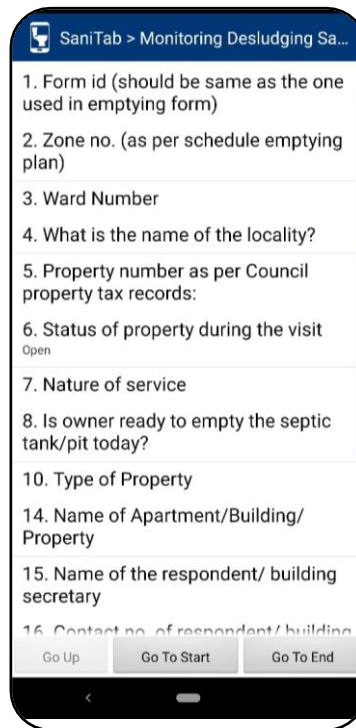
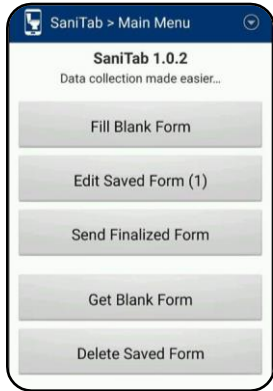


Currently – Form for monitoring desludging services + developing a database of onsite systems

- Customizable app - not only as a data collection tool but also as a **monitoring system**
- **Desludging monitoring form** created for monitoring the performance of the desludging services being provided by the private sector service provider and the ULB truck
- **Dashboard** developed for easy monitoring of the desludging operations.
- Creating a **unique database of onsite systems** – Added questions about septic tanks
- If all tanks are to be visited in 3 years – use this opportunity to create a database!



Surveyor app + Monitoring Dashboard



Downloadable MIS results

Submissions Form Management Site Admin Log Out

Filter Submissions Exported Submissions

Form Scheduled Emptying Filter: none Visualize Export Publish

Save Save As Delete

Submissions per page 100

Filters Applied Add Filter Display Metadata

Form	Scheduled Emptying	Filter	none	Visualize	Export	Publish
Save	Save As	Delete				
Submissions per page	100					
Filters Applied	Add Filter	Display Metadata				

