Digital Monitoring Systems for FSSM

@ NFSSM Alliance | Learning Labs | Digital Monitoring 11.10.2022

CWAS CENTER FOR WATER AND SANITATION | CRDF CEPT RESEARCH AND DEVELOPMENT FOUNDATION | CEPT UNIVERSITY | NFSSM

Digital monitoring systems for FSSM

SaniTab

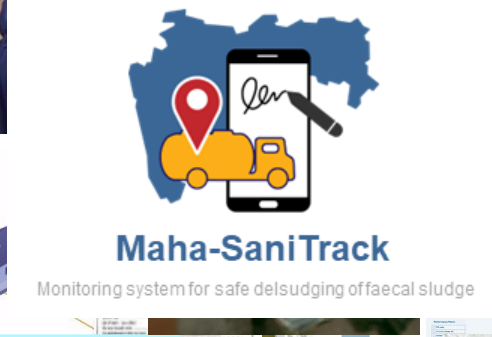
- App for collecting data and provides quick analyses
- Custom survey forms
- Web dashboards reflecting real time progress

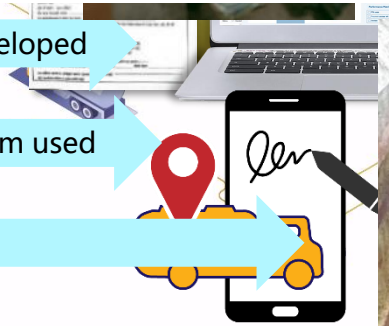
SaniTrack

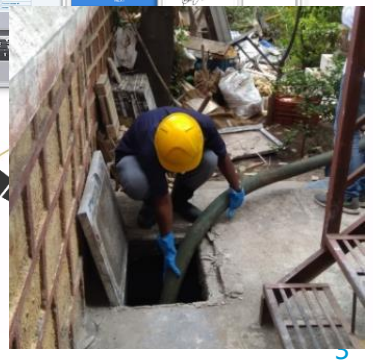
- End to end monitoring for desludging
- Role based modules – scheduler, truck operators, ULB official/administrators
- Signature based acknowledgements and reports
- Spatial dashboards

Evolution and development history

- Wai Sinnar engagement – city sanitation plans
- Household sanitation survey - SaniTab developed
- Over time, used for other surveys like “ODF assessment” “san-credit” etc
- FSSM, scheduled desludging and PLAM - need for monitoring
- Moving from paper based receipts to SaniTab digital monitoring forms
- Need for custom FSSM app + Inspiration from e-commerce apps = SaniTrack developed
- Data on onsite systems – taking advantage of scheduled desludging – SaniTab form used
- Lessons from use in other cities, evolutions, scaling up





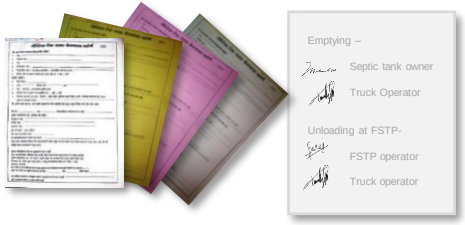


Monitoring needs for FSSM – CWIS perspective

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?

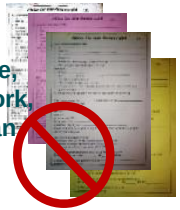
Usually - Paper based monitoring



- **Proof of safe and successful desludging** = signature of the customer on a paper form at collection as well as signature of FSTP operator at unloading.
- In case of PLAM with pvt contractor - Submission of required number of such forms is mandatory for municipality to approve monthly payment – **need to process paper based information for this**
- 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

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

Easy to Operate
Reduce paperwork
Minimize human error

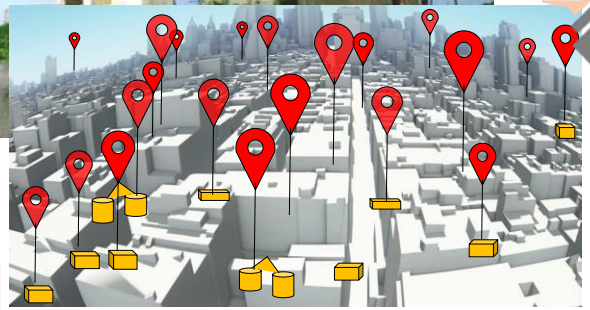


Integrated monitoring system – Across FSM service chain

Inclusive – support vernacular language

Can view progress easily and process payments

SaniTab - Mobile App for Sanitation Survey



- ✓ Custom survey forms
- ✓ Answer based looping and flows through excel based code
- ✓ Capture location and photos
- ✓ Supports local languages
- ✓ Stores offline data and uploads when internet is available

Four Types of questionnaire available in V1.0

Open Defecation Free	Integrated ODF-FSM	Fecal Sludge Management	Basic Information
Toilet availability , OD and CT dependency			
	Toilet connectivity		
Willingness to build own/shared toilets			
Financial capability			
		Septic tank details	Number of septic tanks
		Information about emptying and cleaning	

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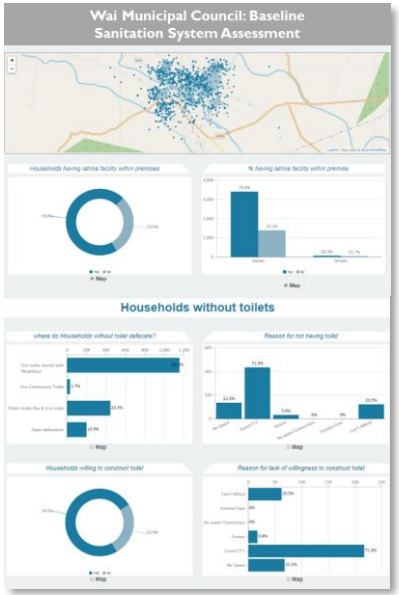
In 2015: > 10,000 properties surveyed in Wai for sanitation baseline assessment with SaniTab

