Digital Transformation of Urban Sanitation Governance: Implementing an Open-Source Integrated Municipal Information System (IMIS) in Lakshmipur Municipality, Bangladesh

Makfie Farah

Global Water & Sanitation Center

Asian Institute of Technology

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SDG 6.2 Context & Urban Sanitation Challenges

Sustainable Development Goal 6.2

Calls for access to adequate and equitable sanitation and hygiene, paying special attention to the needs of women and girls.

Persistent Structural Barriers

Municipalities grapple with fragmented data, manual workflows, and weak institutional capacity for planning.

Climate Risk Intensification

Increasing floods and weather events disrupt services and widen inequities, particularly in secondary cities.

Why Digital Public Infrastructure (DPI)?

To enable integrated data, efficient service delivery, transparency, and long-term resilience.

Context Statistics

66.5 %

of the urban population does *not* have access to safely managed sanitation in urban areas of Bangladesh

The Transformation

Moving from reactive, manual systems to proactive, data-driven governance.

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Lakshmipur Municipality: City Profile & Context

City Profile

13000+
POPULATION

28.26 sq Km
TOTAL AREA

15
ADMIN WARDS

10
LOW-INCOME COMMUNITIES

25,095
Total Buildings

20,980
Residential

550
Mixed (Residential, Commercial, Office uses)

1,307
Commercial

95
Institution

541
Industrial

220
Educational

1,402
Others

SERVICE CONTEXT

Incomplete FSM Chain
Heavy reliance on on-site sanitation with unsafe containment. Collection and treatment services are fragmented.

Data & Asset Gaps
Limited spatial data availability. Lack of digital asset registers makes planning reactive rather than proactive.

Engagement Barriers
Citizen feedback channels are manual and paper-based, leading to slow grievance redressal and low accountability.

Siloed & Fragmented Data

Disconnected datasets across sanitation, drainage, solid waste, and taxation departments prevent holistic planning.

Manual & Paper-Based Workflows

Reliance on physical records limits monitoring of FSM services and creates administrative bottlenecks.

Limited Visibility on Service Gaps

Lack of spatial data leads to low visibility into containment status and underserved zones, especially in LICs.

Weak Citizen Engagement

Limited mechanisms for service requests, feedback, and grievance redress reduce accountability.

Financial & Capacity Constraints

Resource limitations and weak institutional memory impede proactive, long-term development planning.

📈 Baseline Indicators

SANITATION COVERAGE

* %

Households with access

DESLUDGING FREQUENCY

* Years

Average interval

TREATMENT CAPACITY

* m³/day

Operational capacity

ℹ️ *"Without data, we are blind to the needs of the most vulnerable."*

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Integrated Municipal Information System (IMIS)

IMIS is an open-source GIS-based Digital Public Infrastructure (DPI) which functions as both a municipal information system and a software solution, integrating data, processes, and services to enhance municipal governance-particularly in sanitation management with Citywide Inclusive Sanitation (CWIS) approach to achieve SDG 6.2.

IMIS Functional Modules

https://imis.gwsc.ait.ac.th/

Building Information Management System (BIMS)

Maintain information about all existing and new buildings with their building footprints, sanitation system, socio-economic condition etc, along with information about low income communities with their geographic coverage and sanitation system

Property Tax Collection Support System

Enables to import of property tax data into system for spatial visualization of buildings with their tax

Urban Management Decision Support System

Dashboard for monitoring the situation of sanitation required for planning, management and monitoring and evaluation of CWIS and KPI,Tools for real-time monitoring of the sanitation service chain,Spatialanalysis tools

Utility Information Management System

Maintain road, water supply, sewerage and drainage network

Solid Waste Information Support System

Enables to import of solid waste management data into system for spatial visualization of buildings with their bill payment status

Watersupply Information Support System

Enables to import of water supply bill payment data into system for spatial visualization of buildings with their bill payment status

IMIS Solution Overview: Open-Source, GIS-Integrated DPI

A modular **Digital Public Infrastructure (DPI)** designed to integrate sanitation, drainage, water supply, solid waste, and taxation data through a unified web and mobile interface.