Surveyor Id	start_time	end_time	Actual Date of Em	device_id	Form Id	Actual form	Zone No.	Ward No.	Locality Name	Property No.	Property No.	Status of property at	Natur of services o
1	31-05-2019	31-05-2019	31-May-19	8.69184E+14	18	118	3	3	वाघपावडी चौकी जवळ विवाही नगर	87.88	283	Open	Scheduled Empt
2	31-05-2019	31-05-2019	31-May-19	8.69184E+14	119	119	3	3	वाघपावडी चौकी जवळ विवाही नगर	87.88	336	Open	Scheduled Empt
3	31-05-2019	31-05-2019	31-May-19	8.69184E+14	20	120	3	3	वाघपावडी चौकी जवळ विवाही नगर	87.88	336	Open	Scheduled Empt
4	31-05-2019	31-05-2019	31-May-19	8.69184E+14	121	121	3	3	वाघपावडी चौकी जवळ विवाही नगर	87.88	340	Open	Scheduled Empt
5	31-05-2019	31-05-2019	31-May-19	8.69184E+14	122	122	3	3	वाघपावडी चौकी जवळ विवाही नगर	87.88	350	Open	Scheduled Empt
6	01-06-2019	01-06-2019	1-Jun-19	8.69184E+14	123	123	3	3	शिवाजी नगर	87.88	349	Open	Scheduled Empt
7	01-06-2019	01-06-2019	1-Jun-19	8.69184E+14	124	124	3	3	शिवाजी नगर	87.88	353	Open	Scheduled Empt
8	01-06-2019	01-06-2019	1-Jun-19	8.69184E+14	125	125	3	3	शिवाजी नगर	87.88	356	Open	Scheduled Empt
9	01-06-2019	01-06-2019	1-Jun-19	8.69184E+14	126	126	3	3	शिवाजी नगर	87.88	355	Open	Scheduled Empt
10	01-06-2019	01-06-2019	1-Jun-19	8.69184E+14	127	127	7	7	शंकरेशी नगर	87.88	767	Open	Emergency yes
11	01-06-2019	01-06-2019	3-Jun-19	8.69184E+14	128	128	3	3	शंकरेशी नगर	87.88	798	Open	Emergency yes
12	01-06-2019	01-06-2019	3-Jun-19	8.69184E+14	129	129	4	4	शंकरेशी नगर	87.88	6,98,699	Open	Emergency yes
13	01-06-2019	01-06-2019	4-May-19	8.69184E+14	18	38	5	5	उजवेल नगर m i d c	87.88	5213	Open	Emergency yes
14	01-06-2019	01-06-2019	14-May-19	8.69184E+14	47	68	5	5	उजवेल नगर m i d c	87.88	5221	Open	Emergency yes
15	01-06-2019	01-06-2019	3-Jun-19	8.69184E+14	130	130	5	5	उजवेल नगर	87.88	5348	Open	Emergency yes
16	01-06-2019	01-06-2019	3-Jun-19	8.69184E+14	21	41	6	6	उजवेल नगर	87.88	1867	Open	Emergency yes
17	04-06-2019	04-06-2019	4-May-19	8.69184E+14	30	40	6	6	उजवेल नगर	87.88	1866	Open	Emergency yes
18	04-06-2019	04-06-2019	4-May-19	8.69184E+14	39	49	6	6	उजवेल नगर	87.88	1862	Open	Emergency yes
19	04-06-2019	04-06-2019	29-Dec-19	8.69184E+14	19	466	6	6	उजवेल नगर	87.88	2799	Open	Emergency yes
20	04-06-2019	04-06-2019	4-Jun-19	8.69184E+14	131	131	6	6	उजवेल नगर	87.88	2300-2311	Open	Emergency yes
21	04-06-2019	04-06-2019	4-Jun-19	8.69184E+14	132	132	6	6	उजवेल नगर	87.88	4327	Open	Emergency yes
22	04-06-2019	04-06-2019	3-May-19	8.69184E+14	14	32	6	6	उजवेल नगर	87.88	4200	Open	Emergency yes
23	04-06-2019	04-06-2019	10-May-19	8.69184E+14	38	59	5	5	नाग नागर	87.88	4344	Open	Emergency yes
24	05-06-2019	05-06-2019	27-Mar-19	8.69184E+14	1	1	5	5	नाग नागर	87.88	4327	Open	Emergency yes
25	05-06-2019	05-06-2019	4-May-19	8.69184E+14	16	36	5	5	नाग नागर	87.88	4344	Open	Emergency yes
26	05-06-2019	05-06-2019	20-May-19	8.69184E+14	67	88	5	5	नाग नागर	87.88	4692	Open	Emergency yes
27	05-06-2019	05-06-2019	4-Jun-19	8.69184E+14	121	133	6	6	नाग नागर	87.88	2799	Open	Emergency yes
28	05-06-2019	05-06-2019	20-May-19	8.69184E+14	63	84	2	2	नाग नागर	87.88	50	Open	Emergency yes
29	05-06-2019	05-06-2019	12-May-19	8.69184E+14	61	69	4	4	नाग नागर	87.88	1988	Open	Emergency yes



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?

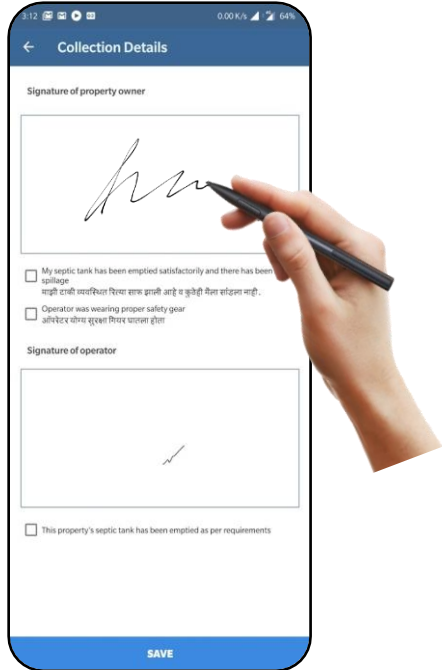
CWIS Principles

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

One step further -



Scheduled Emptying of Septic Tanks
Collection and transport record
Unique desludging ID: 14/02/19/01

