As-Is Study Report

On State IT Systems

Water Supply Department

GUJARAT

Arghyam

Disclaimer: This As-Is Study Report has been prepared based on information, documents, and inputs made available by the concerned stakeholders, as well as field interactions and secondary research. The analysis, findings, and observations presented herein are intended solely for informational and decision-support purposes. While due care has been taken in compiling the report, the authors and contributing organizations do not assume any responsibility for errors, omissions, or subsequent changes in the underlying information. The report reflects the present situation and may be subject to change. Neither the department nor the authors shall be liable for any direct, indirect, or consequential loss arising from reliance on this report. The report does not, in any way, constitute a legally binding commitment from the department or the authors.

FOREWORD

It is with great pride and deep appreciation that I present the As-Is Study Report on State IT Systems of the **Water Supply Department of Gujarat**. It is prepared under the Jal Jeevan Mission (JJM) as part of a national effort to assess, document, and strengthen the digital capabilities of rural drinking water departments across India. This report has been prepared in collaboration between SPM Niwas and Arghyam. It helped in bringing together institutional expertise in rural water governance and philanthropic commitment to water security. A partnership that reflects the shared conviction that data-driven decision-making is fundamental to achieving universal and sustainable access to safe drinking water.

The Water Supply Department of Gujarat, stands as a strong example of coordinated institutional design supported by progressive digital adoption across its constituent agencies. Through the combined efforts of GWIL, GWSSB, and WASMO—where WASMO plays a critical role in community-led service delivery—the state has developed a comprehensive and well-integrated approach to rural water supply. The ecosystem reflects a clear emphasis on operational efficiency, transparency, and responsiveness, supported by structured digital systems for scheme monitoring, grievance redressal, field operations, and water quality management. This collaborative and layered model of service delivery highlights how institutional alignment, when complemented by technology-enabled processes, can significantly strengthen outcomes at scale and offer valuable insights for broader sectoral adoption.

This report is organised around a comprehensive Digital Maturity Model for Rural Drinking Water. It is a structured framework developed to systematically measure the state IT capabilities across five layers of key stakeholders along the guiding principles of Citizen Centricity, Frontline Workers Empowerment, Agencies Efficiency, Departments Effectiveness and State Functionaries Interoperability. There are additional two layers for Technology Foundation and Infrastructure. Together, these capabilities provide a holistic picture of where Gujarat stands today, and where it must go next.

The findings of this report affirm that Gujarat possesses the institutional capacity and technical talent for innovation to lead digital transformation in India's rural drinking water sector. By addressing the identified gaps, through shared registries, middleware integration, and unified dashboards, the state can set a benchmark that others may follow.

I extend my sincere appreciation to the WASMO Gujarat team, the field functionaries, and all stakeholders who contributed their time, knowledge, and institutional experience to this study. I also place on record my gratitude to **Arghyam** for their partnership, intellectual contribution, and steadfast commitment to the mission of universal water access. Their collaboration has meaningfully strengthened both the depth and the credibility of this report. I acknowledge as well the dedication of the technical team whose rigorous field interactions and analytical work have made this assessment possible.
It is my earnest hope that this report serves not merely as a record of the present, but as a compass for the future. This will help in guiding Gujarat towards a fully digital, equitable, and sustainable rural drinking water system where every citizen has access to safe water, and every decision is driven by data.

Priyatu Mandal, IAS,
Director SPM-NIWAS

MESSAGE

Water is not merely a resource; it is a right. And the ability to govern it well, to monitor it transparently, and to deliver it reliably to every household is one of the most meaningful tests of a state's institutional commitment to its people. It is in this spirit that Arghyam is proud to have partnered with SPM NIWAS in the preparation of this As-Is Study Report on State IT Systems — Water Supply Department, Gujarat.

At Arghyam, our work has always been rooted in the belief that lasting change in the water sector requires more than infrastructure. It requires knowledge, accountability, and the systems to sustain both. This collaboration with SPM NIWAS is a natural expression of that belief. By bringing together the programmatic depth of SPM Niwas and Arghyam's long-standing engagement with water governance, this study offers something that neither institution could have produced alone. That includes a credible, field-grounded and analytically rigorous picture of where Gujarat stands in its digital journey, and what it will take to go further.

What stands out most about the Water Supply Department of Gujarat, is not any single system or application, but the strength of its coordinated institutional approach. The alignment between GWIL, GWSSB, and WASMO reflects a model where bulk supply, infrastructure development, and community-led service delivery function as parts of a larger, well-coordinated ecosystem. The state has steadily built a robust digital foundation through systems such as scheme tracking, ERP-enabled governance, GIS-based asset mapping, and structured grievance redressal mechanisms.

With this strong foundation in place, the next phase of evolution lies in further deepening integration and enabling more seamless data exchange across systems. Strengthening interoperability, advancing unified data platforms, and expanding the use of analytics and real-time insights can help unlock additional value from existing investments. These are not gaps, but natural opportunities that emerge as systems mature and scale. The direction forward is therefore one of thoughtful enhancement—building greater cohesion across already well-functioning systems while continuing to reinforce transparency, efficiency, and responsiveness.

This is where studies such as this one play an important role. A clear and grounded understanding of the current ecosystem enables institutions to move forward with alignment and purpose. It helps create a shared perspective across stakeholders, supporting informed decision-making and prioritization of future investments. It is hoped that this report contributes to that process by providing a structured view of the existing digital landscape in Gujarat and supporting the continued evolution of its water sector governance.

I am grateful to the WASMO team for their openness and engagement throughout this process, and to the SPM-NIWAS team for their partnership and rigour. I also wish to acknowledge the technical team whose field interactions, institutional conversations, and analytical work gave this report its texture and credibility. Arghyam remains committed to walking this journey alongside the states and institutions working to make safe water a lived reality for every Indian. We hope this report is a useful step on that path.

Anuj Sharma
CEO Arghyam

PREFACE

India's rural drinking water sector is undergoing a profound transformation. The Jal Jeevan Mission (JJM), launched in 2019, marked a decisive shift by committing to providing safe and adequate drinking water to every rural household. As the Mission transitions from its initial phase of rapid infrastructure creation to a phase focused on assured and sustained service delivery, the role of digital systems becomes increasingly critical. Ensuring reliability, quality, and accountability at scale requires a strong foundation of data-driven governance.

While flagship initiatives such as the Jal Jeevan Mission (JJM) have substantially expanded rural drinking water infrastructure across the country, ensuring equitable, reliable, and measurable service delivery at scale now requires a fundamentally stronger digital foundation. The next phase of transformation depends not merely on asset creation, but on building an interoperable, intelligent, secure, and scalable digital ecosystem capable of enabling data-driven governance, service monitoring, institutional coordination, and citizen-centric delivery.

In this context, the need for a sectoral Digital Public Infrastructure (DPI) for rural drinking water has emerged as a strategic national requirement. To support this objective, SPM-NIWAS and Arghyam jointly undertake a baseline assessment of existing digital solutions, platforms, and governance practices in the rural drinking water sector across selected states. The study aims to evaluate current digital maturity, identify interoperability gaps and sectoral challenges, and recommend appropriate DPI principles, characteristics, and architectural considerations to inform the sector's future vision, approach, and strategic roadmap.

India's experience with foundational and sectoral DPIs such as Aadhaar, Unified Payments Interface (UPI), and emerging digital ecosystems in health and agriculture demonstrates the transformative potential of federated, open, and interoperable digital architectures. In the rural drinking water sector, a DPI can enable seamless data exchange, improved coordination, and informed decision-making across stakeholders ranging from water sources and household taps to frontline functionaries and national institutions.

However, such a DPI must evolve from existing operational realities rather than be designed in isolation. It should build upon effective systems, address fragmentation, and strengthen areas that are inadequate. Accordingly, the As-Is Study of State IT Systems was undertaken as a foundational step toward developing a robust and contextually relevant DPI architecture for the sector.

This As-Is Study is conceived not as an audit, but as a diagnostic and collaborative exercise. The study seeks to identify existing gaps, assess institutional capacities, and understand operational realities across the sector. It adopts a multi-pronged approach comprising structured questionnaires across States and Union Territories, virtual consultations for broader stakeholder engagement, and in-person visits to selected states for deeper field-level insights.

To support a comprehensive assessment, a customized Digital Maturity Model for the rural drinking water sector has been developed. The model evaluates digital capabilities across multiple stakeholder layers, including citizens, frontline workers, implementing agencies, departments, and state-level functionaries, thereby enabling a holistic understanding of the ecosystem and informing future digital transformation strategies.

Among the states studied, Gujarat was identified for an in-depth assessment due to the scale, institutional strength, and operational breadth of its water service delivery architecture, as well as its demonstrated commitment to structured and program-driven governance. The Water Supply Department in Gujarat, is responsible for delivering safe drinking water and sanitation services to over four crore people through its three key arms. These are Gujarat Water Infrastructure Limited (GWIL), Gujarat Water Supply and Sewerage Board (GWSSB), and Water and Sanitation Management Organisation (WASMO). The department undertakes bulk transmission, distribution, treatment, and source development projects, along with their operation and maintenance, representing a comprehensive and multi-tiered institutional ecosystem. As WASMO looks after the rural drinking water supply side, the visit took place in the same department.

At the same time, Gujarat's experience reflects a critical insight: even with strong institutional frameworks and multiple advanced digital initiatives. The coexistence of diverse systems, such as the Scheme Tracking System (STS), ERP platforms, GIS mapping, laboratory systems, and grievance redressal mechanisms, reflects the state's strong and multi-dimensional approach to digital adoption. These systems collectively demonstrate Gujarat's commitment to leveraging technology across various aspects of water service delivery. As these initiatives continue to evolve, there is a valuable opportunity to further enhance interoperability, strengthen data integration, and enable more unified decision-making through a cohesive architectural framework. Such advancements can help amplify the impact of existing systems and serve as a model for broader sectoral and national-level digital transformation efforts.

This report presents a comprehensive understanding of the existing digital ecosystem of the Water Supply Department of Gujarat, based on stakeholder consultations, field interactions, system demonstrations, and analysis of available documentation. The findings highlight the state's significant progress in implementing structured digital systems. This includes end-to-end scheme monitoring, ERP-enabled governance, GIS-based asset mapping, water quality surveillance through integrated laboratory networks, and robust grievance redressal platforms. At the same time, they point to the need for greater system integration, unified data platforms, enhanced use of advanced analytics, and more citizen-centric transparency mechanisms to fully realize the potential of a digitally enabled water governance ecosystem.

It is hoped that the insights and recommendations presented in this report will support the department in its ongoing digital transformation efforts and serve as a reference for other states undertaking similar journeys. More broadly, this study aims to contribute meaningfully to the design and development of a unified, resilient, and scalable Rural Drinking Water DPI, one that builds on existing strengths, addresses systemic gaps, and advances the long-term goal of ensuring safe, reliable, and sustainable drinking water for every rural household.

ACKNOWLEDGEMENT

The successful completion of this As-Is Study has been made possible through the invaluable support, cooperation, and openness of the Water Supply Department, Government of Gujarat, particularly the teams from WASMO and GWSSB. The department's willingness to engage constructively and share insights into its existing IT systems, processes, and institutional practices has been instrumental in enabling a comprehensive and meaningful assessment.

The openness in sharing detailed information on digital applications, operational workflows, and implementation practices significantly contributed to the depth and quality of this study. The opportunity to engage in in-person discussions with departmental leadership and technical teams provided a well-rounded understanding of the digital ecosystem and its role in strengthening rural water service delivery across the state.

Special acknowledgement is extended to **Ms. Stuti Charan, IAS, Chief Executive Officer, WASMO**, for her leadership and guidance. Sincere appreciation is also extended to **Shri Hemant Rajput** (Superintending Engineer, GWSSB), **Shri Rahul Solanki** (Superintending Engineer, GWSSB), **Shri Manish Modi** (Civil Engineer, GWSSB), **Shri Khant Shah** (Senior Consultant, WASMO), and **Shri Dhananjay Dwedi** (Consumers Grievance Cell) for their valuable inputs and technical insights during the interactions.
The department extended full support in facilitating structured discussions, system walkthroughs, and interactions with relevant teams. Their openness and responsiveness enabled seamless access to information and perspectives, which proved essential in developing an evidence-based understanding of the state's digital landscape.

This collaboration reflects the department's strong commitment to advancing digital transformation and strengthening water service delivery systems. Their insights and cooperation have significantly enriched this study and contributed to shaping a grounded and actionable assessment.

TECHNICAL NOTE

Towards Making a Drinking Water Digital Public Infrastructure (DW-DPI): Conceptualising the Digital Water Ecosystem of India

India's rural drinking water sector stands at a transformative juncture. Following the rapid expansion of infrastructure under the Jal Jeevan Mission (JJM), the sector's focus is now shifting toward long-term sustainability, operational efficiency, water quality assurance, and citizen-centric service delivery. This transition requires not only physical assets but also a robust digital foundation capable of enabling real-time governance, interoperability, accountability, and innovation across the ecosystem.

In this context, the need for a sectoral Digital Public Infrastructure (DPI) for rural drinking water has emerged as both a strategic and operational imperative. To inform this transition, these studies were undertaken to assess the sector's current digital maturity, identify interoperability gaps, understand operational and institutional challenges, and define key principles, architectural considerations, and building blocks required for a future-ready ecosystem.