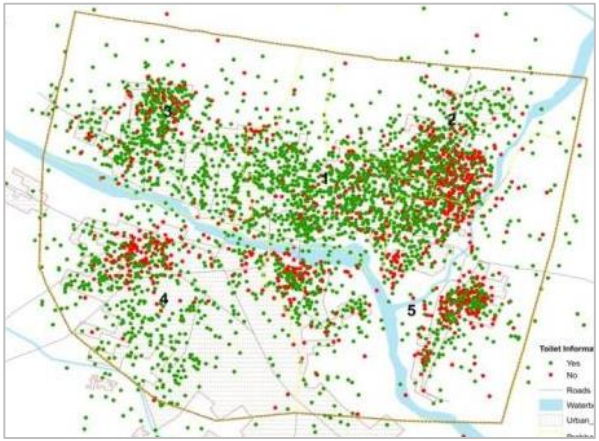
✓ **Citywide survey on :**

- 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**



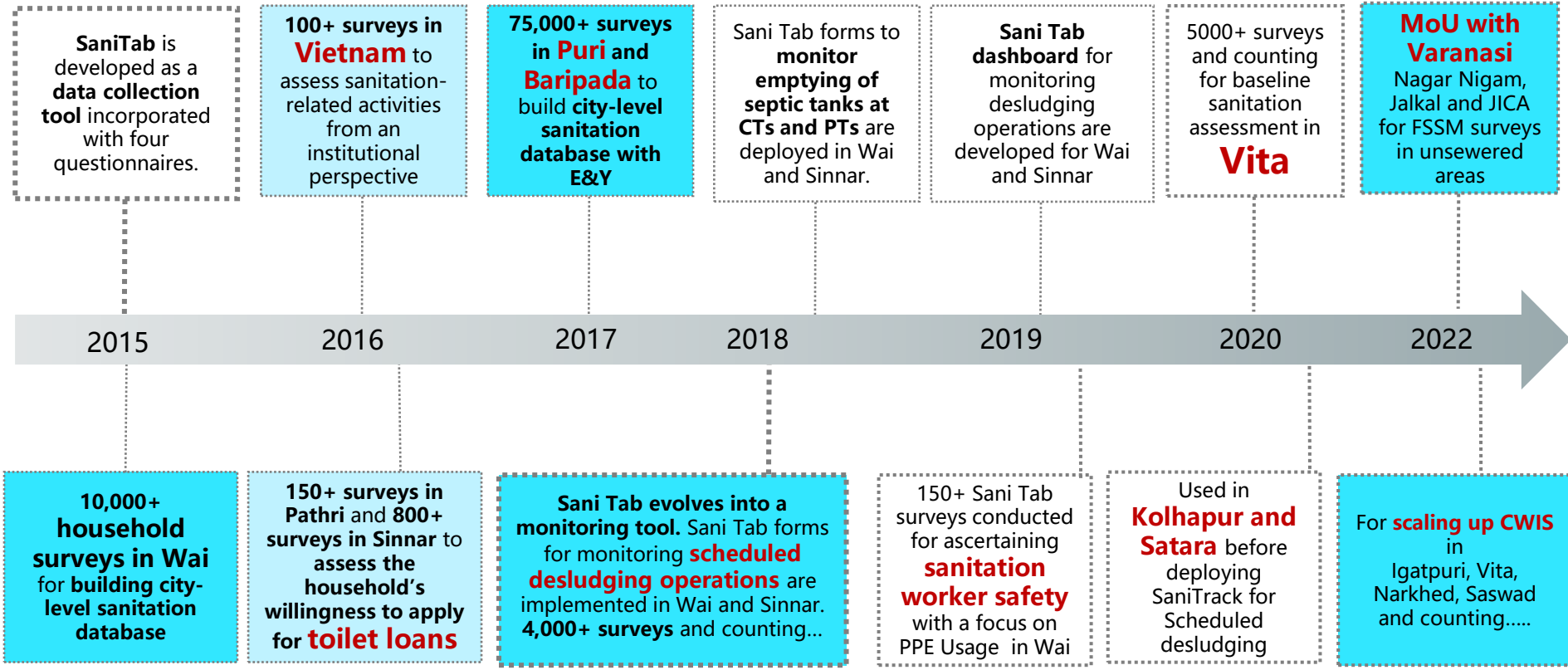
Dashboard generated from SaniTab



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

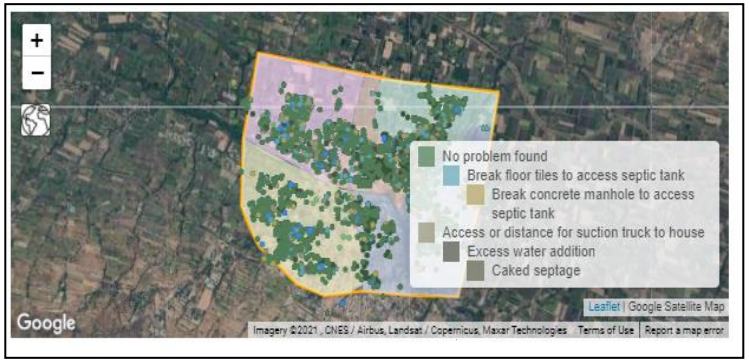
On-field surveyors conducting surveys using SaniTab

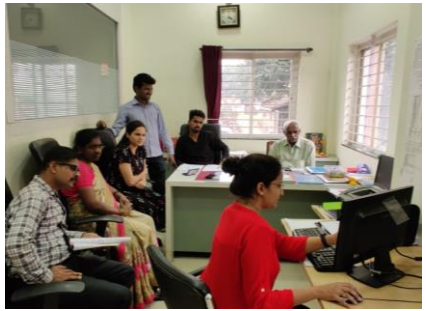
Use of SaniTab for 1 Lakh+ surveys

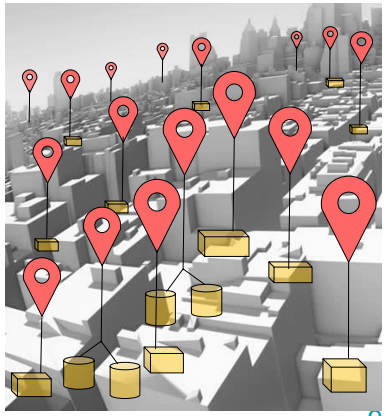


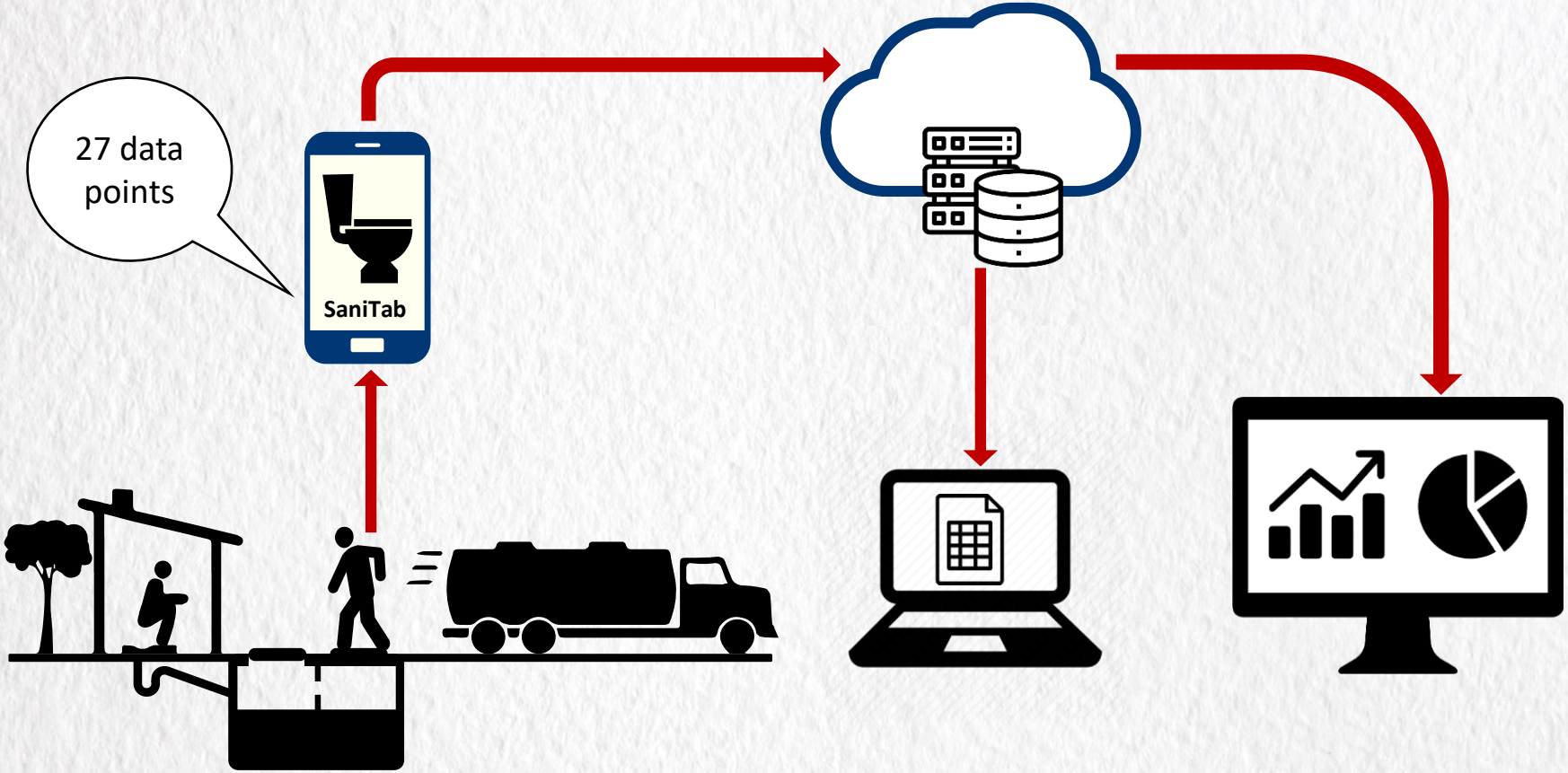
Recently concluded – Form for monitoring desludging services + developing a database of onsite systems in Wai