Property

Property number: 07-1432-01, 07-1432-02, 07-1433-00, 07-1434-00

Type: Residential - Apartment, Commercial - Shop

Address: कार्यालय, माणिक गंगुली रोड, लिट्टा - 422103

Owner: श्री. विठ्ठल कृष्णरावराव

Phone no: 9873456234

Emplyer

Truck ID: **Subject Truck #1**

Reg. no: 43A/13/12345

Truck cap: 3000 L

	14/02/19/04	14/02/19/05	14/02/19/06	Trip number
Truck Operator signature at emptying				
	13:40	14:30	15:30	

Desludging service

Type: Scheduled

Date: 14/02/2019

Start time: 13:20

Total trips: 3

Volume: 4560 L

Access cover: open on arrival
 replaced after emptying

PPE use:

Customer satisfaction:

	13:40	14:30	15:30	Property owner Signature at emptying
Property owner Signature at emptying				
	13:40	14:30	15:30	

Safe disposal

Disposal site: **Subject FSTP**

Date: 14/02/2019

End time: 15:30

Disposal at correct location:

	13:40	14:30	15:30	Truck Operator signature at disposal
Truck Operator signature at disposal				
	13:40	14:30	15:30	

	13:40	14:30	15:30	FSTP Operator signature at disposal
FSTP Operator signature at disposal				
	13:40	14:30	15:30	

SaniTrack - end to end monitoring for FSSM

End to end monitoring for desludging operations from service at property end to safe unloading at FSTP

Web and mobile modules catering to every stakeholder – truck operators, ULB Officials, administrators etc

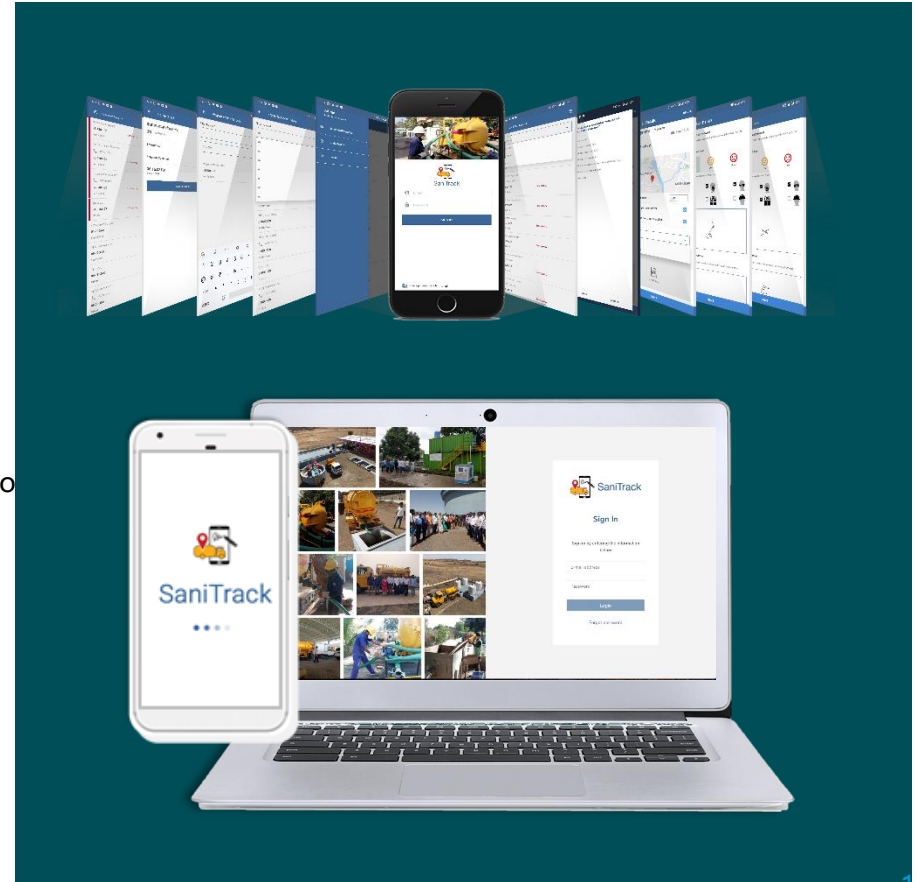
Can handle both scheduled emptying as well as demand based operations

Integrate validation checks. Simpler choice based questions, location checking, volume and truck capacity