Accordingly, detailed field studies and stakeholder consultations were conducted across multiple states. Comprehensive "As-Is Study Reports" were developed for Assam, West Bengal, Punjab, Gujarat, and Rajasthan, along with a consolidated national report. These studies document existing digital systems, institutional processes, data flows, governance mechanisms, and technological maturity within the sector. The insights derived from these reports serve as foundational inputs for shaping the strategic vision, implementation roadmap, and policy framework for a National Drinking Water Digital Public Infrastructure (DW-DPI).

The findings indicate that the next phase of sectoral transformation must be anchored in a federated, interoperable, and standards-driven digital ecosystem. The objective is not to build another centralized platform, but to establish common digital rails that connect schemes, assets, laboratories, institutions, field functionaries, and citizens. Such an approach enables seamless data exchange, reduces fragmentation, and fosters innovation across states and ecosystem participants.

A key priority in this journey is the creation of authoritative digital registries for water assets, schemes, laboratories, service entities, and sources. These registries will act as trusted "single sources of truth," enabling lifecycle management, traceability, and data consistency across administrative and technological boundaries. Complementing this, the sector must adopt common metadata standards, open APIs, device interoperability specifications, and shared vocabularies to ensure seamless collaboration.

The integration of emerging technologies—including IoT-enabled monitoring, GIS-based asset mapping, SCADA systems, AI-driven analytics, and advanced water quality surveillance—will further strengthen operational resilience and enable proactive decision-making. However, technology adoption must remain aligned with field realities, sustainability considerations, and long-term maintainability.

Equally critical is the need for strong data governance, cybersecurity, and trust frameworks. As digital systems and operational technologies converge, ensuring secure, reliable, and privacy-aware data exchange becomes essential. Robust mechanisms for access control, auditability, and authentication will be key to building confidence across stakeholders.

The transformation must also prioritize the empowerment of frontline institutions. Village Water and Sanitation Committees, Gram Panchayats, engineers, and field operators form the backbone of service delivery. Providing them with mobile-first, multilingual, and user-friendly tools—supported by capacity building and institutional strengthening—will be central to success.

Finally, an open and interoperable DPI ecosystem can catalyze participation from innovators, startups, research institutions, and civil society, enabling scalable solutions without fragmentation or vendor lock-in.

The journey toward DW-DPI is ultimately a governance transformation—shifting the sector from reactive operations to proactive, data-driven service delivery. By building trusted digital foundations today, India can ensure safe, reliable, and sustainable drinking water for all.

“Think Federated, Build Trusted, Scale Sustainably.”

The Technical Team consisting of Mr. C.K. Dhar, Chief Technology Officer, SPM-NIWAS; Mr. Manu Srivastava, COO, Arghyam; Mr. Deepak Gupta, Director Digital Infrastructure, Arghyam, Dr. Prerna Pandey, Consultant Arghyam, which undertook this study under the active guidance of Mr. Ashok Kumar Meena , Secretary; Mr. Kamal Kishore Soan, Additional Secretary & Mission Director; Ms. Swati Meena, Joint Secretary (JJM); Pradeep Singh, Director; Ms. Ankita Chakravarty, Deputy Secretary, Department of Drinking Water and Sanitation (DDWS) extends its sincere gratitude to the officers of DDWS, Mr. Mohammad Ishfaq , Advisor, SPM-NIWAS, Mr. Prasenjit Paul, Consultant, SPM-NIWAS and all participating individuals, institutions and State officials who actively contributed to the study through their valuable insights, experiences and continuous support during the process.

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Executive Summary

The **Water Supply Department Gujarat**, is responsible for delivering safe drinking water and sanitation services to over four crore people in the state through its three arms— **Gujarat Water Infrastructure Limited (GWIL), Gujarat Water Supply and Sewerage Board (GWSSB), and Water and Sanitation Management Organisation (WASMO)**. The department undertakes bulk transmission, distribution, treatment, and source development projects, along with their operation and maintenance.

The **broader division of responsibilities** of the three governing bodies is depicted in Figure 1 below.

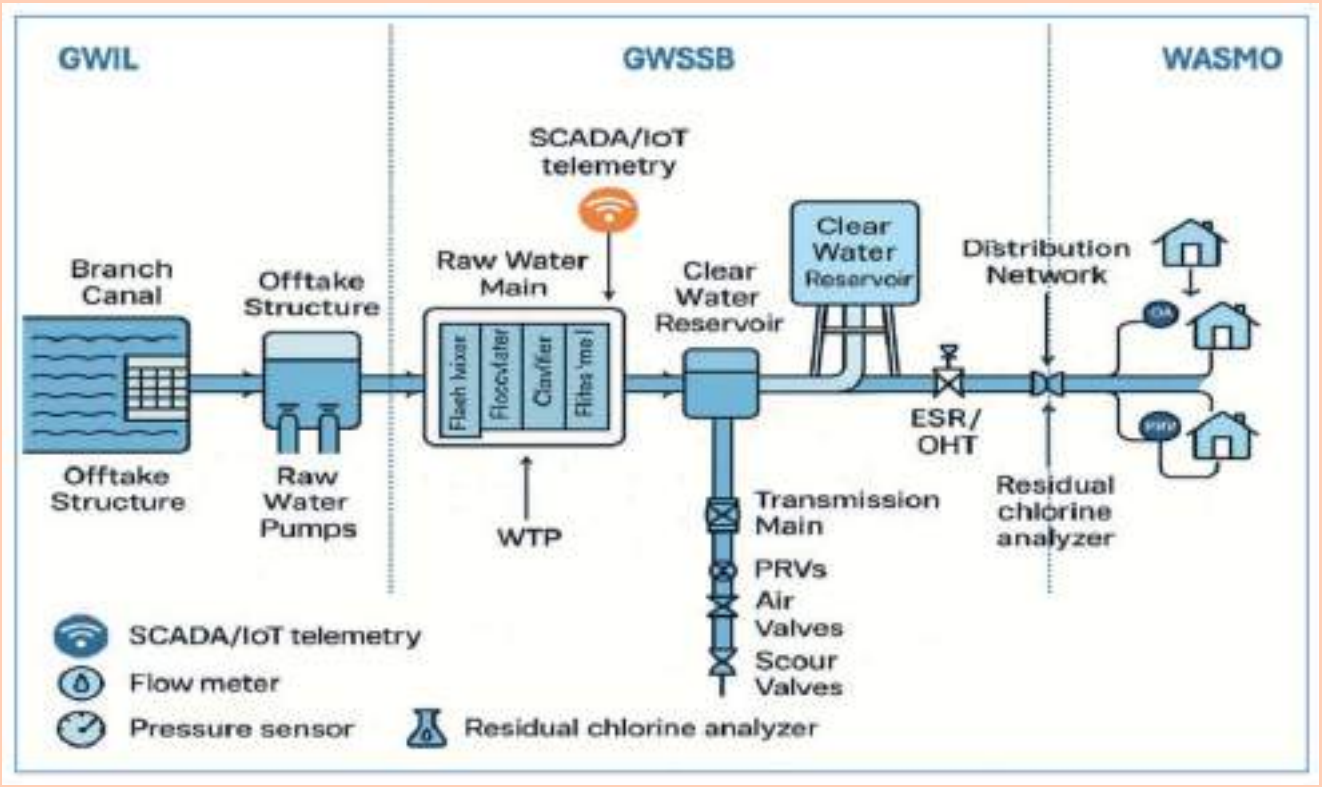

Figure 1: Block diagram on water supply

Rural water supply schemes under the **Jal Jeevan Mission (JJM)** in Gujarat are designed to deliver water at a service level of **70 litres per capita per day (LPCD)**. To ensure resilience and sustainability, the system is engineered with an additional **35% buffer capacity**, allowing the network to accommodate **future uncertainties in demand, seasonal fluctuations, and population growth**. For infrastructure, the state has adopted **PVC pipes** for the distribution network, which are widely used due to their durability, ease of installation, and cost-effectiveness. As of now, Gujarat records a **72% satisfaction rate among rural households** with respect to the provision of **Functional Household Tap Connections (FHTCs)**.

35%

BUFFER CAPACITY

72%

SATISFACTION RATE

99%

COMPLAINTS RESOLVED SUCCESSFULLY

The state operates approximately **18,225 water supply schemes** across villages, reflecting the scale and outreach of its efforts to ensure safe and adequate drinking water for all.
To enhance efficiency and service delivery, GWSSB has implemented a **comprehensive Enterprise IT Solution** comprising a centralized **Web Portal (ERP system)** and a **mobile application**.

This integrated platform enables end-to-end, paperless management of core functions such as project conceptualization, execution, monitoring, operations and maintenance, grievance redressal, fund management, procurement, HR, and reporting. It facilitates real-time tracking of civil infrastructure projects, budget utilization, and tender processes, while also generating detailed reports. With secure, role-based access and online audit trails, the system strengthens organizational performance, ensures faster project delivery, enhances accountability, and provides robust citizen-centric grievance redressal mechanisms.

The **Jal Sampark application** has been developed as a field-level tool, primarily used by **PHED engineers, pump operators, Jal Samitis, and other frontline workers** to update and manage information about the rural water supply network. The application is built around three core functions—**Inspect, Attendance, and Close**. A reported problem is first **inspected** by the responsible person, and their entire journey from the starting location to the problem site is **geo-tracked** by the application. Before beginning the repair, the field staff mark **attendance** by uploading a self-photo at their origin point and again at the site, creating clear traceability of the visit.

Once the issue is resolved on the ground, the staff member must **close** the ticket by uploading a photograph of the repaired asset or resolved problem. The application automatically captures the **latitude, longitude, time, and date**, ensuring verifiable evidence of resolution. In addition, the system uses a **dropdown-based complaint registration menu**, which helps classify issues accurately (e.g., leakage, pump failure, low pressure). All updates from Jal Sampark are seamlessly pushed to the **ERP platform via APIs**, allowing supervisors to track the status of grievances, inspections, and repairs in real time.

The **1916 grievance redressal call centre** is one of the most effective mechanisms for addressing consumer issues in Gujarat's rural water supply sector. Developed under **WASMO**, this initiative has transformed grievance management into a **responsive, transparent, and citizen-friendly system**. With more than **99% of complaints resolved successfully**, it has set a strong benchmark for **consumer satisfaction, accountability, and efficiency** in public service delivery.

The **Hand Pump Grievance Redressal Application** has been developed exclusively for consumers who rely on handpumps (especially in tribal areas) for their daily water needs. There are more than 8,000 hand pumps installed across the state. Overconsumption or the end of a hand pump's operational life often causes the water table to fall below the desired level, creating supply challenges for users. In addition, the presence of certain minerals in groundwater sometimes leads to **water quality issues**.

This dedicated application has been introduced in the state to address such problems more efficiently and ensure the timely resolution of complaints.

Bulk water metering and IoT-based monitoring are managed through a **central command centre at WASMO**, operated by the private vendor **Endress+Hauser**. The vendor has installed sensors at key points—primarily in front of pumping stations within the distribution network—that record **flow, pressure, chlorine levels, and Total Dissolved Solids (TDS)** at five-minute intervals each day. Along with monitoring, the vendor is responsible for the **management and maintenance** of these devices. The system also benefits from **geo-tagging**, as the sensors are linked with the state's asset mapping database, ensuring precise location tracking. This integration of bulk metering and IoT not only strengthens **real-time visibility of water quantity and quality** but also supports proactive management, early anomaly detection, and accountability, moving Gujarat closer to a **smart water grid model**.

The **Gujarat Jalseva Training Institute (GJTI)** serves as an institution for training and capacity building in the water and sanitation sector under GWSSB.

It conducts regular **programmes, workshops, and seminars** for engineers, field staff, Pani Samitis, and Gram Panchayats, covering both **technical aspects** such as construction, O&M, and water quality monitoring, as well as **social aspects** like participatory planning and tariff setting. GJTI plays a central role in **Water Quality Monitoring & Surveillance (WQMS)** by training community members and laboratory staff in the use of **Field Test Kits (FTKs)** and linking results with digital platforms like LIMS and WQMIS. To strengthen practical learning, it organizes **exposure visits** to model villages where community-managed water systems are successful, enabling participants to see real-life applications. The institute also develops and shares extensive **training manuals, IEC content, and lecture materials**, with many resources available online, including on YouTube.

Before the launch of the **Jal Jeevan Mission (JJM)** in 2019, Gujarat had already been actively pursuing rural water supply initiatives since **2002** under its own **state-level mission**. The state pioneered large-scale investments in **regional water supply schemes, bulk water transfer through canals, and the creation of a state water grid** to address the challenges of arid regions like Kutch and Saurashtra. This early start provided Gujarat with a strong institutional framework and infrastructure base, enabling smoother integration and faster progress once the JJM was rolled out nationally.

Highlights

1. Scheme Tracking System (STS)

The **Scheme Tracking System (STS)** under GWSSB provides a **digital platform for end-to-end tracking of water supply schemes and projects**. It monitors progress from conceptualization to execution, ensuring accountability, timely updates, and effective coverage monitoring. The system links data on **WTPs, pumping stations, pipelines, and village-level connections**, allowing engineers and administrators to track status at multiple levels.

2. Grievance Redressal Mechanism

Gujarat has established a robust **grievance redressal mechanism** for rural water supply. Citizens can raise complaints through the **1916 toll-free helpline** and the **Hand Pump Grievance App**, with all complaints logged digitally, geo-tagged, and forwarded to the relevant division (Civil, Mechanical, WASMO) for resolution.

In parallel, the **Jal Sampark application** is used by **engineers, pump operators, and frontline staff** to inspect issues, mark attendance, and close tickets with photo and geo-tagged evidence. Together, these systems ensure responsive grievance handling, with over **99% of complaints successfully resolved**.