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

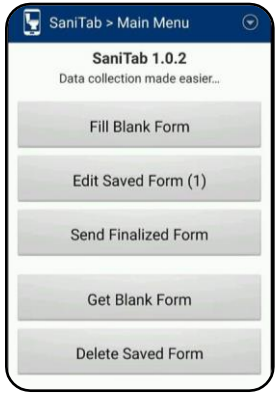


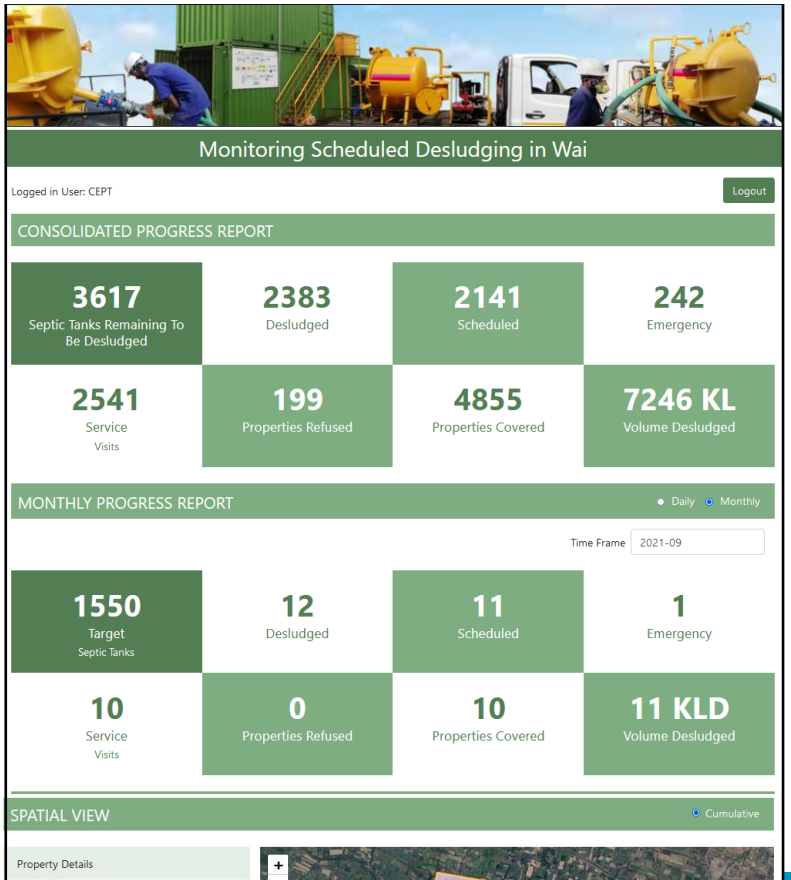




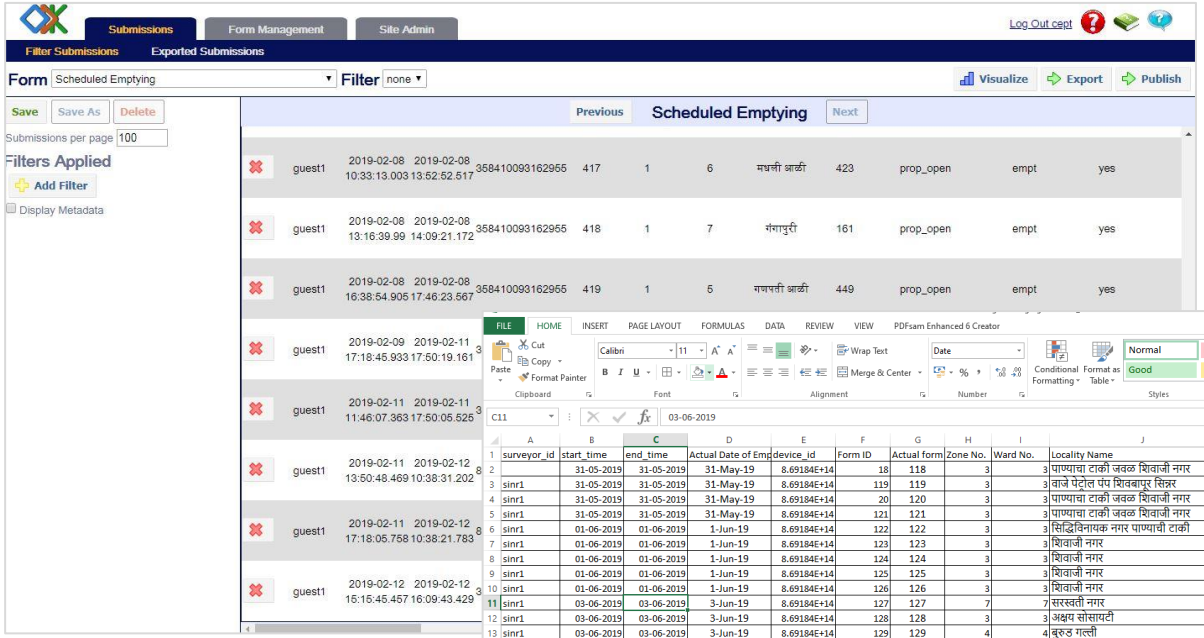

27 data points
SaniTab

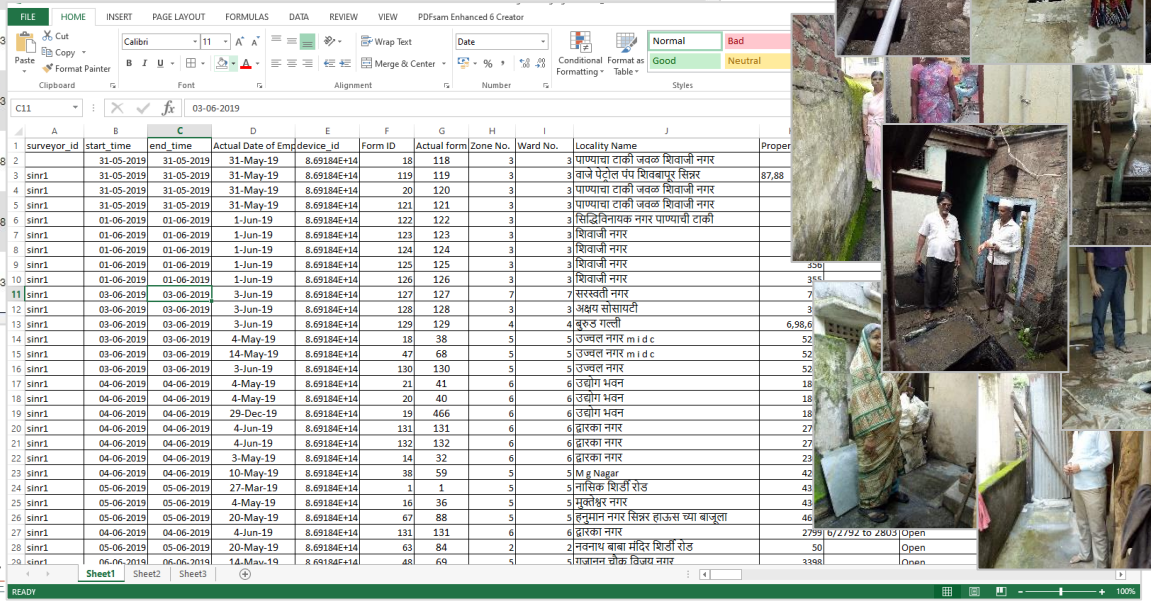
Surveyor app + Monitoring Dashboard





Downloadable MIS results





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

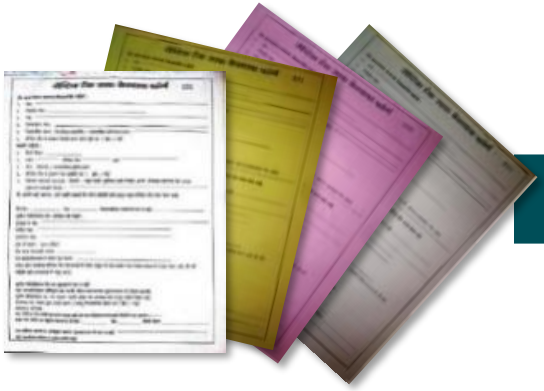
1. Vulnerable Areas Covered – BPL Card Holder, width of road on which property is located, caste