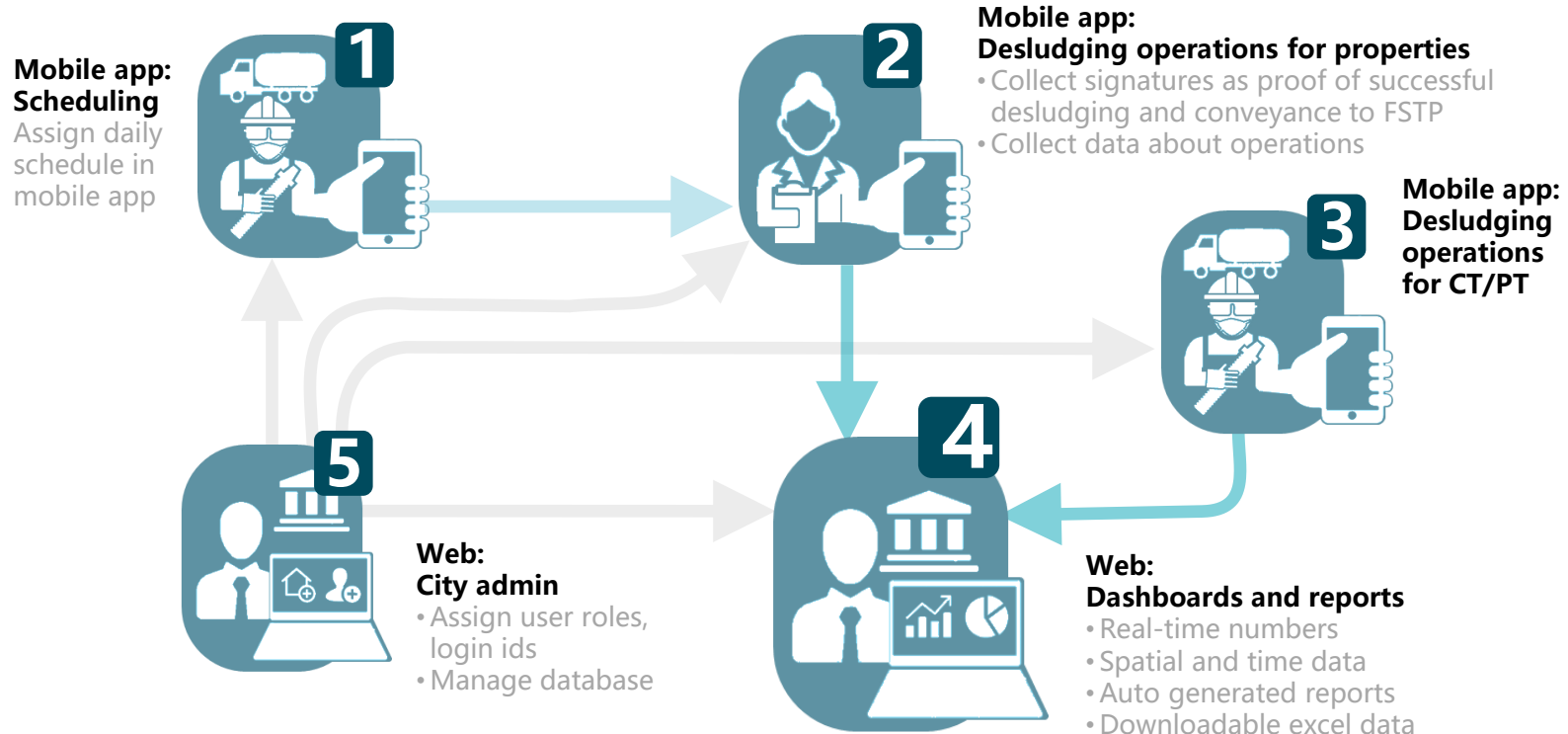
On-screen signatures like modern delivery apps (eg: Amazon). Can also generate individual reports automatically like paper form reporting system.

Real time results on dashboards. Key performance indicators displayed. Basic analysis possible.

Performance linked payments – Payment to private operator can be linked to results from this system



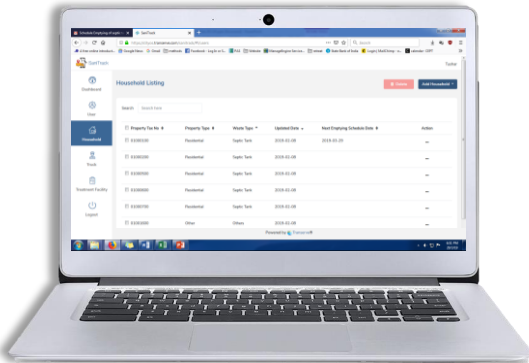
Components and modules



How does it work?