3. Call Centre for Customer Feedback

A proactive call centre is operational for **measuring citizen satisfaction**, particularly in rural water supply schemes.

4. ERP & HR Modules

Since **May 2020**, the department's **ERP system (developed by In2IT Technologies)** has become the digital backbone for governance. It includes modules for **project monitoring, O&M, procurement, finance, and HR**.

HR modules manage **leave, payroll, transfers, and postings**, while integrated mobile apps like **Jal Sampark** allow field-level updates. This has streamlined administrative workflows and enabled **paperless governance**.

5. GIS Mapping Initiatives

With support from **BISAG and PM GatiShakti**, GWSSB has mapped critical water infrastructure such as **pumping stations, reservoirs, pipelines, and ponds** using GIS. This enables **accurate asset tracking, geo-tagging of IoT devices**, and better planning of future schemes. GIS-based mapping also strengthens cross-sector planning, linking water schemes with other infrastructure like roads and power lines.

6. Water Quality Monitoring

Water quality is monitored using a **two-tier system**: **80% through Field Test Kits (FTKs)** and **20% through laboratories**. Gujarat has **283 block-level labs, 33 district labs, and 1 state-level lab**, all integrated through the **Lab Information Management System (LIMS)**. Results are uploaded into **WQMIS**, ensuring transparency.

IoT-based sensors further monitor **chlorine, turbidity, and TDS** at pumping stations, linking quality assurance to real-time operations.

7. MIS & Reporting Dashboards (Internal)

The ERP and STS systems generate **role-based dashboards** for different administrative levels (HO, Zone, Circle, Division, Subdivision). These dashboards track **scheme progress, fund utilization, grievance pendency, pumping station status, and water quality compliance**. Engineers and administrators rely on these dashboards for **real-time decision-making** and performance monitoring.

8. Tendering & E-Procurement Integration

The department uses **government e-procurement platforms** to handle tenders, ensuring transparency, efficiency, and compliance with state digitization initiatives. Through this system, vendors and contractors can access tender notices, submit bids, and track contract status online, minimizing manual intervention and reducing delays.

Strategic improvement area

1. Citizen-Facing Dashboards

- **Issue:** No real-time dashboards are available for citizens to view water supply status, scheme coverage, or water quality.
- **Impact:** Limited transparency leads to reduced citizen trust and weaker accountability.
- **Recommendation:** Develop **public-facing dashboards** linked to ERP, WQMIS, and IoT data, displaying village-level supply status, quality reports, and grievance resolution progress

2. Data Lake & Unified Information Store

- **Issue:** Information is fragmented across systems (STS, labs, grievance redressal, HR).
- **Impact:** Lack of integration prevents comprehensive analytics, slows decision-making, and duplicates efforts.
- **Recommendation:** Establish a **centralized data lake/Unified Virtual Information Store** to consolidate datasets from all digital initiatives, enabling seamless analysis and cross-departmental use.

3. Advanced Analytics & AI

- **Issue:** Limited use of predictive analytics for demand forecasting, leak detection, or scheme performance monitoring.
- **Impact:** Reactive management continues, with missed opportunities for early intervention and optimization.
- **Recommendation:** Introduce **AI/ML models** for **demand forecasting, anomaly detection, and predictive maintenance**, integrated with ERP and IoT systems.

4. Water Quality Transparency

- **Issue:** While labs and FTKs test water, citizens cannot easily access real-time local water quality results.
- **Impact:** Communities remain unaware of water safety, reducing confidence in service delivery.
- **Recommendation:** Publish **village-level water quality results** on public dashboards and mobile apps, updated directly from LIMS/WQMIS.

5. Integration of Disparate Systems

- **Issue:** Systems like STS, ERP, grievance portals, IoT devices, and GIS mapping operate in silos.
- **Impact:** Duplication of work, inconsistent data, and weak flow of information across platforms.
- **Recommendation:** Create a unified digital platform with APIs, ensuring interoperability and a single source of truth across all water sector applications.

6. Enhancing Mobile Applications

- **Issue:** Existing apps (e.g., Jal Sampark) are primarily staff-facing and limited in scope.
- **Impact:** Citizens, contractors, and many frontline workers lack mobile tools for reporting and engagement.
- **Recommendation:** Expand the mobile application ecosystem with role-specific apps for citizens, contractors, pump operators, and supervisors, integrated with ERP and grievance systems.

7. Data-Driven Decision Making

- **Issue:** Although data is collected, analytics and modelling are underutilized in decision-making.
- **Impact:** Resource allocation and supply chain management remain suboptimal.
- **Recommendation:** Institutionalize data-driven governance, using analytics to predict demand, plan schemes, and optimize O&M, with insights fed into management dashboards and review processes.

Measurement of IT Advancement Capabilities

The development of IT applications in the rural drinking water sector across India is a mixed bag, with some States/UTs showcasing robust digital ecosystems, while others have yet to fully embrace the use of digital technology. Therefore, a States Information Systems **Digital Maturity Model (DMM)** has been developed to systematically measure, improve, and manage the States/UTs IT capabilities in the rural drinking water sector over time. The DMM is a structured framework for assessing the maturity of advancements in IT systems & applications in states's Rural Drinking Water Management. The model would provide structured inputs for IT governance and strategic digital transformation planning of States/UTs.

The model adopts a holistic, stakeholder-centric view of the rural water supply ecosystem, organizing stakeholders into five layers with citizens at the core: **Citizens, Frontline Workers, Agencies, Departments, and State Functionaries.**

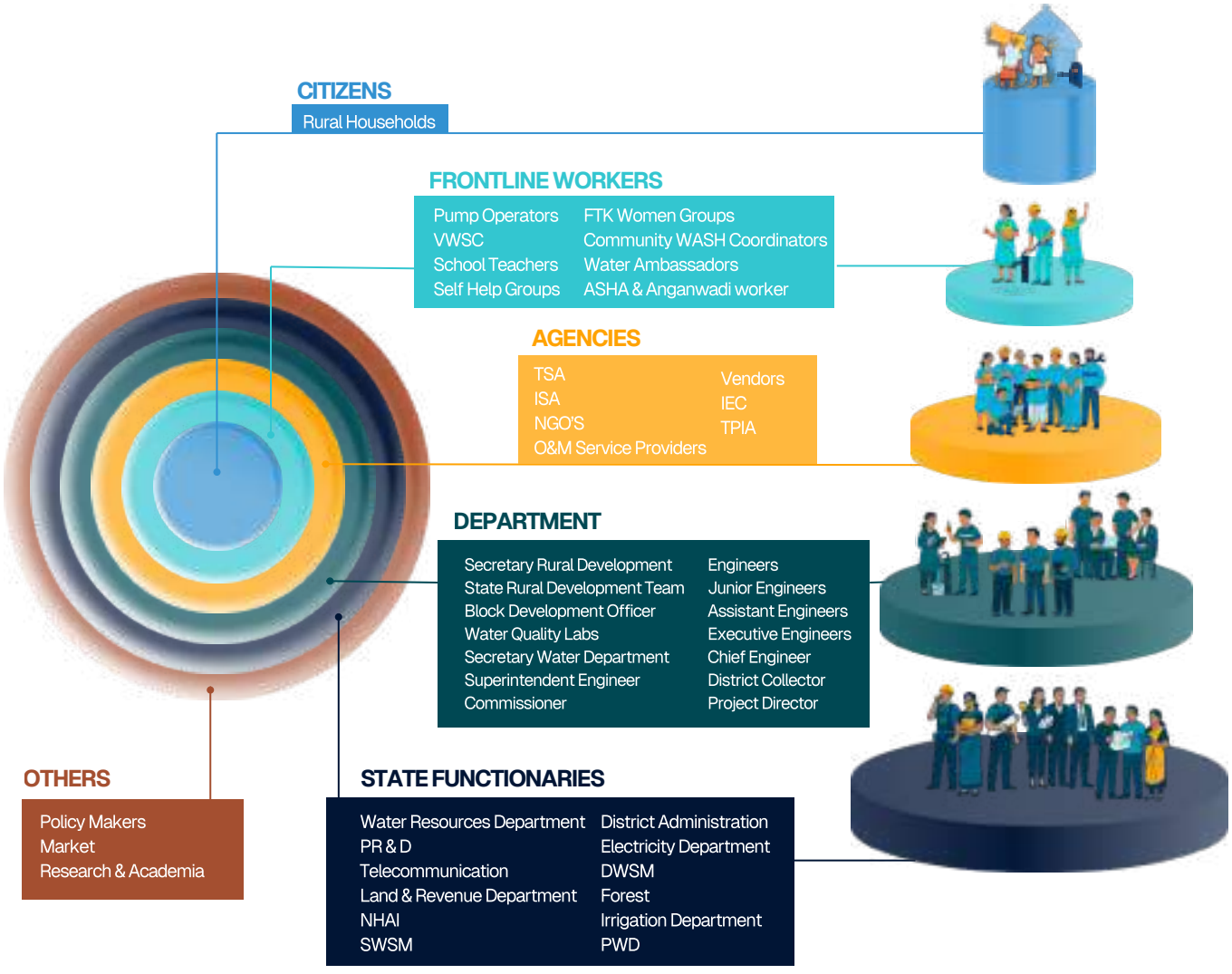

Figure 2: Stakeholders Mapping - State IT Systems

Based on a comprehensive analysis of water departments across several states, the above figure illustrates a holistic view of the stakeholders involved in the rural water management ecosystem. While the specific names and numbers of stakeholders may vary by state, this representation broadly captures the full spectrum of actors typically engaged in the system.

Guiding Principles

The Digital Maturity Model (DMM) is built on six foundational principles that ensure that digital transformation efforts in the rural drinking water sector under the Jal Jeevan Mission (JJM) are effective, inclusive, and sustainable.

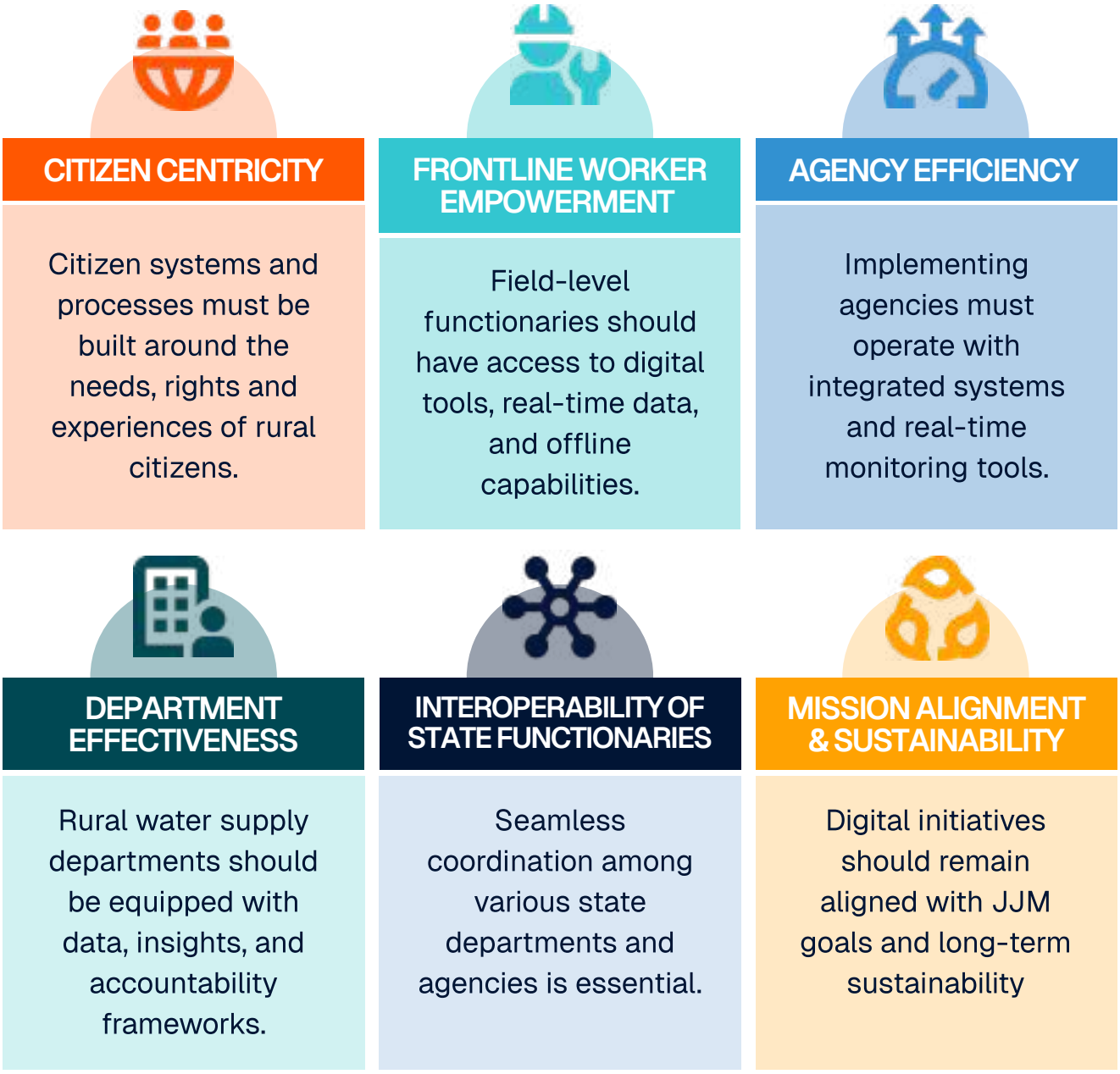

Figure 3: DMM Guiding Principles

These guiding principles ensure that digital maturity assessment under the DMM remains not just technically robust but also socially relevant and mission-aligned. The model defines seven distinct capability areas per layer —except for Departments, which have fourteen distinct capabilities— resulting in forty-two unique capabilities system-wide. In addition, seven common capability areas, applicable across the ecosystem are grouped under a separate **Common Capabilities** layer to avoid duplication. Two foundational layers further support this model: the **Technology Foundation** layer, covering seven core application-related capabilities, and the **Infrastructure** layer, which includes seven capabilities related to hardware and connectivity.