Unified Interfaces

Web portals for administrators and offline-first mobile apps for field staff and citizens to report and manage services.

- Web
- Mobile

GIS Backbone

Comprehensive spatial mapping of assets, service coverage, and risk layers using high-resolution 30cm satellite imagery.

- 30cm Imagery
- Spatial Layers

Visual Dashboards

Near-real-time monitoring of FSM services, KPI tracking, and visual analytics for evidence-based decision making.

- KPI Tracking
- Real-time

Interoperability

Open API architecture allowing seamless integration with the National Sanitation Dashboard (NSD) and other e-gov tools.

- REST APIs
- NSD Link

Modular Scope

Scalable design covering core municipal functions: Sanitation, Drainage, Water Supply, Solid Waste, and Taxation.

- WASH
- Tax

Open Source Stack

Built on open standards to ensure sustainability, cost-effectiveness, and freedom from vendor lock-in.
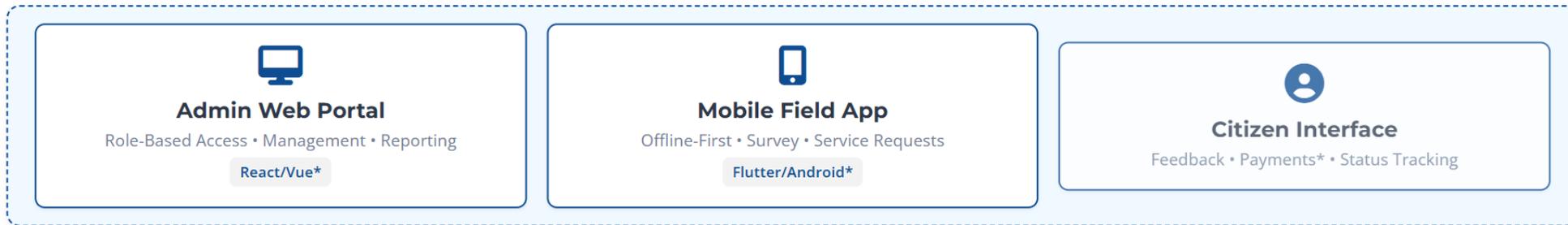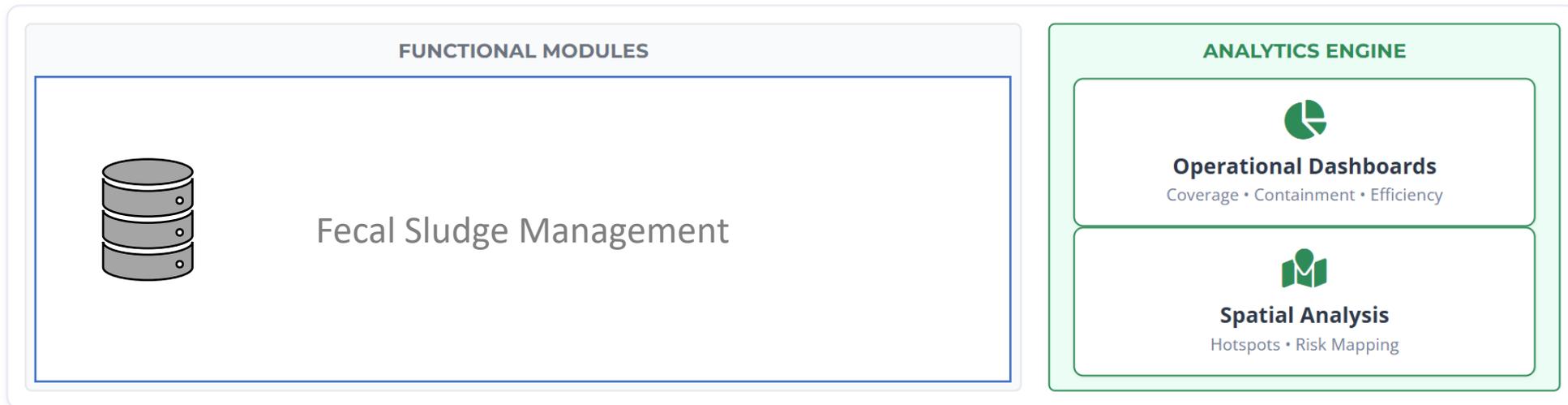
- * License
- PostGIS