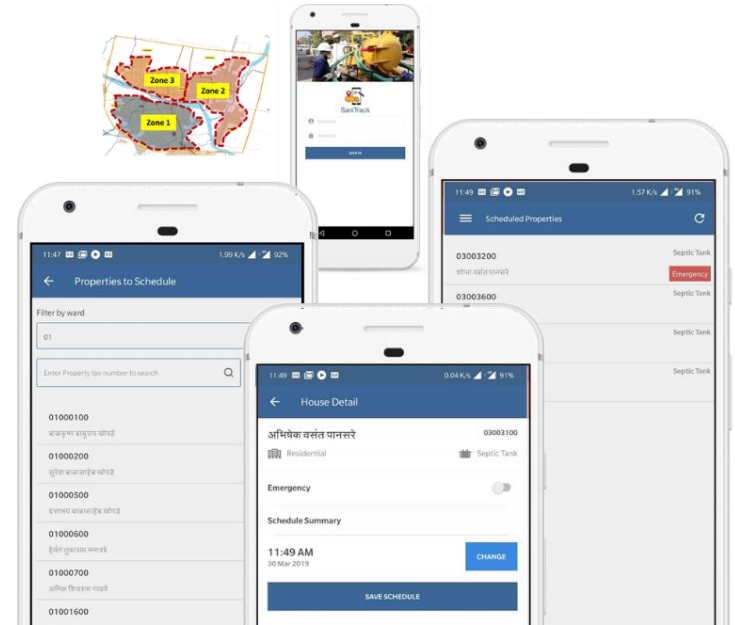
1 System set up – one time

- ✓ User profiles created – admin, scheduler, delsdudger
- ✓ Uploaded a list of properties
- ✓ Registered trucks and set location of treatment facility



2 Supervisor creates daily schedule in app - periodically

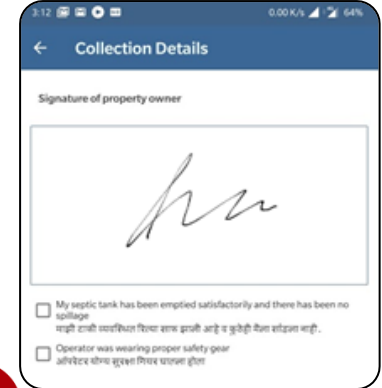
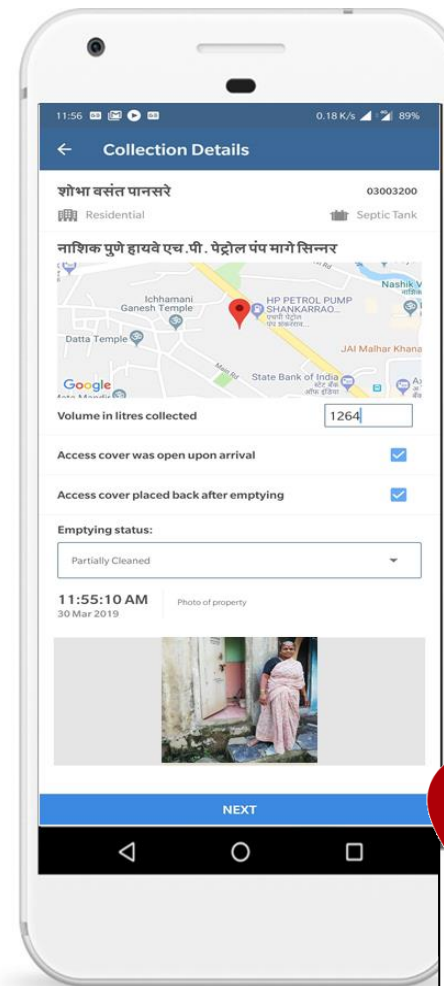
- ↓ Supervisor login for scheduling module
- ↓ Select and schedule properties to be serviced today from available list
- ↓ "Today's Schedule" goes to truck operator



How does it work?