In total, the model defines sixty-three capabilities across eight layers, with each capability evaluated against four maturity levels: **Not Assessed, Aspiring, Performing, and Leading**.

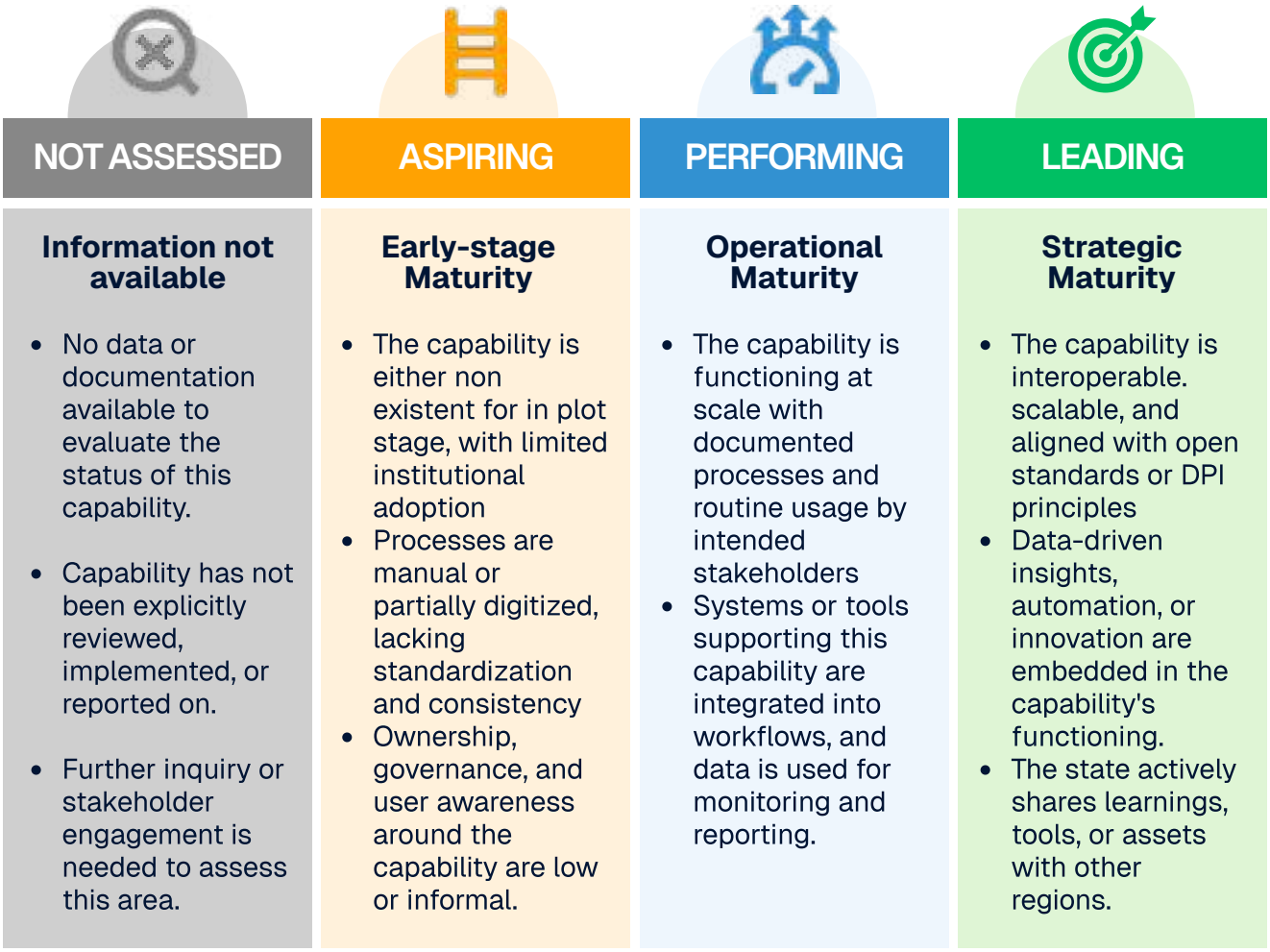

Figure 4: DMM Maturity Levels

Digital Maturity Model (DMM)

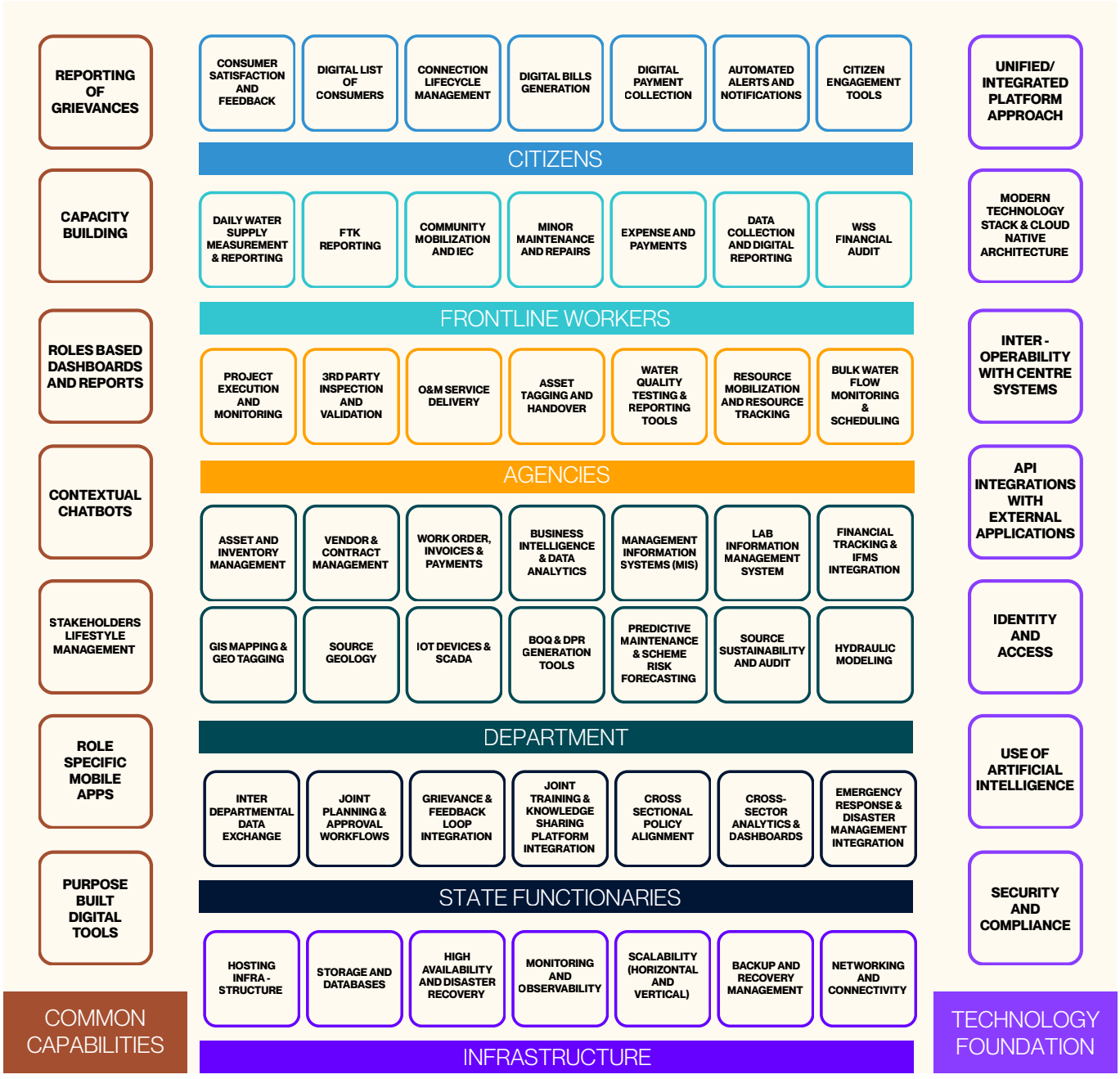

Figure 5: State IT Systems- Digital Maturity Model (DMM)

Gujarat IT Capabilities Mapping

Based on a two-day on-site As-Is Study visit to GWSSB (Gujarat Water Supply and Sewerage Board), this report attempts to map the capabilities of Gujarat GWSSB IT systems using the DMM framework.

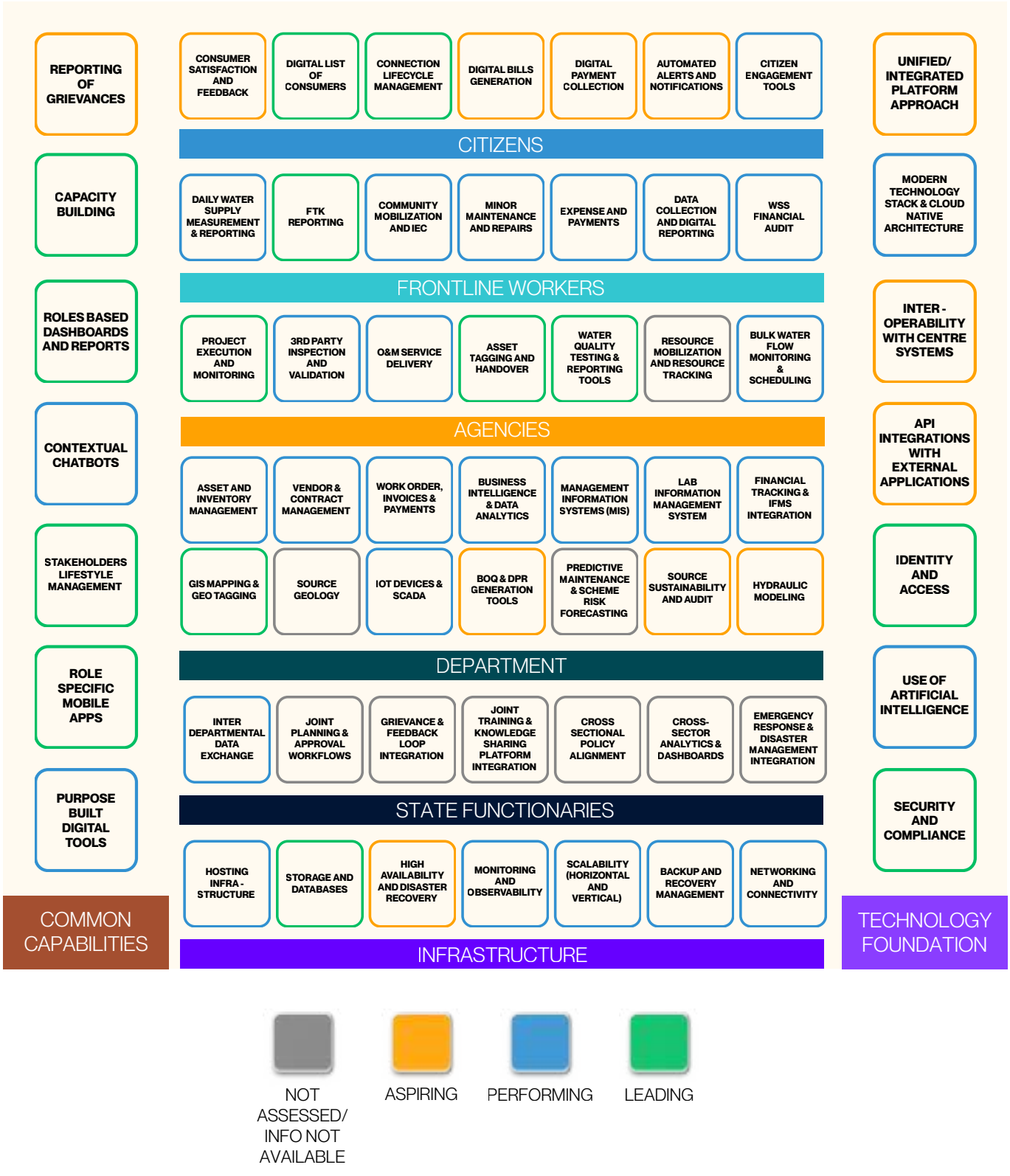

Figure 6: State IT Systems- Gujarat's GWSSB IT Capabilities Scorecard

Digital Landscape

GUJARAT HAS ONE OF THE MOST EXTENSIVE RURAL WATER SUPPLY SYSTEMS IN THE COUNTRY, WITH NEARLY **15,000 OUT OF 18,592 SCHEMES** DEPENDENT ON **SURFACE WATER SOURCES**.

15,000
SCHEMES

To better distinguish the design and functioning of these schemes, the government has classified them into **three distinct levels**, each representing a critical stage in the supply chain from source to household.