Implementation Methodology & Timeline

MAY – JUL 2024
Co-design & Alignment

Stakeholder workshops with DPHE, Municipality, & GWSC to align goals.

JUL – SEP 2024
Baseline & Config

Defining parameters, tool configuration, and initial system architecture.

SEP '24 – JAN '25
GIS & HH Surveys

Digital survey of 24k+ households using Mergin Maps; Asset mapping.

NOV '24 – MAR '25
Iterative Build

Platform development, module integration, and QA validation cycles.

DEC '24 – APR '25
Training & Capacity

Hands-on training for enumerators and municipal staff on digital tools.

April onwards
Trial run, backend testing, technical backstopping, orientation, system integration

Key Milestone
Go-Live Approval: Dec 25

Resources
Team Size: 30+ enumerators+ staffs

Budget
Project Funding   *

Status
On Track / Completed

Data Collection Methodology

24,000+
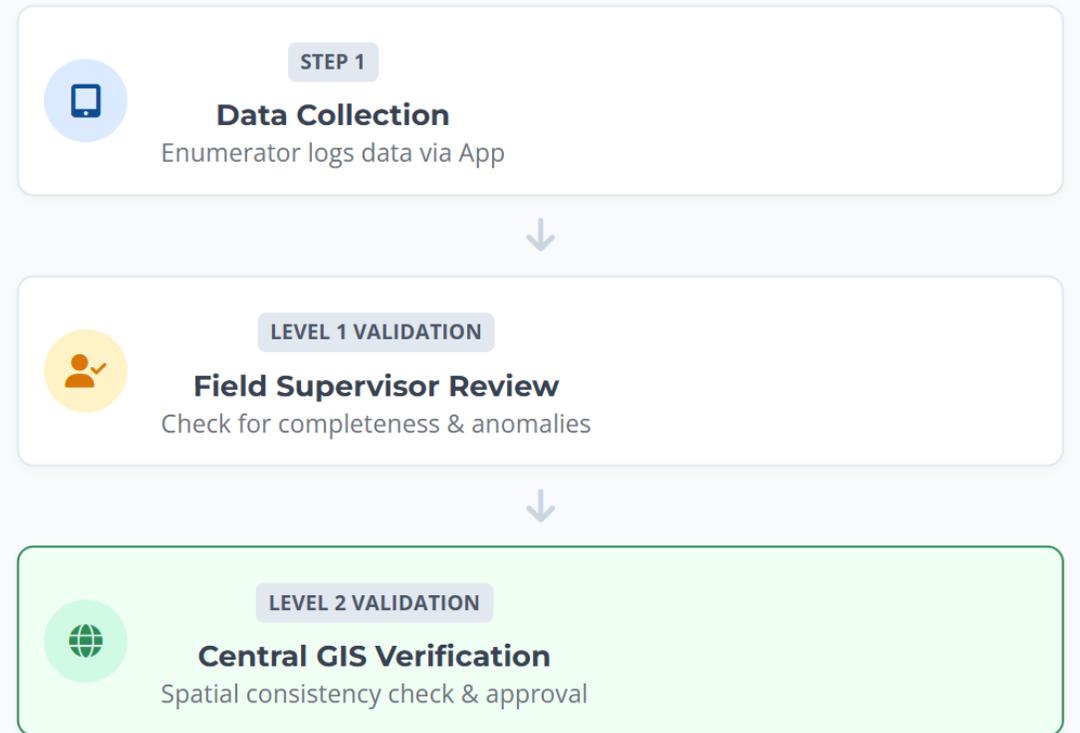Households Surveyed

30 cm
Satellite Imagery Resolution

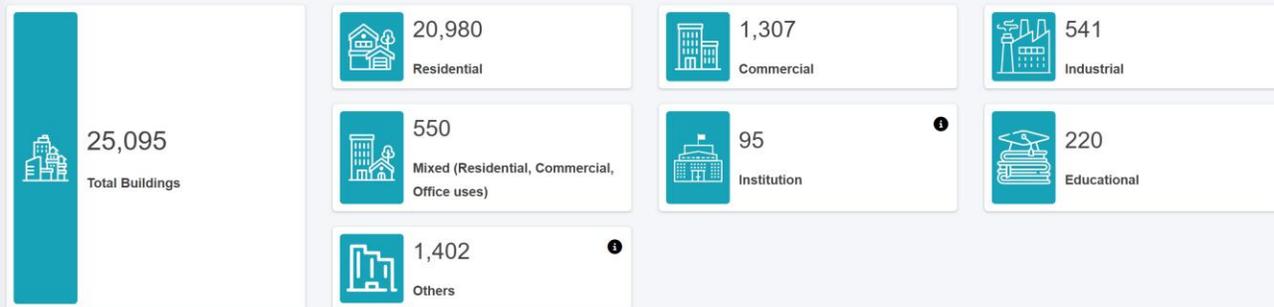**Mergin Maps**
Open-Source GIS Tool

Field Execution & Capacity

1. Spatial Baseline Creation

Digitization of building footprints, roads, and drains using high-resolution imagery to create a verified base map before field deployment.

2. Comprehensive Asset Mapping

Geo-tagging of containment units (septic tanks/pits), disposal points, communal bins, and transfer stations to map the full service chain.

3. Training & Mobilization

Hands-on training for local enumerators and municipal staff on digital data entry, GPS handling, and community engagement protocols.

QA/QC Validation Workflow
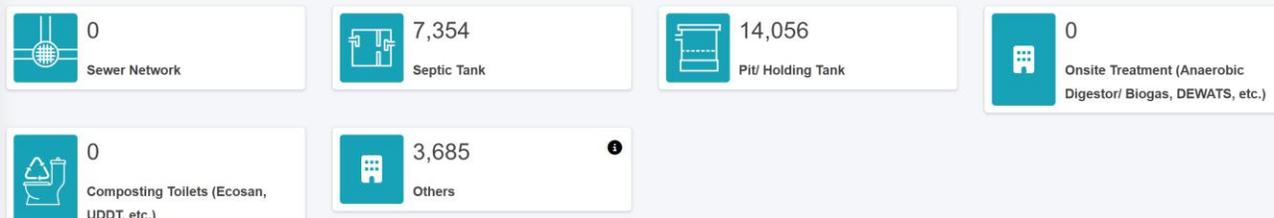
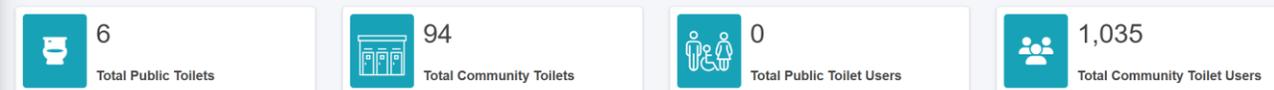**STEP 1**
Data Collection
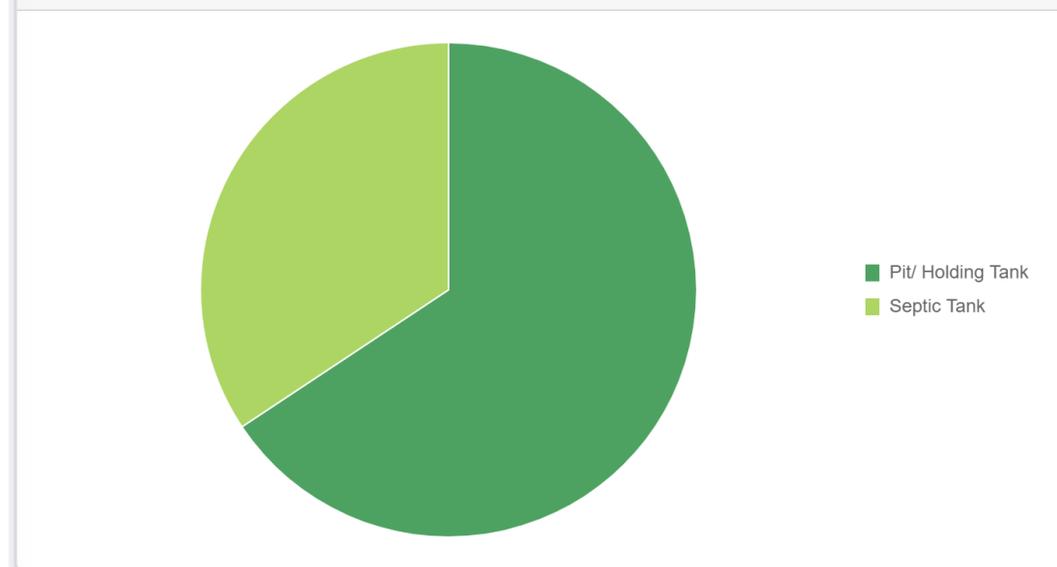Enumerator logs data via App