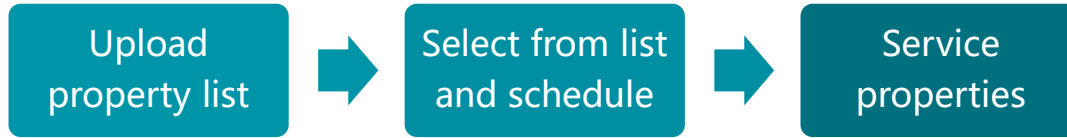
3 Desludger records operations and signatures on app - daily

- ↓ Truck operator login for desludging module
- ↓ Select scheduled/emergency properties visible in "Today's Schedule" ←
- ↓ Location and address of property appears on screen
- ↓ Fill simple form with basic questions
- ↓ Take signature and feedback of household after emptying
- ↓ Unload at FSTP and take signature of FSTP operator



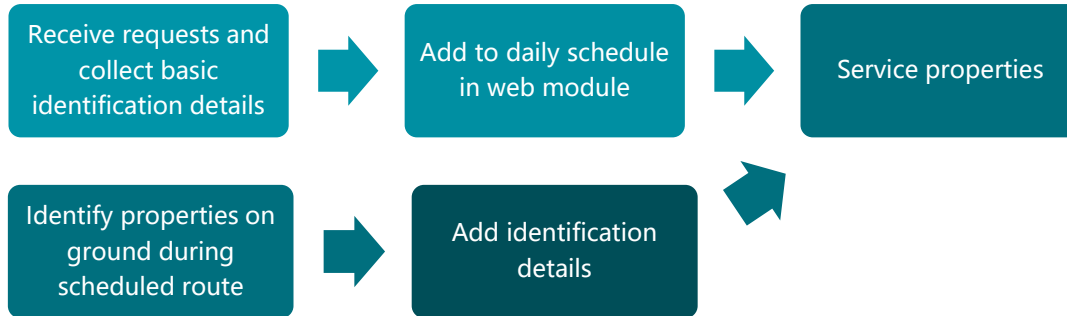
Next iteration – delinking from property list