- **Level 1** refers to the stage where water is lifted directly from the **intake well or source** using large-diameter pipelines for bulk transmission. This forms the backbone of the supply network, ensuring that raw water is conveyed from surface sources into the main system.
- **Level 2**, known as the **Individual Water Supply Scheme (IWSS)**, covers **in-village and household-level distribution**. At this level, water is delivered to communities and households, ensuring that each family receives safe drinking water through Functional Household Tap Connections (FHTCs). IWSS represents the last-mile infrastructure, focusing on access and equity at the consumer level.
- **Level 3**, the **Regional Water Supply Scheme (RWSS)**, represents large-scale, multi-village systems. Here, water from the surface source is pumped to a **Water Treatment Plant (WTP)**, treated to meet quality standards, and then supplied through a regional grid to several villages. RWSS ensures economies of scale, reliable treatment, and regional-level service delivery.

Together, this **three-level structure (Level 1 → Level 2/IWSS → Level 3/RWSS)** creates a comprehensive framework for water supply in Gujarat. It balances bulk water transfer, regional distribution, and individual household access, making it one of the most robust state-managed systems in India.

Based on the above classification, GWSSB has defined different patterns of the scheme based on their sources as follows:

Individual Water Supply Scheme (IWWS): An Individual Water Supply Scheme is formulated for those villages or hamlets where sufficient water is available from local sources. The scheme is handed over to the Gram Panchayat for operation and maintenance after its formulation and successful implementation.

Regional Water Supply Scheme (RWSS): Adequate and potable drinking water is supplied through regional water supply schemes comprising more than one village, where local drinking water sources yield insufficient water or the water is non-potable. In this situation, water is fetched from remote water sources. Regional water supply schemes are taken up under the Rural Water Supply Programme. These regional water supply schemes are based on reliable sources like tube wells (underground sources) or surface water sources (dams or Narmada water).

Citizens Applications

Capability Matrix

Below table outlines the mapping of a Capability from DMM to the Gujarat IT systems for consumers/citizens.

 CONSUMER SATISFACTION SURVEY/FEEDBACK	The Consumer Satisfaction Survey Call Centre is housed at the WASMO building and is operated with technical support from BSNL. On average, 700 calls per day are made from this call centre. Approx. 4.5 lakh calls have been made till date. The process is streamlined but not integrated with other IT applications, therefore, there is human intervention involved in transferring the data back and forth.
DIGITAL LIST OF CONSUMERS	At present, there is no comprehensive process to manage and maintain a digital list of consumers. For purpose such as the Consumer Satisfaction Call Centre, the consumer list is collected from multiple sources like ASHA workers, doctors, ration shops, etc.
CONNECTION LIFECYCLE MANAGEMENT	Such management is not happening yet; however, the department plans to introduce a digital Connection Lifecycle Management system to streamline new connections, transfers, and closures, ensuring greater efficiency and transparency.
DIGITAL BILLS GENERATION	Bills are not getting generated digitally at present. However, the tariff is fixed at a rate of Rs. 2/1000 Liters.
DIGITAL PAYMENT COLLECTION	Payment collection happens manually.
AUTOMATED ALERTS AND NOTIFICATIONS	The department is exploring the implementation of automated alerts and notifications to further enhance responsiveness and citizen engagement.
CITIZEN ENGAGEMENT TOOLS	A minimum level of citizen engagement activity takes place on the ground, conducted by Pani Samitis or VWSCs. In addition, Gujarat also celebrates a Jal Utsav festival in order to promote water conservation, making citizens a medium for the same.

REPORTING OF GRIEVANCES

The GWSSB and WASMO have established effective grievance redressal mechanisms through the 1916 toll-free helpline, ensuring citizens' water supply issues are addressed promptly and transparently. The Jal Sampark mobile application performs evidence-based tracking and closure of grievances. A separate mobile app exists for raising hand pump-related grievances. Overall, the process adherence for grievance management is conducive. This includes raising suo-moto grievances via television news, print media, radio, and social media. Suo-moto grievances are also raised based on customer satisfaction surveys.

CAPACITY BUILDING

Citizen training includes community-led planning, water source mapping, and formulation of solutions for long-term water security. Committees are trained in WASH practices and scheme maintenance.

ROLE-BASED DASHBOARDS AND REPORTS

No consumer-facing dashboards have been developed.

CONTEXTUAL CHATBOTS

No contextual chatbots are present in the system currently, but there is a plan to develop them.

STAKEHOLDER LIFECYCLE MANAGEMENT

There is no mechanism for end-to-end lifecycle management. However, online water connection applications are supported.

ROLE-SPECIFIC MOBILE APPS

There are no citizen-facing mobile applications yet.

PURPOSE-BUILT DIGITAL TOOLS

There is no information about additional purpose-built digital tools.

Grievance Redressal

The **1916 toll-free helpline** stands out as one of the most impactful digital governance tools introduced by the Government of Gujarat, led by WASMO. It has transformed grievance redressal in the rural water supply sector into a responsive, transparent, and citizen-friendly system. By bridging the gap between consumers and service providers, the platform has become a trusted medium for villagers to raise concerns, track their resolution, and feel assured that their voices matter. With over **99% of complaints** resolved successfully, the initiative has set a benchmark for consumer satisfaction and accountability in public service delivery. Complaints are recorded and maintained through a form-based system, which is used by the operators to capture caller details and grievance information for further action.

How the System Works

EASY ACCESS TO COMPLAINTS

Residents of rural Gujarat dial the toll-free number 1916 to report water supply issues—ranging from non-availability of water, leakages, pump or borewell failures, water quality concerns, and operator absenteeism, to pipeline disruptions, theft, and hand pump or solar panel repairs. Complaints can also be raised through email or online modes, making the system highly accessible.

STRUCTURED REGISTRATION & TRACKING

Once a complaint is received, details such as the complainant's name, village, taluka, district, and mobile number are uploaded onto the ERP portal. The citizen immediately receives a unique complaint number via SMS and email, ensuring transparency and easy tracking.

RESOLUTION & FEEDBACK LOOP

After the problem is addressed on the ground, the ERP portal is updated to reflect the resolution. The complainant is notified instantly through SMS, and in most cases, officials follow up with a confirmation call to verify satisfaction and collect feedback. This closed-loop mechanism strengthens accountability and ensures citizen trust.

AUTOMATED FORWARDING & SWIFT RESPONSE

The system not only routes the complaint automatically to the concerned division—Civil, Mechanical, or WASMO—but also ensures real-time notification to the respective district officials, who are expected to resolve the issue within 48 hours. Importantly, the process incorporates a field-level tracking mechanism: the personnel assigned to repair the asset or address the complaint are themselves tracked through the system. Once the repair work is completed, the field staff are required to capture a photograph of the damaged asset or problem site and upload it to the ERP portal. Along with the image, the system automatically records the latitude and longitude of the location, creating a verifiable digital trail of the grievance redressal process. This feature not only strengthens accountability and transparency but also provides an evidence-based record of resolution for both officials and citizens.

Proven Impact of the approach;

SINCE LAUNCH	2023–24	JAN 2024–MAR 2025
2,22,116 COMPLAINTS	89,410 COMPLAINTS	65,553 COMPLAINTS
2,21,364 RESOLVED (~99.66%)	88,992 RESOLVED (~99.53%)	65,509 RESOLVED (~99.93%)

Why the 1916 Platform Stands Out

- **Streamlined, Paperless Workflow**
  Replacing past approaches using WhatsApp and Excel—with their limitations of unclear data, delays, and reporting inertia—the 1916 system now ensures structured, transparent grievance handling. Data integrity and reporting accuracy have improved significantly.

- **Citizen-Centric & Trust-Building**
  Automated updates, rapid resolution, and follow-up feedback loops instil trust and ensure accountability—creating a responsive governance loop that citizens notice.

- **Data-Driven Efficiency & Monitoring**
  Integrated within the ERP, the portal allows senior officials to monitor grievance patterns, response timelines, and workload distribution—enabling real-time performance tracking. The system is equipped to detect repeated or false complaints. In cases where such complaints are submitted three times in a row, the consumer's access to raise further grievances is temporarily restricted, helping ensure the platform remains fair and effective for genuine users.

Figure 7: Process flow of 1916 grievance call

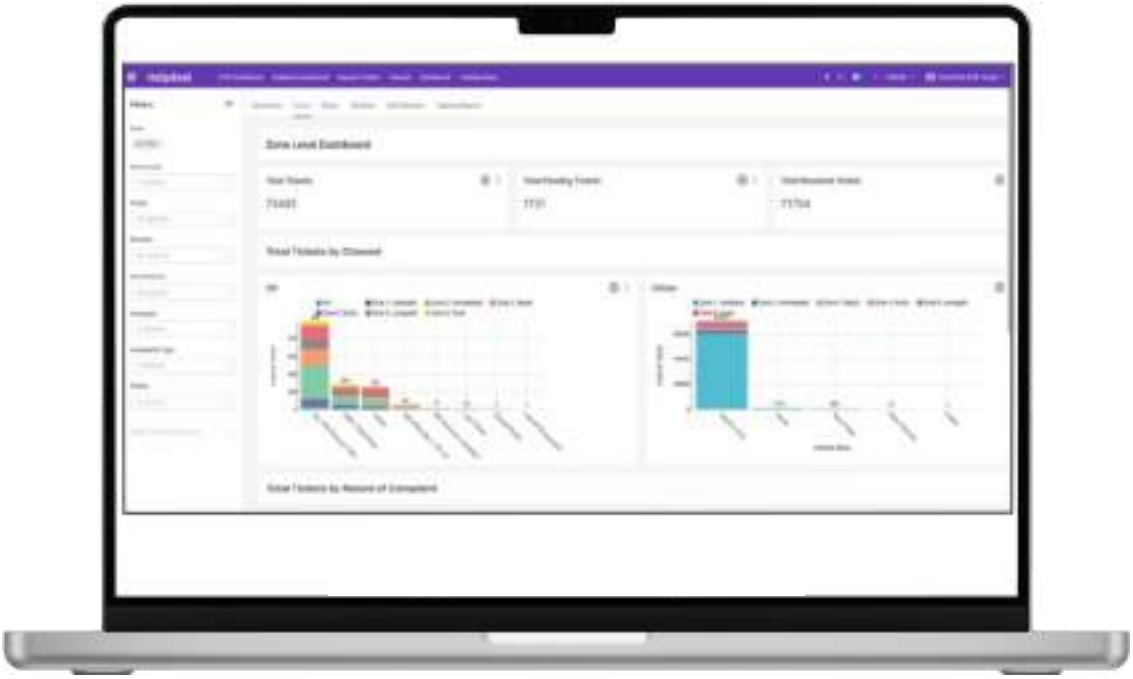

Figure 8: Dashboard in ERP system

Grievance Data Analytics

Grievance data analytics provides actionable insights into consumer complaints and departmental performance. While Power BI is currently used as the **analysis tool**, the process is platform-independent and can be performed using any analytics software, as it is not part of **GWSSB's core ERP system**.

1. DATASET STRUCTURE

The grievance dataset is standardized to capture the following fields:

- **Ticket Number** – A unique identifier for each grievance.
- **Location Details** – Village, taluka, or scheme-level identification.
- **Type of Issue and Sub-category** – such as leakage, pump failure, low pressure, or water quality.
- **Key Dates** – including complaint receipt, assignment, and resolution.
- **Assigned Office** – the responsible division, subdivision, or agency.
- **Associated Assets** – nearest headworks, pumping stations, or multi-village schemes linked to the grievance.

2. ANALYTICS PERFORMED

The data is analyzed along multiple dimensions, including:

- **Geographic Hotspots:** Identifying locations, villages, or schemes with the highest volume of complaints.
- **Category-wise Assessment:** Breaking down complaints by type to see the most common service-related issues.
- **Resolution Times:** Measuring the average time taken to resolve grievances and identifying bottlenecks.
- **Critical Areas:** Highlighting priority zones such as multi-village schemes (MVS) or habitations with repeated complaints.
- **Pendency & Ageing Reports:** Tracking unresolved grievances and categorizing them by age (e.g., <7 days, 7–30 days, >30 days).

3. USAGE OF REPORTS

- **Management Reviews:** The analytical outputs are presented during weekly or fortnightly management review meetings.
- **Operational Feedback:** Reports are shared with field offices to guide corrective measures and improve service delivery.
- **Non-Public Reports:** These analytics are for internal use only and are not published on public portals, maintaining operational confidentiality.

In addition to consumers' reported grievances, there is a systematic process to capture **suo-moto grievances** from the newspapers, social media platforms, news channels, television, and radio. The diligence of the process is reflected by the fact that, when a grievance is raised from the newspaper, the newspaper cutting, along with the date of reporting and **ERP ticket number**, is maintained in a secure album. Year-wise albums of such grievances are maintained in the grievance centre.