↓

LEVEL 1 VALIDATION
Field Supervisor Review
Check for completeness & anomalies

↓

LEVEL 2 VALIDATION
Central GIS Verification
Spatial consistency check & approval

IMIS Dashboard

Buildings

25,095 Total Buildings	

- **20,980** Residential
- **1,307** Commercial
- **541** Industrial
- **550** Mixed (Residential, Commercial, Office uses)
- **95** Institution ⓘ
- **220** Educational
- **1,402** Others ⓘ

Sanitation Systems

- **0** Sewer Network
- **7,354** Septic Tank
- **14,056** Pit/ Holding Tank
- **0** Onsite Treatment (Anaerobic Digestor/ Biogas, DEWATS, etc.)
- **0** Composting Toilets (Ecosan, UDDT, etc.)
- **3,685** Others ⓘ

FSM Services

- **1** Service Providers
- **3** Desludging Vehicles
- **1** Treatment Plants
- **4** Applications Responded
- **4** Volume of Sludge Emptied (m³)
- **4,555** Revenue Generated

PT/CT

- **6** Total Public Toilets
- **94** Total Community Toilets
- **0** Total Public Toilet Users
- **1,035** Total Community Toilet Users

Proportion of Different Containment Types

Legend: Pit/ Holding Tank, Septic Tank

Wardwise Distribution of Containment Types

Wards (x-axis: 1–15), y-axis: 0–2500

Legend: Pit/ Holding Tank, Septic Tank

Key Outcomes and Benefits
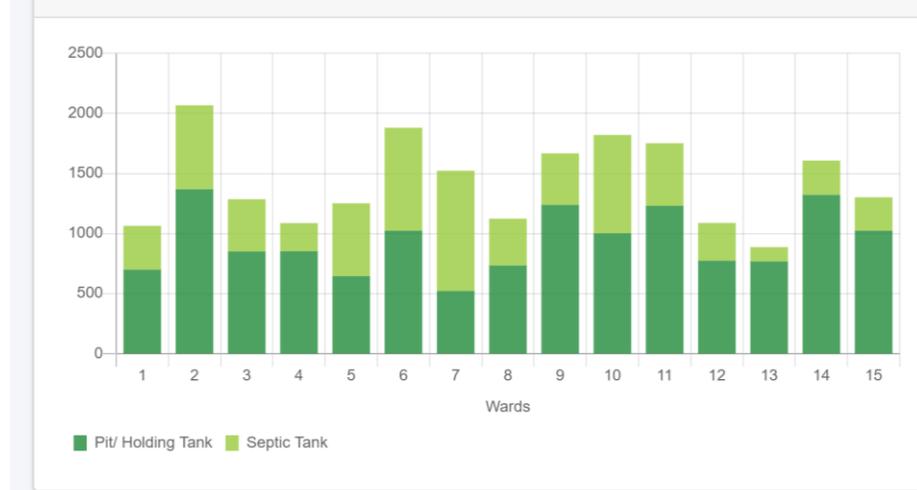
🚀 Transformational Shifts

From reactive administration to proactive, data-driven governance.