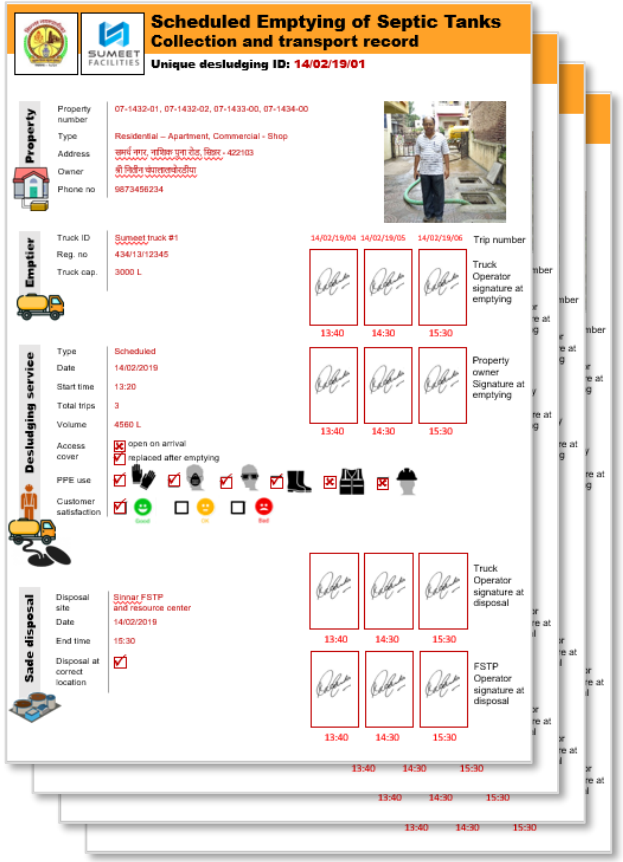
2. Gender Aspect – gender of the person responding to the form and gender of the person supervising the emptying service

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 -





SaniTrack – custom 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

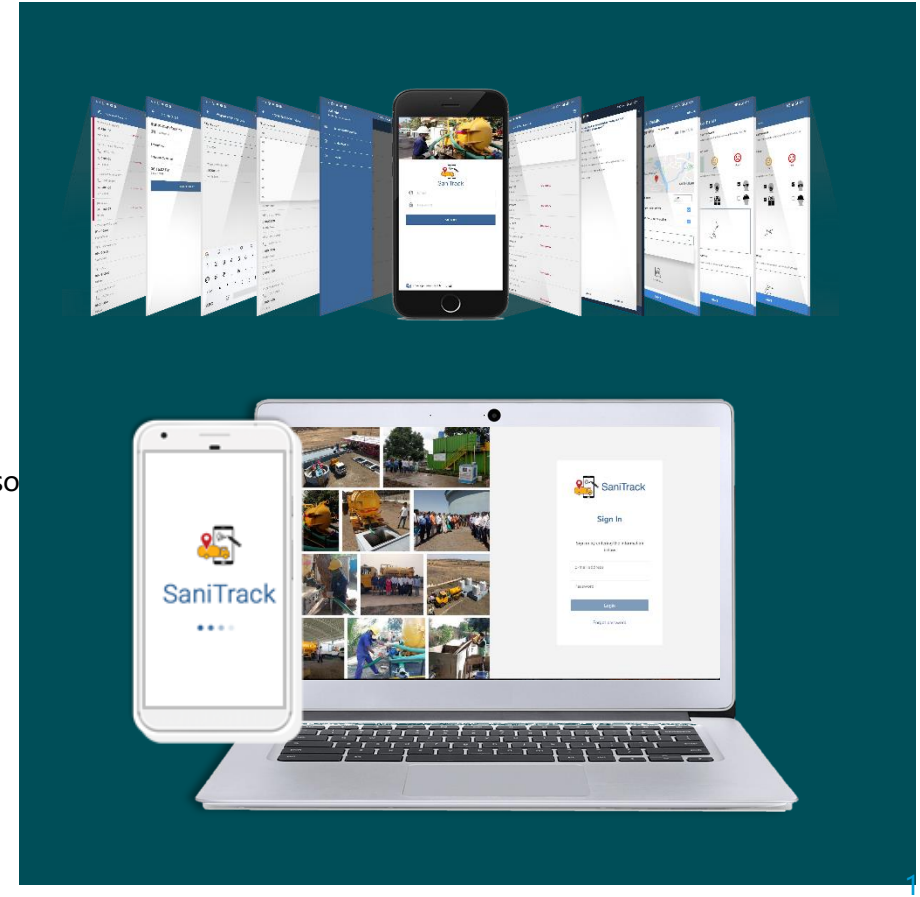
Can handle both scheduled emptying as well as demand based operations

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

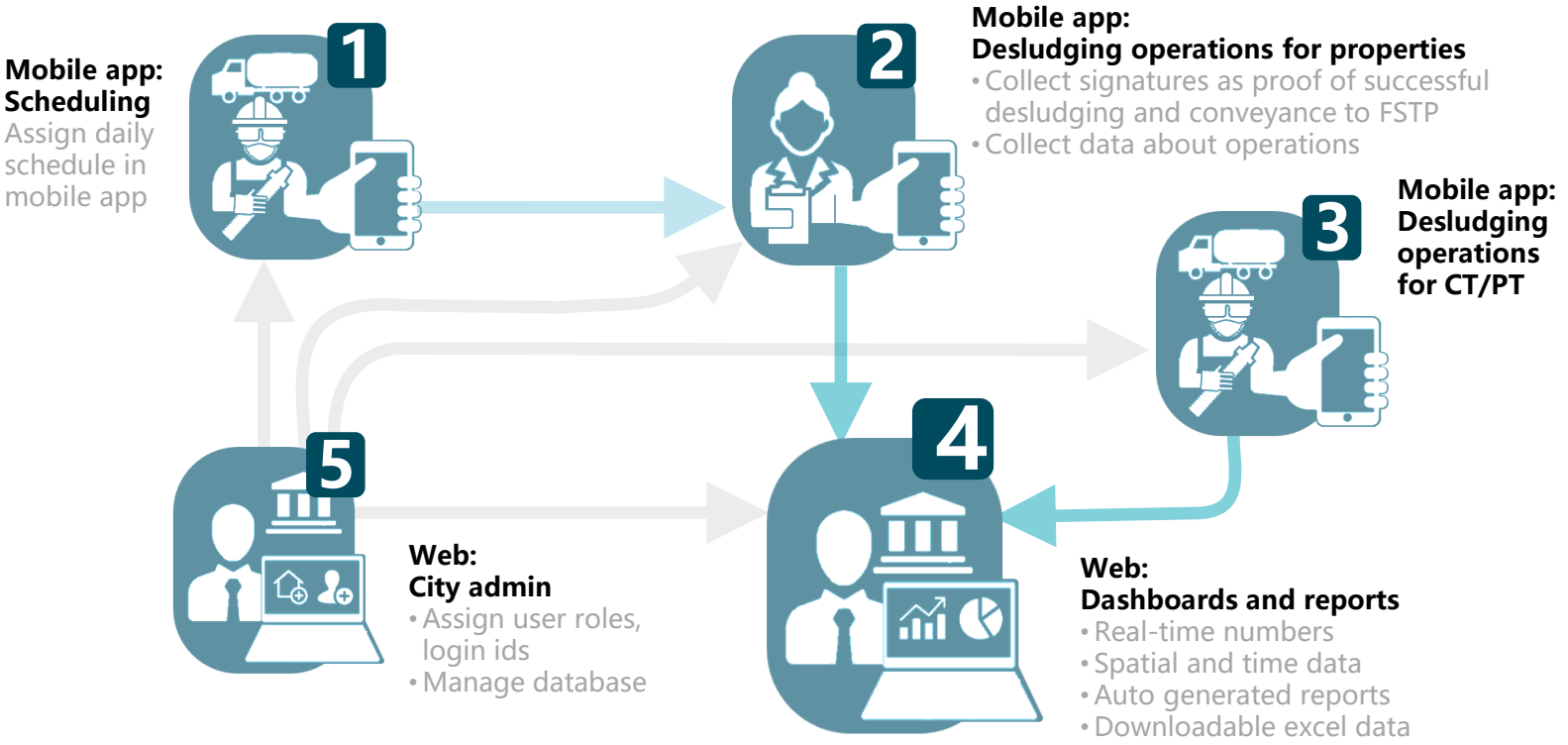
On-screen signatures like modern delivery apps (eg: Amazon). Can also generate individual reports automatically like paper form reporting system.