પાણી છોડાતાં જ 35થી 40 ફૂટ ઊંચો ફુવારો ઉડ્યો
સંખેડામાં નવીન થાંભલો નાખતી વખતે પાણીની લાઈનમાં ભંગાણ

Figure 9: Grievance from the Newspaper

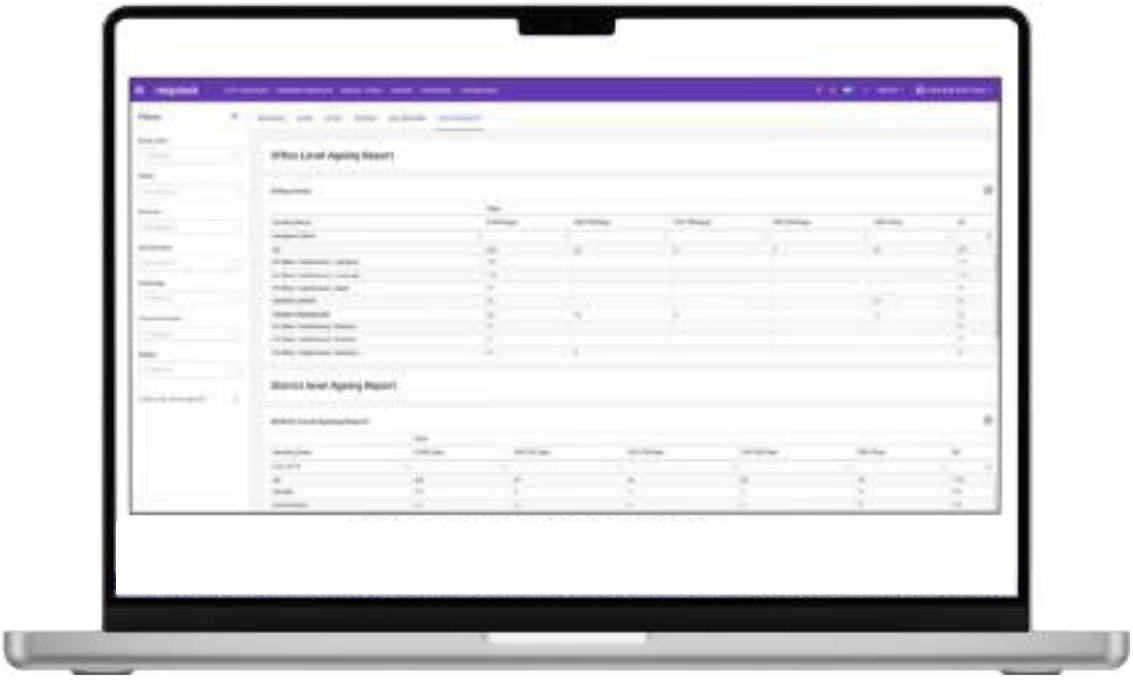

Figure 10: Grievances aging report in ERP system

Handpump Grievance Redressal Application

To strengthen rural service delivery, the **GWSSB** has developed a dedicated Hand Pump Grievance Redressal Application.

This mobile-based tool is specifically designed to **capture and resolve complaints related to hand pumps, which continue to be a critical source of drinking water in many villages.**

The application provides a simple and citizen-friendly interface. Users log in using their registered mobile number, which is verified through a **One-Time Password (OTP) authentication system.** Once logged in, the user can view options for “Open New Ticket” or “Closed Tickets.”

When a new ticket is opened, the user has to select his/her geolocation on the map, ensuring accurate mapping of the complaint. The user then enters relevant details of the hand pump, such as the hand pump ID, date of issue, village, taluka, and district, along with photographs of the faulty site. After confirmation, the issue is formally raised in the system and automatically linked to the ERP portal, similar to the mechanism of the Jal Sampark platform.

This ensures that the complaint is instantly reported to the concerned officials, enabling quick redressal and tracking of progress. The system also provides visibility to citizens by maintaining a record of both open and closed complaints.

The application is expected to be particularly valuable in addressing service gaps at Level 2 IWSS (Individual Water Supply Schemes), where hand pumps and village-level infrastructure remain central to ensuring reliable access to drinking water.

By combining geo-tagging, photographic evidence, ERP integration, and a user-friendly design, the Hand Pump Grievance Redressal Application represents a significant step towards responsive, accountable, and technology-driven water service delivery in rural Gujarat.

In Gujarat, a significant proportion of the tribal population continues to depend heavily on hand pumps as their primary source of drinking water. Unlike regions served by large surface water grids or regional supply schemes, many tribal habitations rely on localized groundwater sources accessed through these hand pumps. Also, there is a lot of resistance from the community regarding FHTCs. The introduction of the Hand Pump Grievance Redressal Application is particularly important in these areas, as it provides a structured, digital mechanism for reporting faults, tracking repairs, and ensuring the timely resolution of issues.

Key Issues Faced by Tribal Communities

- **Water Table Variations:** Seasonal and geographical fluctuations in the groundwater table often lead to irregular handpump performance, making water availability unpredictable.
- **Mechanical Failures:** Frequent breakdowns of handpump components, such as cylinders, rods, and leathers, are common due to intensive use.
- **Delayed Repairs:** Remote and scattered tribal settlements often face delays in maintenance, as manual reporting and response mechanisms take time to reach service providers.
- **Limited Awareness:** Citizens in tribal regions may not always know where or how to report complaints, which leads to underreporting of issues and longer downtimes.

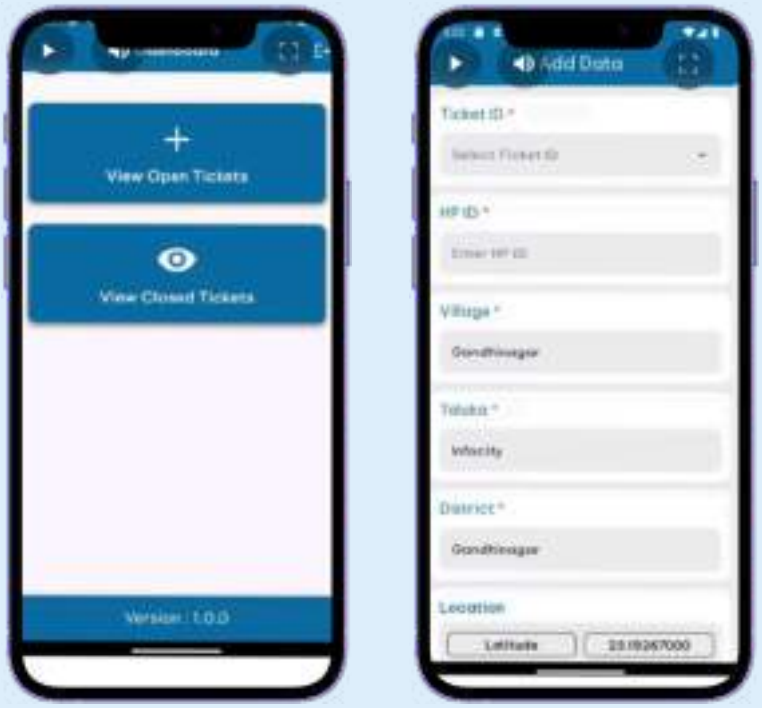

Figure 11: Handpump grievance application display

JalSampark Mobile Application

The **Jal Sampark platform** is a **mobile and web-based application**, hosted on the **Ncode server**, that strengthens grievance redressal, inspection, and monitoring of the rural water supply network in Gujarat. It is integrated with the **ERP system** through **API communication**, ensuring that every update made in Jal Sampark is automatically reflected in ERP.

The application is available for both **Android and iOS devices**, making it accessible to a wide range of frontline workers. It is widely used by **PHED engineers, pump operators, Jal Samitis, and other field-level staff**, enabling them to update information directly from the ground.

Core Features

- **Inspect** – When a grievance is raised, the responsible person first inspects the issue. The journey from the inspector's original location to the problem site is **geo-tracked** within the app.
- **Attendance** – This feature is linked to the repair person's physical presence and movement. The individual marks attendance by **clicking a self-photo before leaving their original location** and **uploads another photo upon reaching the problem site**. This creates **clear traceability of the field movement**, confirming that the assigned person has physically attended the site.

- **Close** – Once the repair is completed, the responsible staff member closes the ticket by uploading a **photo of the resolved asset or issue**. The application automatically captures the **latitude, longitude, date, and time**, providing verifiable proof that the grievance has been addressed on the ground.

- **Dropdown-based Complaint Registration** – While registering a grievance in Jal Sampark, the user is presented with a **dropdown menu** that lists common categories of issues (e.g., leakage, pump failure, low pressure, water quality). This structured approach standardizes complaint reporting, helps in identifying the exact nature of the problem, and ensures that the ticket is routed to the appropriate technical division for resolution.

Current Progress

So far, the Jal Sampark application has facilitated more than **6,000 inspections**, covering not only grievance tickets but also updates related to **travel, leave marking, inspection activities, and repair tracking**.

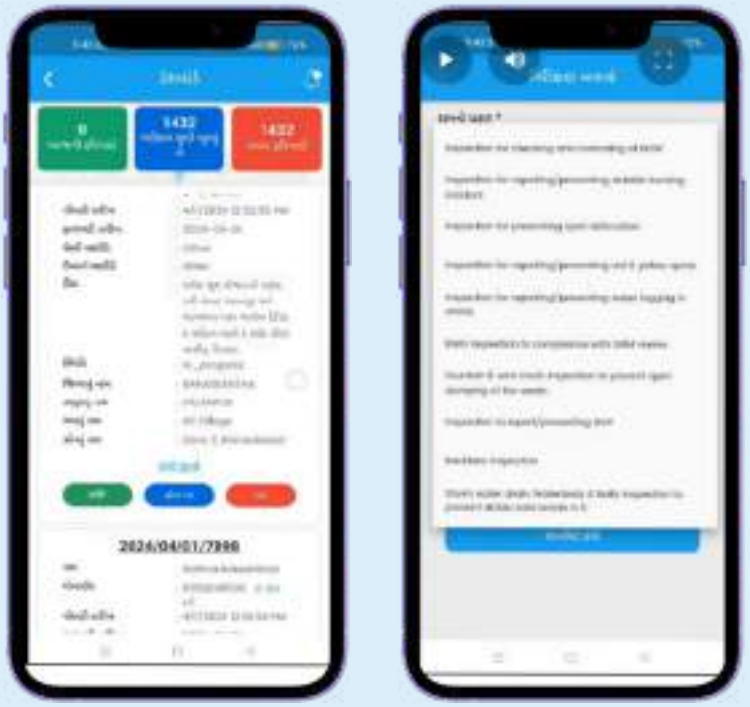

Figure 12: JalSampark Mobile Application Display

Consumer Satisfaction Survey/Feedback

The Consumer Satisfaction Survey Call Centre is housed at the WASMO building and is operated with technical support from BSNL. Since **February 2024**, the facility has been hosted and maintained by a team comprising one supervisor and **25 operators**. On average, **700 calls** per day are made from this call centre.

The call centre runs on separate Wi-Fi and LAN networks, functioning as a standalone system without integration into other departmental databases.

The call centre also calls Asha workers, Pani Samitis, farmers, and Angadwadis, in addition to citizens. On receiving the call, if a consumer expresses dissatisfaction over the water supply, then the issue is captured under one or more of the following categories:

CATEGORIES

- No water in the source
- Not getting RWSS water
- Not getting water due to an operator issue
- Not getting water due to leakage
- CEB issue
- Motor/Cable burnt
- The operator did not get their salary
- Issue in in-village water distribution
- Water quality issue
- The village is not getting sufficient water as per the population
- Household tap connection not given
- Water supply issue - technically unable to supply water to the village
- Village not getting water voluntarily
- No Issue
- Other

At present, there is no system integration between the Call Centre application and the grievance management system, requiring human intervention to log these complaints into the grievance system. Once the grievance is raised in the grievance system, the complaint ID is also updated in the call centre application manually against the corresponding issue. This helps in tracking the issue to its closure. A call is made to the consumer for verification once the grievance is resolved. If a consumer expresses dissatisfaction with the grievance resolution, then the issue is reopened.

The call centre application provides reasonable statistics and insights into the customer satisfaction data.

Frontline Workers Applications

Capability Matrix

Below table outlines the mapping of a Capability from DMM to the Gujarat IT systems for frontline workers.

DAILY WATER SUPPLY MEASUREMENT & REPORTING	The pump operator records the on/off status of pumps on a daily basis, ensuring that operational data is consistently tracked. This information is then uploaded and reported on the ERP portal, providing real-time visibility of pumping operations to supervisory staff and enabling better monitoring of the rural water supply system.
FTK REPORTING (FIELD TEST KIT REPORTING)	80% of the water quality testing is done by FTKs.
COMMUNITY MOBILIZATION & IEC	WASMO is responsible for community mobilization through awareness campaigns. GWSSB has made the provisions of the IEC very broad for the villagers.
MINOR MAINTENANCE & REPAIRS	It is primarily taken care of by the Gram Panchayat. There is no digital tool to manage this area.
EXPENSE AND PAYMENT MANAGEMENT	No information is available.
DATA COLLECTION AND DIGITAL REPORTING	Not much information could be gathered on the field data collection digital tools.
WSS FINANCIAL AUDIT	No information is available.
REPORTING OF GRIEVANCES	There is no separate channel for front line workers to raise grievances, however they can make use of the 1916 helpline to report their grievance.
CAPACITY BUILDING	WASMO has a dedicated in-person training for frontline workers. For instance, in the tribal villages of Dahod, Pani Samitis successfully managed O&M after training by WASMO.

ROLE-BASED DASHBOARDS AND REPORTS	Not available.
CONTEXTUAL CHATBOTS	Not currently available.
STAKEHOLDER LIFECYCLE MANAGEMENT	Stakeholders like pump operators etc. are properly onboarded in the ERP system.
ROLE-SPECIFIC MOBILE APPS	Applications like Jal Sampark and Hand Pump Grievance Redressal are developed and used by different frontline workers.
PURPOSE-BUILT DIGITAL TOOLS	No information is available on additional purpose-built digital tools.

FTK Reporting (Field Test Kit Reporting)

In Gujarat's rural water supply programme, Field Test Kits (FTKs) form the backbone of community-level water quality monitoring. Nearly 80% of all testing is carried out using FTKs, while around 20% of the samples are tested through laboratory analysis. This approach allows widespread, frequent, and low-cost monitoring while ensuring scientific verification through lab-based testing.