Digitized Core Workflows
Eliminated manual paper records, reducing processing delays and enabling digital tracking of all files.

Evidence-Based Planning
Visual dashboards map underserved zones and containment status, guiding investment to where it's needed most.

Consolidated Institutional Memory
Unified data repository prevents information loss during staff turnover and enhances interdepartmental coordination.

Citizen Accountability
Direct interface for service requests and feedback fosters inclusivity and ensures responsive service delivery.

Early Impact Indicators
Quantitative outcomes post-deployment

80-90 %
Reduction in Processing Time

4+
Modules Live & Active

n
Service Requests Logged Digitally

5+
Municipal Staff Trained & Onboarded

💡 **Near-Real-Time Monitoring:** FSM services are now tracked live, allowing for immediate course correction.

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Governance Impact & CWIS Alignment

Operationalizing CWIS Principles

IMIS transforms governance by embedding equity, accountability, and data intelligence into daily municipal operations.

Targeting Interventions
Equity

Maps Low-Income Communities (LICs) and unserved zones to prioritize investments, ensuring no one is left behind.

Transparency & Feedback

Open dashboards and citizen apps create direct accountability loops, making service performance visible to the public.

Cross-Sector Integration

Breaks down silos by consolidating sanitation, water, and waste data into a shared "Single Source of Truth."

Scalable Interoperability

Open API architecture allows seamless integration with the National Sanitation Dashboard (NSD) and e-Governance tools.

Citywide Inclusive Sanitation (CWIS)

an approach to achieve SDG 6.2 for safe, equitable and financially viable sanitation systems and services. CWIS ensures everyone in a city has access to safely managed sanitation and human waste is safely managed along the whole sanitation service chain ensuring protection of the environment and human health.

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Sustained Commitment

Political and institutional ownership is essential to maintain digital continuity beyond short-term project cycles.

Localized Capacity Building

Hands-on training and change management for local staff enhance the long-term sustainability of digital adoption.
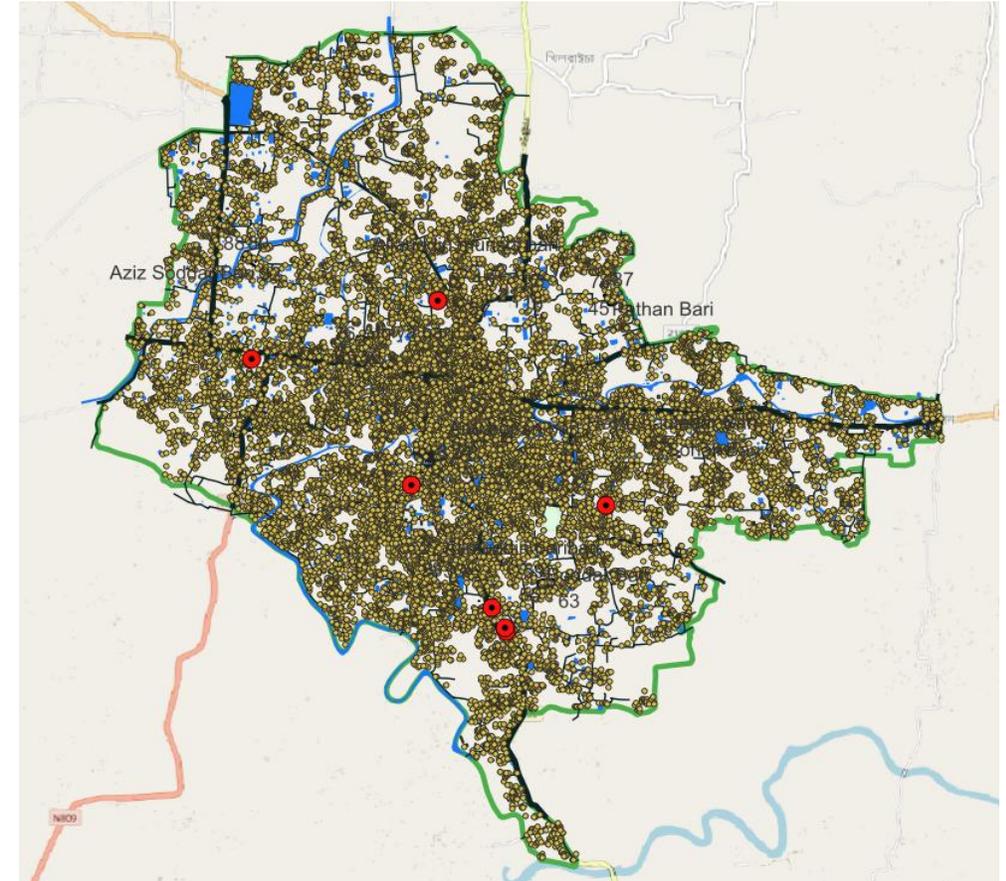
Modular Open-Source Systems