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



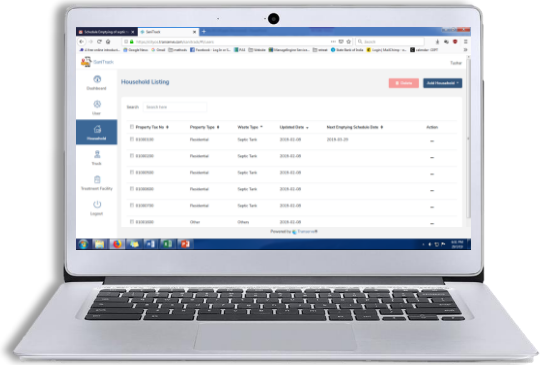
Components and modules



How does it work?

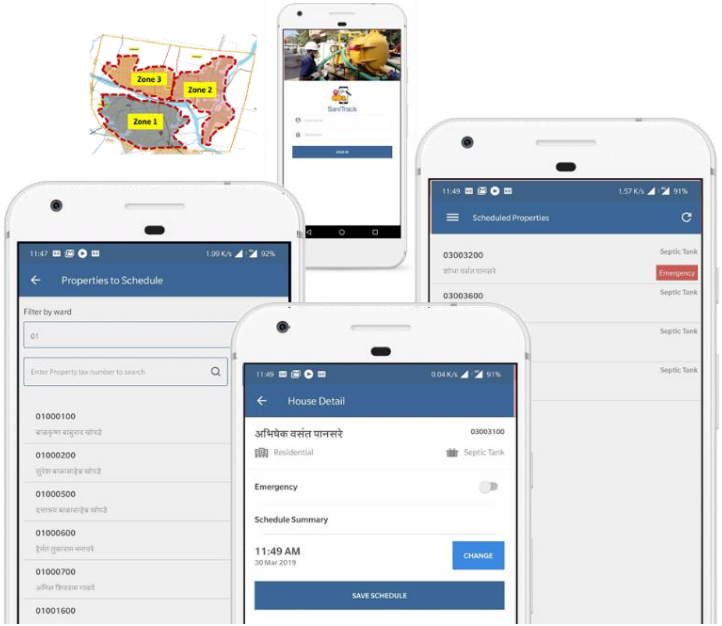
1 System set up – one time

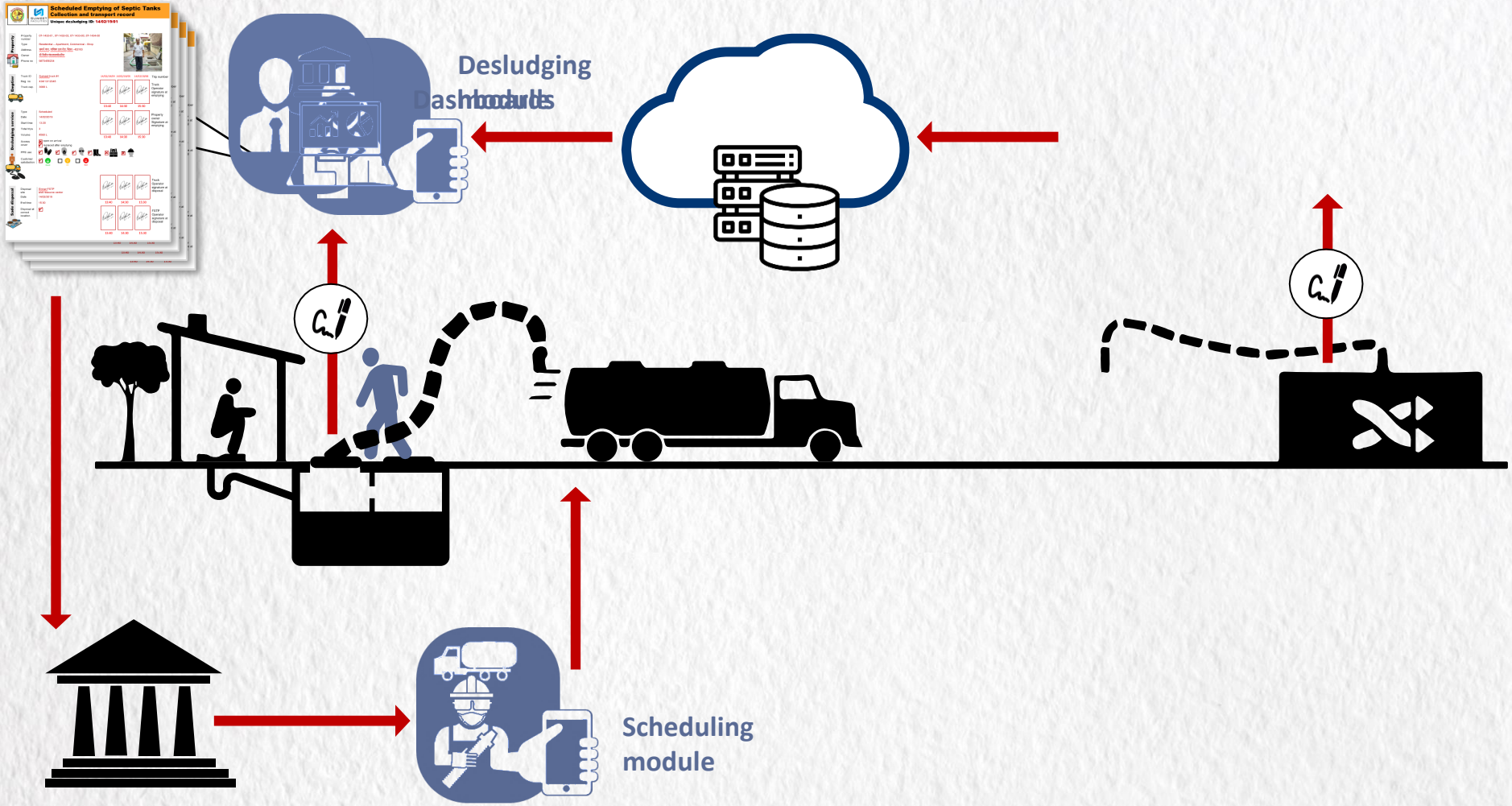
- ✓ User profiles created – admin, scheduler, delsudger
- ✓ Uploaded a list of properties
- ✓ Registered trucks and set location of treatment facility