- **Community-based Testing:** Local staff and community representatives, usually 3–4 people from the agency, are trained to conduct **on-site water testing** using FTKs.
- **Parameters Checked:** FTKs primarily test for **residual chlorine, turbidity, and basic bacteriological indicators**, giving an immediate picture of water safety.
- **Integration with WQMIS:** The results from FTKs are subsequently uploaded to the **Water Quality Management Information System (WQMIS)**, the national portal for tracking drinking water quality.

Community Mobilization

A key mandate of **WASMO** is to mobilize rural communities through awareness campaigns and knowledge transfer, encouraging changes in habits and practices necessary for **demand-driven, community-managed water supply and sanitation programmes**.

This effort is led by WASMO's **Community Mobilisation Unit**—which trains ISAs and Pani Samitis in participatory planning and implementation—

and the **Documentation & Communication Unit**, which spreads awareness through **IEC activities** such as meetings, campaigns, radio programmes, manuals, brochures, and posters.

At the village level, **Gram Sabhas** play a central role in ensuring inclusive participation and transparency. They are held for forming Pani Samitis, preparing and approving village action plans, deciding on community contributions, and reviewing progress. More than **3,700 Gram Sabhas** have been conducted, providing a platform for decision-making, conflict resolution, and community ownership of the programme.

Information Education Communication (IEC)

Information, Education, and Communication (IEC) is a powerful tool for mobilizing communities and raising awareness of the drinking water situation, the importance of water resource conservation, and the impact of safe water on health, education, and socio-economic well-being. In Gujarat, **WASMO** (Water and Sanitation Management Organisation) has actively embraced IEC as a core strategy to engage with rural populations, including those in far-flung and remote areas.

By combining traditional communication methods with modern outreach tools, WASMO ensures that messages on water, sanitation, and hygiene reach diverse sections of the community effectively. (https://wasmows.gujarat.gov.in/information-education-communication) .

It is being carried out in the following ways:

INTERPERSONAL MEETINGS

Face-to-face interaction remains one of the most effective IEC strategies. Professionals from WASMO and its **Implementation Support Agencies (ISAs)** maintain direct contact with villagers to raise awareness about the programme, explain its benefits, and listen to community grievances and demands. These interactions take multiple forms, such as **Gram Sabhas (village assemblies), Falia meetings (neighbourhood-level gatherings), and Mahila meetings (women's groups)**. Such forums not only encourage participation but also help secure the support of village elders and leaders. Special focus is given to **school children**, who are seen as "change agents" capable of carrying forward the messages of health, hygiene, safe water, and sanitation into their families and communities.

PUBLICATIONS

Printed materials play a significant role in spreading information widely. **"Loksamvad,"** meaning "dialogue with the community," is a flagship publication that encourages cross-learning between villages. In addition, **posters, pamphlets, training manuals, and theme-based documents** are developed to support awareness activities, technical training, and knowledge sharing. These publications provide communities with easy-to-understand reference material that they can revisit at their own pace.

FOLK MEDIA

Recognizing the cultural richness of Gujarat, WASMO makes effective use of **traditional folk media** to communicate key messages. Performances such as **Bhavai, Tamasha, Lok Dayro (folk storytelling), street plays, and skits** are organized in villages. These culturally rooted art forms make technical and health-related topics more relatable, engaging, and memorable, especially for audiences that may have limited literacy.

AUDIO-VISUAL MATERIAL

To extend the reach of IEC efforts, **audio-visual channels** are widely used. These include **radio spots, radio programmes, video spots, and educational videos**, delivered both through mass broadcast and distribution of CDs/DVDs. By leveraging the popularity of radio and visual media, WASMO is able to reach a large audience simultaneously, including people in remote areas who may not have access to print media.

DISPLAYS AND CAMPAIGNS

Public displays serve as a constant reminder of water and sanitation messages. **Slogan writing, wall paintings, participation in fairs, and exhibitions** are used as visible platforms to reinforce awareness. Such displays are strategically placed in high-visibility areas like village squares, schools, and community halls, ensuring the message remains in the public eye and encourages continuous dialogue.

Capacity Building

The **Water and Sanitation Management Organisation (WASMO)** has made **capacity building** a cornerstone of Gujarat's rural water supply framework. Its central aim is to **empower local communities—particularly Gram Panchayats and Pani Samitis—to plan, operate, and manage their own water supply and sanitation networks**.

https://wasmows.gujarat.gov.in/activities/capacity-building

To achieve this, two enabling conditions are emphasized:

1. **A supportive policy and legal framework** that gives local communities authority over decision-making and management of water supply systems.
2. **Awareness and skill-building** are achieved through exposure to successful community-led projects and continuous training.

Community Training and Skill Development

- **Orientation Workshops:** Conducted for village communities to improve awareness and enable informed decision-making on water supply and sanitation issues.
- **Financial and Technical Training:** Pani Samiti members receive training on **bookkeeping, record maintenance, tariff fixation, and financial planning.**
- **Operation & Maintenance (O&M):** Training includes technical aspects of the created facilities, **routine O&M schedules, inventory management, minor repair techniques, and quality control measures.**
- **Participatory Approach:** Training modules are designed with community participation, where villagers themselves identify activities, skills needed, costs involved, and the appropriate **water tariffs** to be charged, ensuring ownership and sustainability.

Exposure Visits and Reflection Workshops

- **Exposure Visits:** Villagers and Pani Samiti members are taken to **successful model villages** where communities have independently initiated, owned, and managed their water and sanitation systems. These visits highlight the **potential of self-reliance** and inspire replication.
- **Reflection Workshops:** Workshops are regularly organized, where communities **evaluate and monitor their own performance,** reflect on challenges, and make informed adjustments. These also act as a platform for **cross-learning among different Pani Samitis,** helping share practical experiences and innovative solutions.

Agencies Applications

Capability Matrix

Below table outlines the mapping of a Capability from DMM to the Gujarat IT systems for Agencies.

PROJECT EXECUTION & MONITORING	**This is largely managed by vendors/contractors** under the supervision of GWSSB. Over 350 vendors are spread out across schemes, who take care of the execution and monitoring of the schemes.
THIRD PARTY INSPECTION & VALIDATION	No such provision has been made yet.
O & M SERVICE DELIVERY	In-village schemes (IWSS) are typically operated and maintained by local Gram Panchayats or Pani Samitis, while Regional Water Supply Schemes (RWSS/MVS) may still have O&M support from GWSSB or contracted agencies.
ASSET TAGGING AND HANDOVER	The process is being implemented at scale, and once assets are tagged, the data is systematically uploaded onto the BISAG portal.
WATER QUALITY TESTING & REPORTING TOOLS	Water quality testing is carried out using FTKs and laboratories, and the results are reported through WQMIS.
RESOURCE MOBILIZATION AND RESOURCE TRACKING	No information is available.
BULK WATER FLOW MONITORING & SCHEDULING	Bulk water flow monitoring is carried out with the help of smart monitoring sensors.
CAPACITY BUILDING	Field workers are getting employed with a common training portal GJTI.
REPORTING OF GRIEVANCES	There is no separate digital tool for agencies to report grievances.

ROLE-BASED DASHBOARDS AND REPORTS	ERP provides login access to agencies, using which the corresponding stakeholders can view and access the required information.
CONTEXTUAL CHATBOTS	Not available.
STAKEHOLDER LIFECYCLE MANAGEMENT	The ERP maintains the lifecycle of agencies and contractors/vendors in the system. Login credentials are provided to them, using which they can log in into the system.
ROLE SPECIFIC MOBILE APPS	Jal Sampark and Hand Pump Grievance apps exist but mainly for engineers, operators, and Pani Samitis.
PURPOSE BUILT DIGITAL TOOLS	Tools like Jal Sampark, the 1916 Call Center, ERP portal, and asset mapping systems are in place for specific functions.

Project Execution & Monitoring

In Gujarat, project execution in the rural water supply sector is largely managed by private vendors and contractors under the overall supervision of the **GWSSB**. These vendors are responsible for implementing civil and mechanical works, including the **laying of pipelines, construction of pumping stations, and water treatment plants (WTPs).**

Progress is reported through the **ERP system**, which enables departmental engineers to monitor execution in real time via dashboards.

Once a scheme is constructed and commissioned, the responsibility for its management transitions. Till the water reaches the village boundary, it remains under the jurisdiction of the state, but beyond that, the **Water and Sanitation Committee (WESCOM) / Gram Panchayat (GP)** assume responsibility for local distribution and maintenance. This division of roles ensures that the state manages bulk supply infrastructure while communities take ownership of in-village service delivery.

Interestingly, community preferences also influence implementation. In certain villages, where residents are content with their existing tubewell arrangements, many voluntarily decline the household tap connection. For instance, in a village of **500 households**, if **300** opt out of tap water connections, the remaining **200 households** still receive connections upon request. In such cases, complaints or requests are submitted to the Gram Panchayat, which raises tickets for further action within the system.

Infrastructure & Coverage

- **Pipelines:** Approximately **93,000 km PVC pipes** are being installed as part of the rural water supply schemes.
- **Schemes:** A total of **350 water supply schemes** are operational. This count is based on Water Treatment Plants (WTPs) and Pumping Stations (PS).
- **Villages Covered:** Out of Gujarat's **18,000 villages**, about **16,898 villages** have already been covered, representing significant progress under JJM.
- **Source Type:** Around **15,000 villages** are served through surface water schemes, while **3,000 villages** rely on groundwater-based schemes.
- **Facilities Provided:** Villages are equipped with hand pumps, tubewells under In-Village Water Supply Schemes (IWSS), stand posts, pump houses, and distribution networks, to ensure reliable service delivery.

These **350 schemes** are managed by multiple agencies, with Maruti being one of the key operators responsible for execution and O&M support in certain clusters. Each agency is tasked with ensuring smooth functioning of the schemes under its purview, while overall accountability rests with GWSSB at the state level.

Asset Tagging and Handover

Asset mapping is a critical process undertaken by the GWSSB to create a comprehensive digital inventory of water infrastructure across the state. The process begins with marking point assets—such as pumping stations, ponds, reservoirs, headworks, WTPs, sumps, ESRs, and other water-related structures—on Google Earth. These geo-tagged points serve as the foundation for spatially representing the physical assets of the water supply network.

Once the initial point assets are captured using Google Earth, Keyhole Markup Language (KML) files are generated. The data is then transferred to Bhaskaracharya Institute for Space Applications and Geoinformatics (BISAG) for further processing. At BISAG, the KML files are first corrected, after which the point assets are integrated with pipe network segments, using the reference of existing design-stage maps and files originally developed by consultants during the planning of the water supply schemes. This integration ensures that both linear assets (pipelines) and point assets (pumps, tanks, reservoirs, etc.) are spatially linked, providing a holistic representation of the system.

The mapping data undergoes cleaning and validation at BISAG to ensure accuracy and remove duplication or inconsistencies. Following this, the refined dataset is converted into KML files, which are standardized for geospatial applications. These files are then uploaded to the PM GatiShakti National Master Plan portal as well as the state-level portal (gujarat.pmgatishakti.gov.in). This integration allows for alignment with national infrastructure planning efforts while maintaining a Gujarat-specific digital asset base.

Through this process, GWSSB has built a digitally accessible, geo-tagged, and standardized asset inventory. Such mapping improves planning, monitoring, and decision-making, enabling better operation and maintenance, greater transparency, and more effective coordination with other departments under the GatiShakti framework.

https://law.pmgatishakti.gov.in/GWSSB/login

Bulk Water Flow Monitoring and Scheduling

Gujarat has developed one of the largest and most sophisticated bulk water transmission and monitoring systems in India, designed to manage scarce resources and ensure equitable distribution across regions, particularly in water-stressed areas such as Kutch and Saurashtra. The system integrates bulk metering infrastructure with the State Water Grid, enabling transparent measurement, tariffing, and efficient allocation of water for both urban and rural needs.

Bulk Water Infrastructure

The backbone of this system begins with large-diameter pipelines originating from intake wells near major canals and rivers. The primary bulk line starts at approximately 3,000 mm in diameter, gradually reducing to 1,800 mm and smaller diameters as it extends into the distribution network. In total, over 3,200 km of bulk pipelines have been laid across the state, forming the arteries of the Gujarat Water Grid.

Bulk Flow Meters

To ensure accurate monitoring and management, more than 500 bulk flow meters have been installed across this network. These meters serve multiple purposes:

- **Measurement**: They record real-time flow data to track how much water is being transmitted to different nodes.
- **Monitoring**: They help in identifying leakages, losses, and abnormal consumption.
- **Transparency**: They ensure accountability in bulk water transfer, especially when water is shared between districts or utilities.
- **Tariffing**: They form the basis for calculating bulk water tariffs, which are set by the State Appraisal Panel (SAP). For instance, Nagar Palikas across 200 cities are charged approximately ₹2 per 1,000 litres for bulk water supplied.

Smart Grid Management

The bulk metering system is integrated with **smart grid management tools**, allowing the state to:

- Track **bulk water transfers** from canals and sub-canals to end users.
- Ensure **real-time balancing of demand and supply**, especially in drought-prone regions like Kutch and Saurashtra, where water resources are limited.
- Support **equitable distribution** by prioritizing water-deficient areas and adjust flow dynamically.
- Enable **data-driven decision-making** by combining metered data with ERP and SCADA systems.

This integration ensures that water supplied through intra- and inter-district networks, regional schemes, and treatment plants is monitored not just physically but also digitally.