Wai and Sinnar



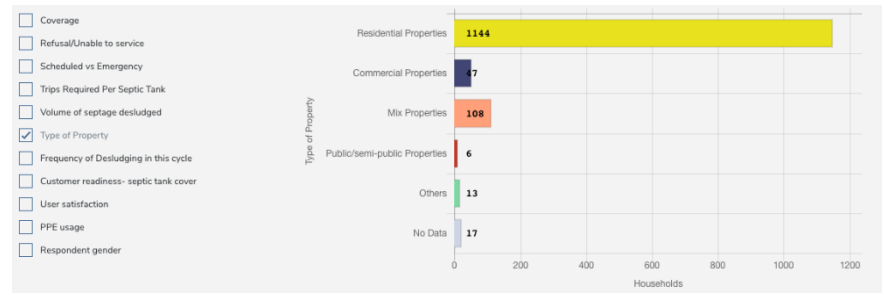
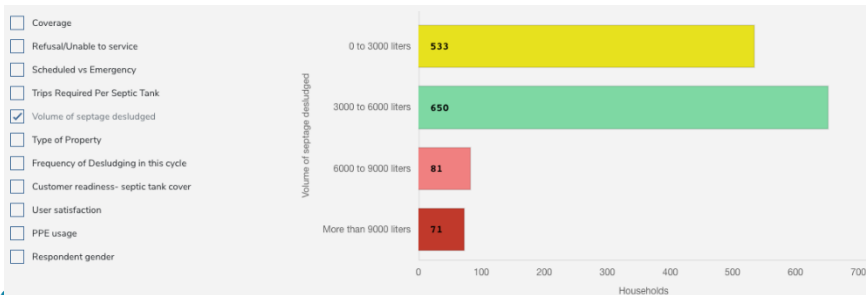
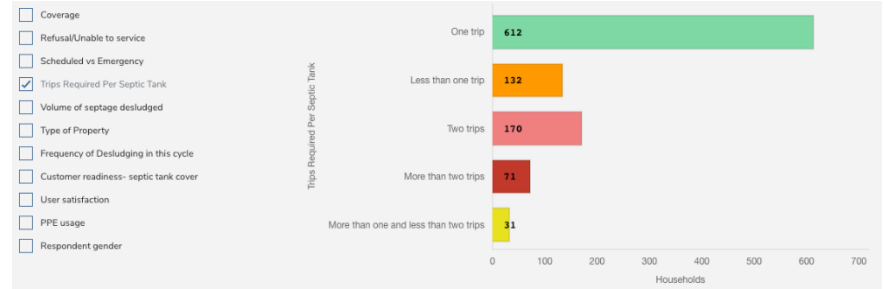
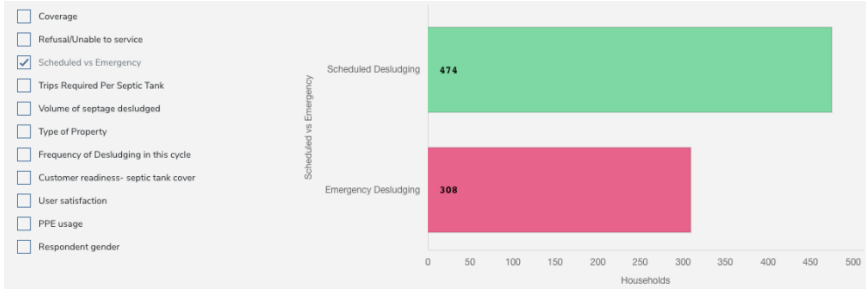
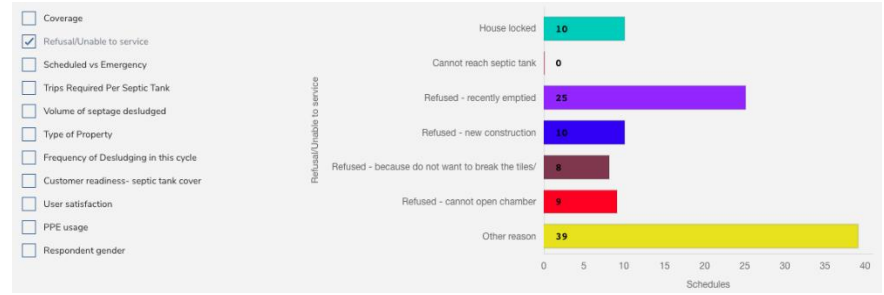
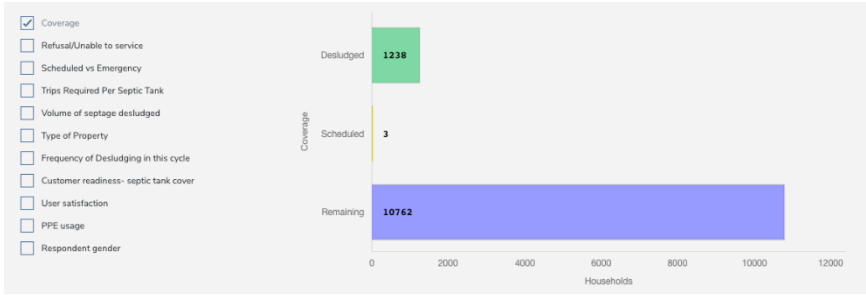
- ✓ Property list readily available
- ✓ Unique property numbers
- ✓ Properties with locations
- ✓ Measure coverage in real time