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

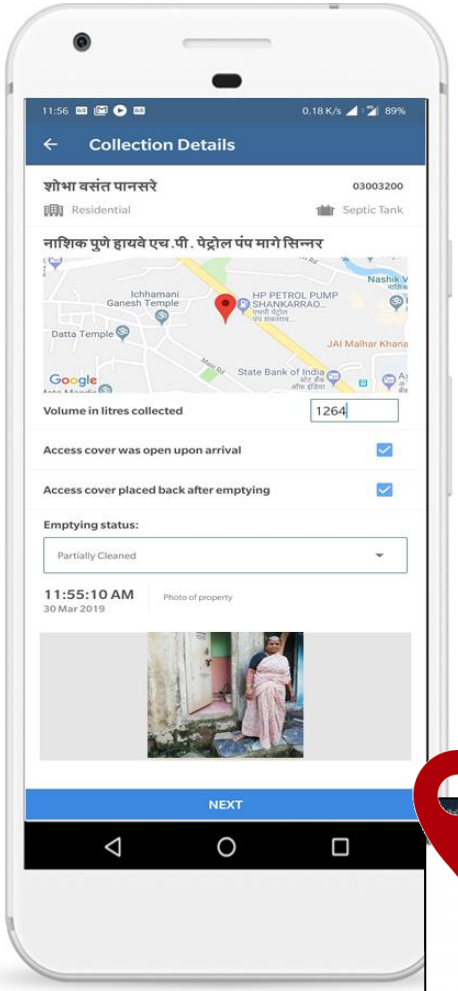


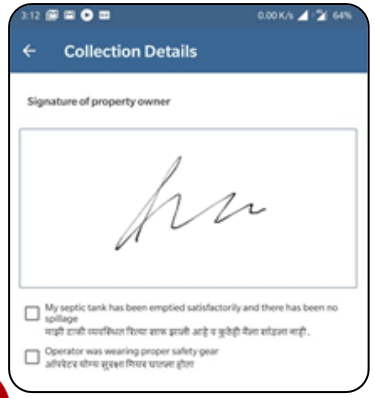

Scheduled Emptying of Septic Tanks
Collection and transport record
Desludging
Dashboards
Scheduling
module

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





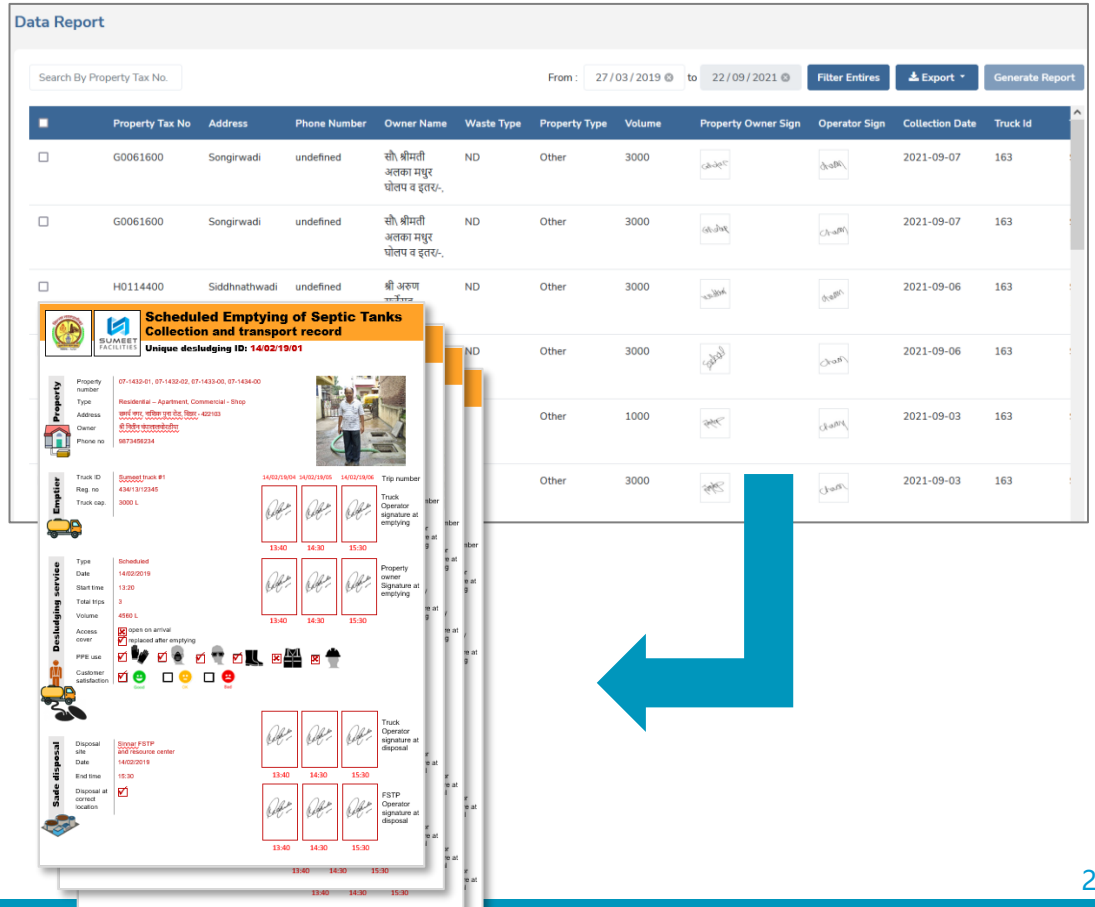
Validation checks

- ✓ Location check - Sludge is picked up and is unloaded at FSTP only – instead of GPS tracking - geoboundary
- ✓ Sludge volume vs truck capacity
- ✓ Signatures and photo as proof of desludging + counter signature
- ✓ Time stamps at every step

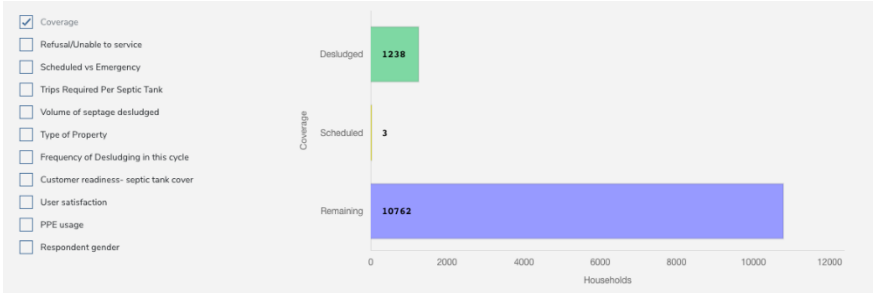
What models for FSSM can SaniTrack accommodate?