Minimizes dependence on proprietary solutions, avoids vendor lock-in, and allows organic system evolution.

E-Governance Integration

Embedding sanitation within wider reforms (taxation, waste, water) enhances cross-sectoral integration.

Containments in Lakshmipur municipality

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A strategic roadmap to deepen digital maturity, integrate financial systems, and align municipal operations with **SDG 6.2** and broader climate resilience goals.

Online Payment Gateways

Integration of secure online payment systems for sanitation fees, holding taxes, and trade licenses to reduce cash handling.

📅 *Timeline*   🏢 Accounts Dept

Expanded Public Portals

Enhanced citizen interface for tracking service requests, viewing transparency data, and submitting feedback.

📅 *Timeline*   🖥 IT Cell

National Dashboard Linkage

Direct API integration with the National Sanitation Dashboard (NSD) for automated reporting and central compliance.

🔌 REST API   🔄 DPHE/NSD

Advanced Analytics

Implementation of predictive models for service scheduling, revenue forecasting, and climate risk mapping.

Scale-up Strategy

Onboarding neighboring municipalities and establishing peer learning networks to replicate the IMIS model.

Execution Framework

Strategic allocation of resources to ensure sustainable deployment and long-term maintenance.

Conclusions & Way Forward

Feasible & Transformative

Digital transformation in low-resource contexts is not just possible but accelerates governance maturity. The Lakshmipur model proves rapid adoption is achievable.

Open-Source DPI Power

IMIS as Digital Public Infrastructure prevents vendor lock-in, reduces costs, and ensures long-term sustainability through modular architecture.

Intelligent Governance

Merging geospatial intelligence with institutional workflows transitions municipalities from reactive firefighting to proactive service delivery.

SDG 6.2 & Resilience

By mapping inequities and tracking services in real-time, IMIS directly supports the "Safely Managed Sanitation" goals and climate resilience planning.

The Path Ahead

01 Consolidate Gains
Solidify staff adoption & data habits

02 Deepen Integrations
Connect with Tax & National Systems

03 Scale Up
Replicate in other municipalities

04 Capacitate
Build capacity of stakeholders at national and city level

Co-authors:

Dilruba Farzana, DPHE

SM Shamim Ahmed, DPHE

Md Adil Hasan, Streams Tech Limited

Md Zulfiqur Hossen, Lakshmipur Municipality

Bilkis Akter, DPHE (Lakshmipur)

Sichu Shrestha, AIT-GWSC

Thank You

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