Kolhapur, Satara

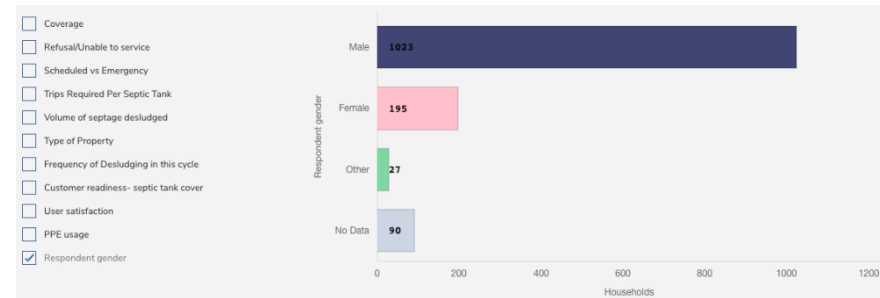
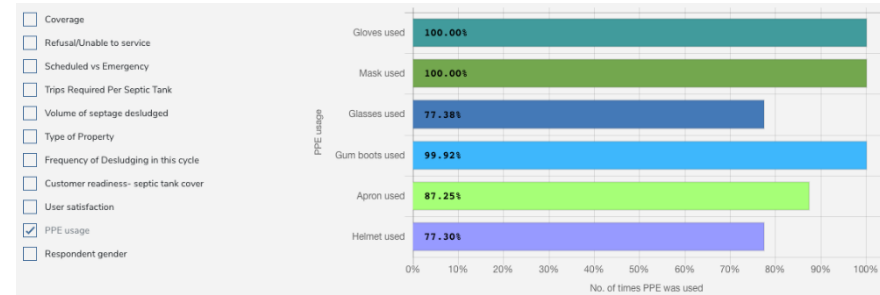
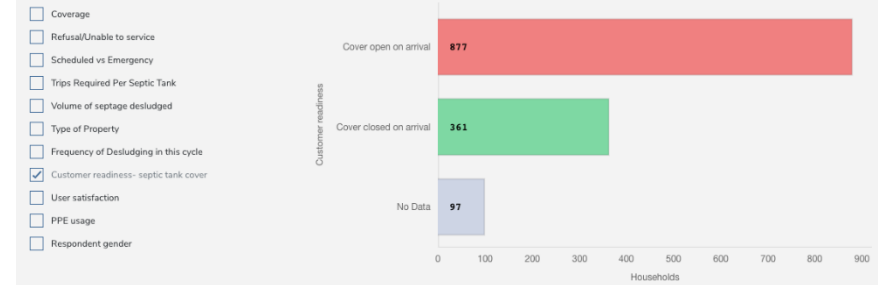
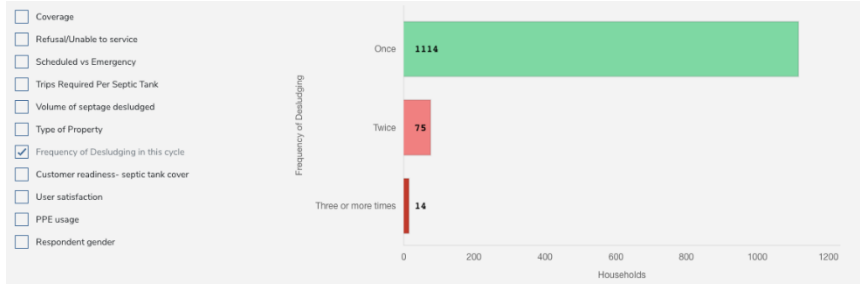


- ✓ No need for pre-uploaded property list
- ✓ Schedule and service while on pre-defined route

Web module – Dashboard



Web module – Dashboard



What data are we collecting?

29 data points
for properties

15 data points
for CT/PT



Pre-uploaded database

1. Property Tax number – WARD:NUMBER:PART
2. Owner name and phone number
3. Address
4. GPS location
5. Type of property
6. Type of sanitation system
7. Is it a shared system?
8. Prop. no of sharers



Property desludging data

9. Emergency or Scheduled
10. Unique Desludging ID
11. Service refusal
12. Time stamps and dates
 - Scheduled
 - Desludging started
 - Desludging ended
 - Delivery at FSTP
16. Respondent gender
17. Status of access cover
18. Volume collected
19. PPE usage
20. Trips taken
21. Signatures
 - Property owner at collection
 - Operator at collection
 - Operator at delivery to FSTP
 - FSTP operator at delivery
25. Photo at collection
26. User Satisfaction level
27. Desludged by which truck
28. If near FSTP at delivery
29. Delivered to which Treatment Facility



CT/PT desludging data

1. Name of CT/PT
2. Unique Desludging ID
3. Time stamps and dates
 - Desludging started
 - Desludging ended
 - Delivery at FSTP
6. Volume collected
7. PPE usage
8. Trips taken
9. Signatures
 - Operator at collection
 - Operator at delivery to FSTP
 - FSTP operator at delivery
12. Photo at collection
13. Desludged by which truck
14. If near FSTP at delivery
15. Delivered to which Treatment Facility

SaniTab and SaniTrack

Key Benefits - Program efficiency for FSSM services

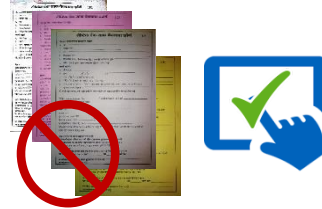
Integrated monitoring system – Across FSM service chain



**“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 awareness about emptying procedures



**Photo stamping,
Geo stamping,
Signatures**



Unique database



Supports vernacular language



Partnerships and Collaboration

BILL & MELINDA
GATES foundation



Government of
Maharashtra

HSBC 

 Transerve

CWAS
CRDF CEPT
UNIVERSITY


SUMEET
FACILITIES



Thank you

About us

The Center for Water and Sanitation (C-WAS) at CEPT University carries out various activities – action research, training, advocacy to enable state and local governments to improve delivery of services.



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