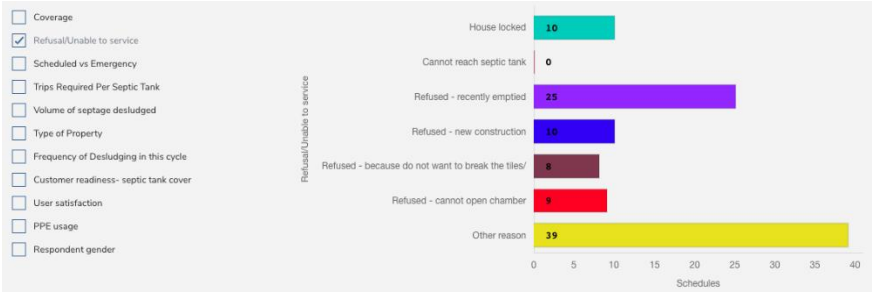
Desludging ops	Operator	Example
Scheduled	Pvt. player contracted by Municipal Govt.	Wai-Sinnar Leh
Scheduled	Municipal Govt. operating by self	Small cities in Maharashtra
Demand	Municipal government	Small cities in Maharashtra
Demand	Pvt. player contracted by govt.	Odisha
Demand	Govt call centre assigning to pvt operators	Dakar - Senegal

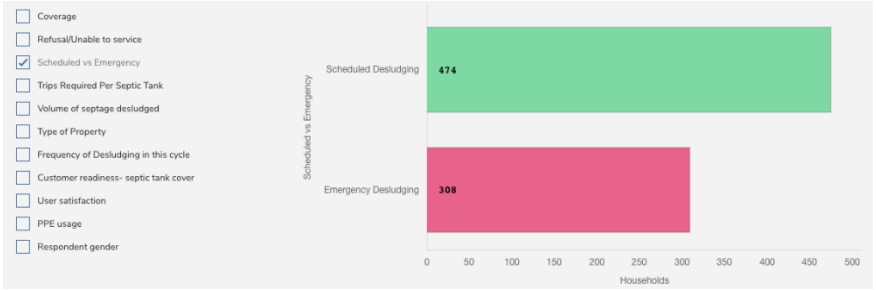
Dashboard, database and reports

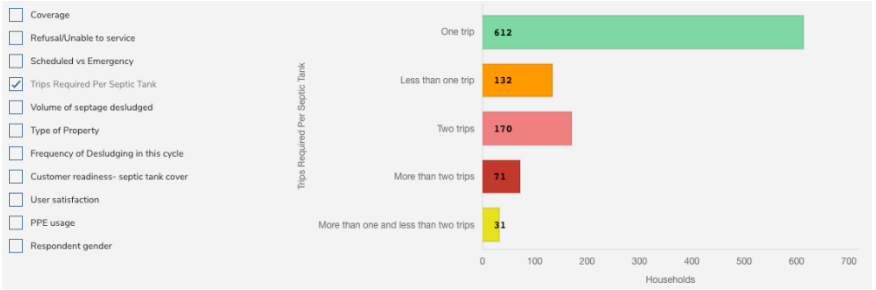


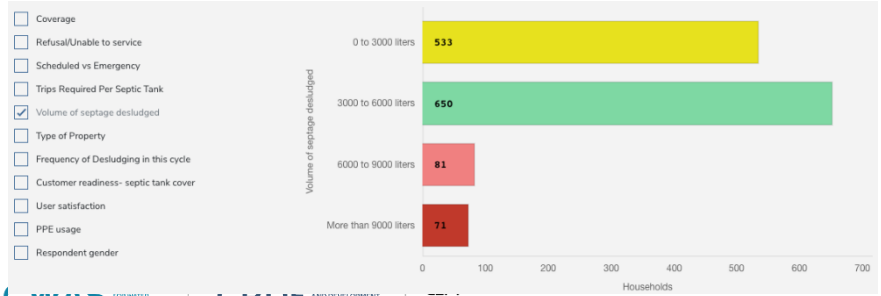
Web module – Dashboard

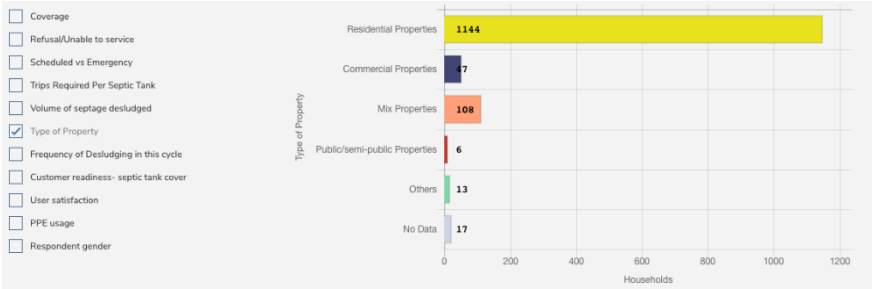




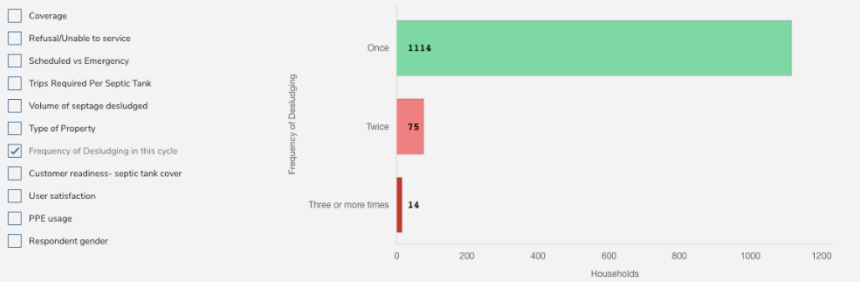


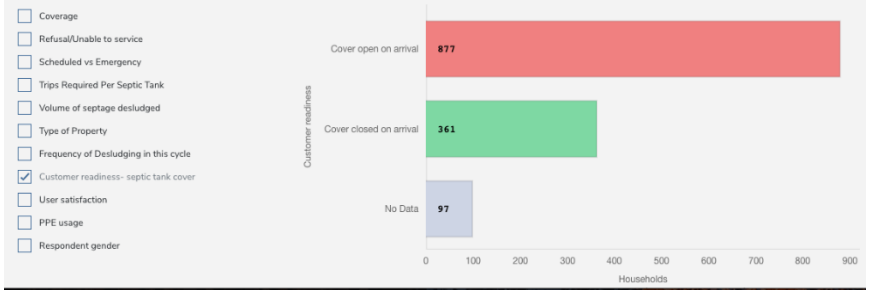


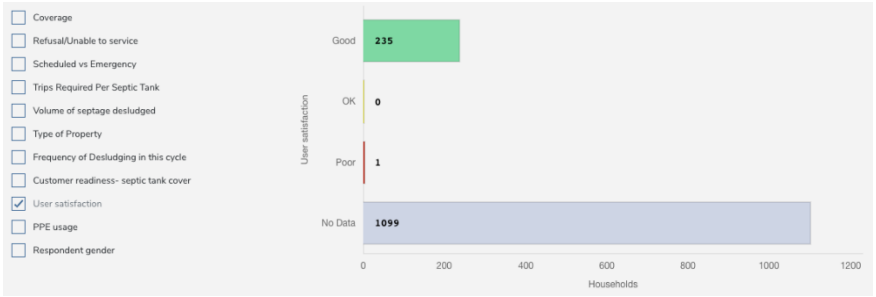


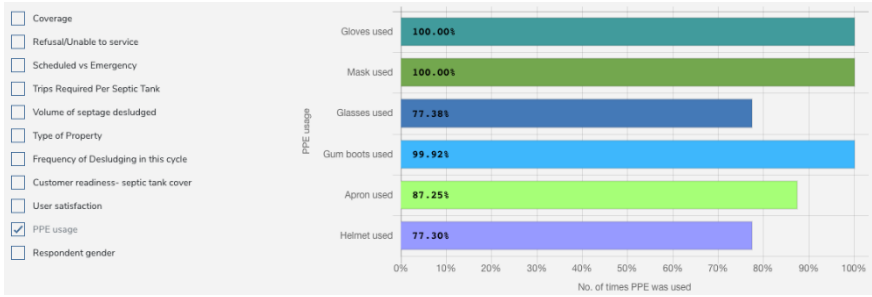


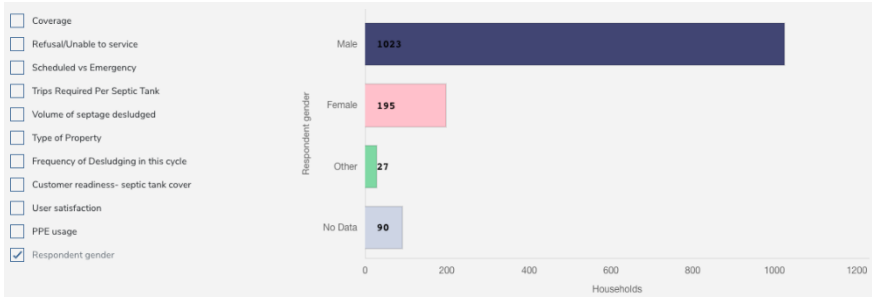
Web module – Dashboard











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

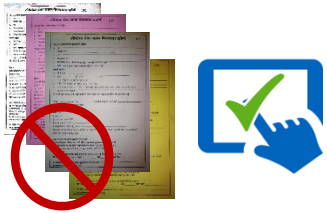
SaniTab and SaniTrack

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

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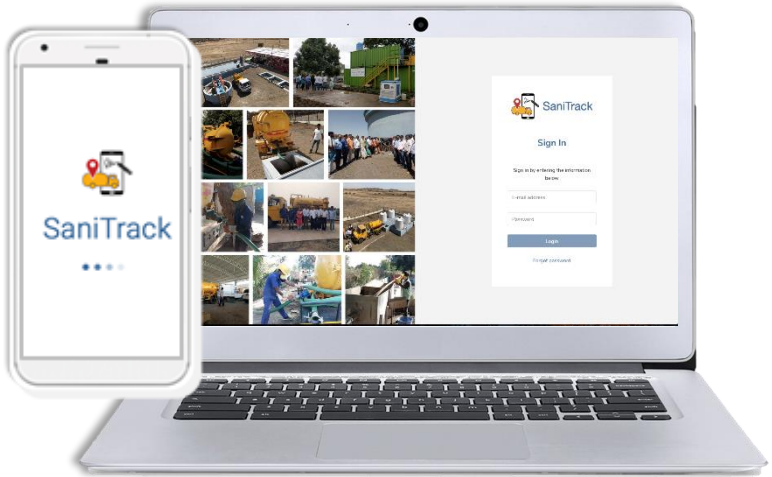
Challenges, lessons, improvements and evolution

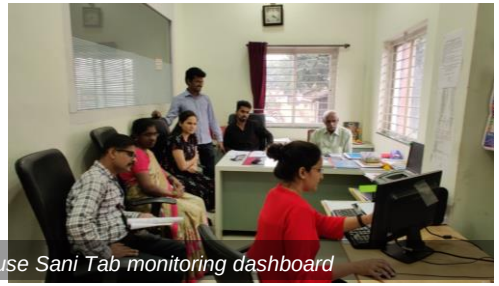
1. Implementation Challenges and lessons

- Mobile format is easy and is quickly adapted however not all stakeholders have access to smartphones
- Sanitation workers are sometimes hesitant to carry their phones near septic tanks for fear of dropping them. To address this issue, a training session was held.
- Staff changes and working memory
- Using local language and terms help with quicker adaptability. Scaling up of apps would require adaptation to more vernacular languages.
- Pictures / symbology are needed to explain – what is type of onsite sanitation system and PPE
- Mobile networks are not strong at FSTPs which are usually located on the fringe of cities. This hampers completion of the form with signture of the FSTP operator.



2. CWIS integration

Not just monitoring desludging completion, but monitoring from perspective of CWIS



Wai Municipal Council staff being trained to use Sani Tab monitoring dashboard

Safe handling of waste

- ✓ Delivery to FSTPs
- ✓ No human contact

Equity in service delivery

- ✓ Coverage of vulnerable HHs
- ✓ Customer satisfaction

Enhancing agency of women

- ✓ Questions to record who responded to the desludging vehicle at the HH vs who supervised and signed

Sanitation worker safety and

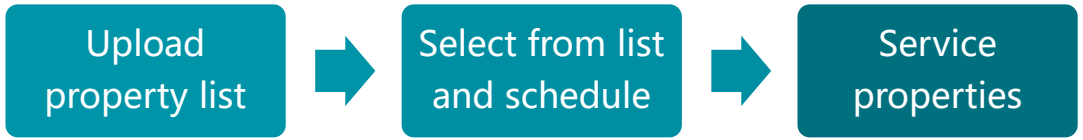
- ✓ Monitoring use of PPE – self reporting and signatures by operators
- ✓ Training in use of apps

Ownership by city governments

- ✓ Use of apps by Municipalities supervisors and sanitation workers
- ✓ Use of dashboards by decision makers
- ✓ Reported by Wai and Sinnar in their Swachh Sarvekshan submissions

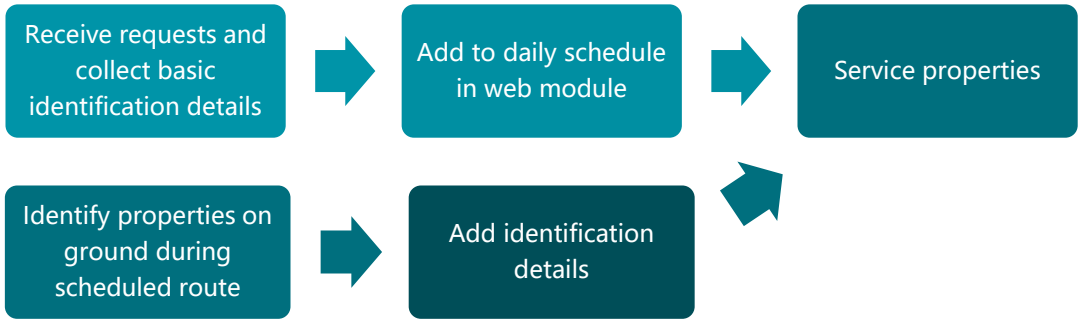
3. Lessons and improvement–
Next iteration – delinking from property list

Wai and Sinnar



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

Kolhapur, Satara



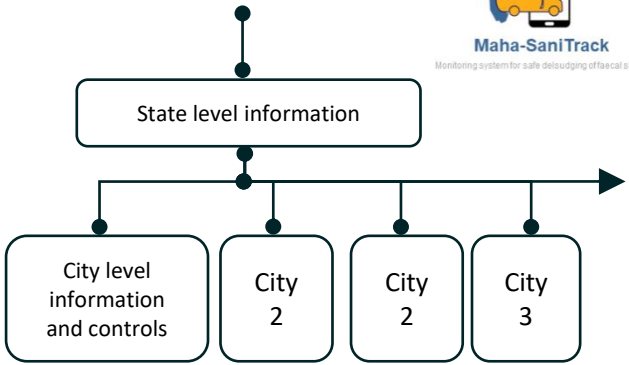
- ✓ No need for pre-uploaded property list
- ✓ Schedule and service while on pre-defined route

3. Evolution: ensuring sustained use and scaling up

Multi – city model

- Sinnar, Wai city-wide
- Kolhapur, Satara pilots
- 210+ FSTPs in Maharashtra

MahaSaniTrack



Working with ULBs

- ✓ Scaling up CWIS across cities in Maharashtra – scheduled desludging implementation
- ✓ Demand based implementation for ULBs
- ✓ Building SaniTrack usage into desludging contracts
- ✓ Training by CWAS divisional team
- ✓ Advocacy for "SMART systems" and "IT enabled systems" as included in Govt. Programs

App store compliance

- ✓ Need to adhere to Google compliances to make available on public app store

Generalize for use case

- ✓ Delink from property numbers
- ✓ Simplify user roles
- ✓ Allow flexibility in user roles
- ✓ Integrate with familiar systems – welcome emails, OTPs, pop up explanations

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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