Significance of Bulk Metering in Gujarat's Water Grid

- **Resource Optimization**: By measuring every bulk transfer, Gujarat ensures that water drawn from major sources is used efficiently and losses are minimized.
- **Equity in Distribution**: Metering enables fair allocation of water, especially critical in arid regions where supply must be prioritized.
- **Financial Sustainability**: Tariffs linked to metered consumption ensure cost recovery and discourage wastage.
- **Accountability**: Real-time flow data provides transparency for both utilities and citizens, reducing disputes and improving trust.

Future-Readiness: With over 500 meters already operational and the backbone grid established, the system can be expanded further with **IoT, SCADA, and predictive analytics** for smarter water governance.

Figure 13: Map of Site showing the Smart Water Grid system

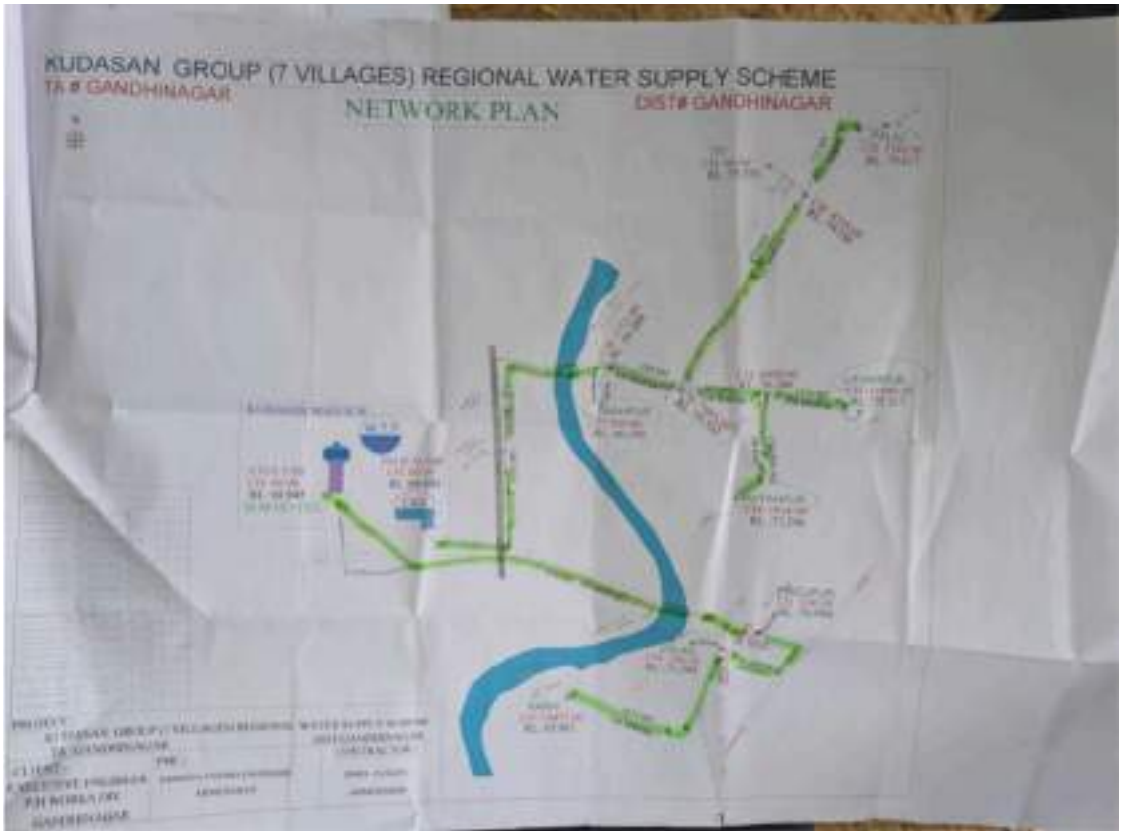

Figure 14: Map of Site showing the Regional Water Supply Scheme (RWSS)

Figure 15: Display of bulk water metering line

Capacity Building of ISA and WASMO Members

To ensure effective programme implementation, **orientation workshops** are conducted for team members of the **Implementation Support Agencies (ISAs)** and **WASMO**. These sessions sensitize participants to the **concept, scope, and provisions of the programme**, covering aspects such as **work organisation, implementation procedures, and role clarity**. Special focus is given to **Participatory Rural Appraisal (PRA) techniques**—including resource mapping, transect walks, activity analysis, and preference ranking. Field visits are organized as part of the training to help participants apply these methods in real-life community settings.

The **technical teams** from the ISAs and WASMO are provided with advanced training to strengthen their capacity for facilitating and supervising programme execution. Training modules cover the **technical and quality aspects of water supply infrastructure, social dimensions of service delivery, community engagement, and supervision of construction activities**. These sessions are also complemented by practical field exposure.

In addition, **skill-upgradation programmes for masons** are organized to improve construction quality, while **training for school children, teachers, and village communities** focuses on **hygiene promotion, the effective use of sanitation facilities, and maintaining clean village and household environments**.

Department Applications

Capability Matrix

Below table outlines the mapping of a Capability from DMM to the Gujarat IT systems for Department.

ASSET & INVENTORY MANAGEMENT	All assets are tagged and have an entry in the ERP system.
VENDOR & CONTRACT MANAGEMENT	There are more than 350 vendors assigned at the scheme level for operation and maintenance of the schemes.
WORK ORDER, INVOICES & PAYMENTS	All these are taken care of by ERP system.
BUSINESS INTELLIGENCE & DATA ANALYTICS	Data analytics is done offline in Power BI, after extracting the data from the ERP portal in Excel format. Human intervention is required to extract, transform and load the data for analytics.
MANAGEMENT INFORMATION SYSTEMS (MIS)	The department has a comprehensive ERP system which is the backbone of the Management Information Systems for the GWSSB/WASMO.
LAB INFORMATION MANAGEMENT SYSTEM	Gujarat has developed a **home-grown LIMS**, supported by NIC, specifically for **water quality testing and reporting**.
FINANCIAL TRACKING & IFMS INTEGRATION	No information is available.
GIS MAPPING & GEO-TAGGING	Asset tagging and reporting are carried out on the PM GatiShakti portal.
SOURCE GEOLOGY	The data is stored in the dedicated department where ground strata data is also stored.
PURPOSE-BUILT DIGITAL TOOLS	There is no information on addition purpose-built digital tools.

IOT DEVICES & SCADA	The department has introduced **bulk water metering and IoT-enabled sensors** to improve real-time monitoring of the rural water supply network. Sensors record parameters such as **flow, pressure, residual chlorine, and Total Dissolved Solids (TDS)** at **five-minute intervals**.
BOQ & DPR GENERATION TOOLS	The ERP system has comprehensive e-procurement & e-measurement book modules that manage Bill of Quantities (BoQ) and Detailed Project Report (DPR).
PREDICTIVE MAINTENANCE & SCHEME RISK FORECASTING	Predictive analysis is not happening currently. However, it is easily doable in future, provided that smart sensors are installed at the major locations.
SOURCE SUSTAINABILITY AND AUDIT	There is no sustainability angle added to the source yet. However, source and tube wells are the responsibility of the State or contractors.
HYDRAULIC MODELING	Hydraulic modelling is not happening.
CAPACITY BUILDING	This is happening by means of the GJTI portal, developed by GWSSB.
REPORTING OF GRIEVANCES	No information is available on whether the department has a grievance system for its staff.
ROLE-BASED DASHBOARDS AND REPORTS	The ERP portal provides role-based dashboards and reporting features, ensuring that information is tailored according to the user's level of responsibility.
CONTEXTUAL CHATBOTS	No chatbots have been built yet.
STAKEHOLDER LIFECYCLE MANAGEMENT	A well-defined lifecycle management system for department officials is managed via the ERP system. With Single Sign On in place, no separate credentials are required for multiple applications.
ROLE-SPECIFIC MOBILE APPS	Jal Sampark mobile application is in use.

ERP

Recognizing the limitations of manual and fragmented systems, the department has undertaken **digital transformation** by implementing a **comprehensive Enterprise IT solution (ERP web portal and mobile app)**. This initiative integrates all lifecycle processes into a unified, paperless platform. The **Enterprise Resource Planning (ERP) application** was launched in **May 2020**, developed by **In2IT Technologies**.

Figure 16: Functional View of ERP System

The ERP system is conceived to enhance the overall performance of the organization while improving the quality of services delivered to citizens. It is designed to optimize the use of existing manpower, enabling the execution of more projects within the same timeframe, and significantly reducing project delivery timelines—from initial conceptualization to the final stage. By providing real-time access to data such as flow, pressure and chlorine residual levels from the concerned sensors, the system strengthens monitoring and decision-making at all levels and ensures greater efficiency in operations, maintenance and management. In addition, it establishes a robust citizen grievance redressal mechanism and shifts all departmental processes to a partially (forms are also getting filled for the grievances) paperless mode.

The ERP system also creates online audit trails and time-tagged progress reports, thereby improving accountability. Its feedback loops and automated gap identification functions support continuous improvement and more responsive governance.

Key Objectives of ERP system

- To enhance the performance of the organization by improving the services delivered to citizens.
- To enhance the capacity of the organization to execute more projects with the same manpower, in the same amount of time.
- To reduce project delivery time, from the conceptualisation to inauguration.
- To have real-time access to information for enhanced monitoring at all levels.
- To improve efficiency in operations and maintenance.
- To create an efficient Citizen Grievance System.
- To shift to paperless implementation of all lifecycle processes of the organization.
- To obtain critical management feedback and inform users automatically on gaps and enhancement needs.
- To maintain time-tagged online progress and activity reports.
- To create an online audit trail for decisions and increase accountability.

Key Modules of ERP System

The ERP system integrates multiple departmental functions through dedicated modules:

- **Works Monitoring Module** – Project progress, milestones, approvals, extensions, billing
- **Accounts and Finance Module** – Fund demand, allocation, RA bills, payments, integration with IFMS
- **Operations & Maintenance Module** – Agencies' master data management, performance of agencies, asset condition reporting, inspections
- **Procurement Module** – Digital indenting, digital MB (measurement book), e-tenders.
- **Inventory Module** - Stock management, quality checks.
- **HR Module** – Leave, performance appraisal, attendance, staff deployment, service record, employee documents.
- **Meeting & Collaboration Module** - Online meetings, calendar, task tracker, and communication.

Legal Module – Ongoing cases, hearing dates, compliance tracking.

Key Highlights of ERP System

- Digitized registry of 2500+ asset information.
- 1600+ users are using the ERP system, and 800+ agencies are now registered on the portal and have started reporting quality and quantity parameters daily.
- 2550+ works and 7100+ part-works are being monitored through the Works Monitoring module.
- All the ongoing court cases and their hearing statuses are being monitored through the Legal module.
- Village-level monitoring of the water supply is being done.
- Various yearly assessments, like Water Audit, etc., are done through the Assessment module.
- All leaves are getting approved through the Online Leave module.

Works Monitoring

The Works Monitoring System (WMS) is a comprehensive application that tracks surveying, design, tendering, budget release, and expenditure for civil works under GWSSB.

Figure 17: Works monitoring: Dashboard to know the exact status of the project

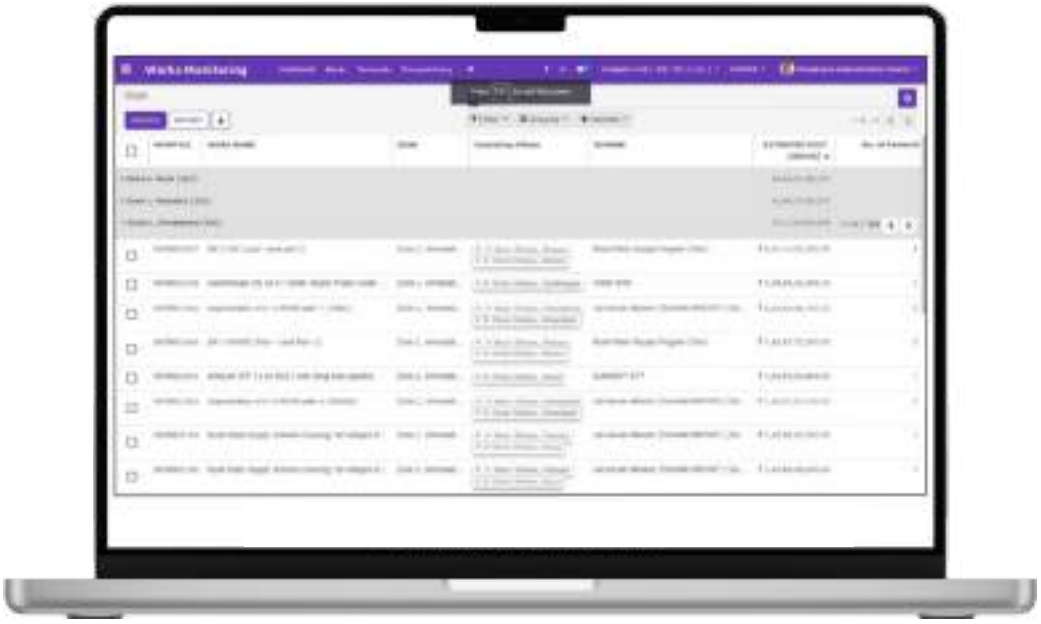

Figure 18: List view of Works Monitoring

Accounts and Finance Module

The Accounts & Finance module manages all financial transactions, budgeting, and accounting processes in a transparent and integrated manner. It handles fund allocation, budget planning, expenditure tracking, and financial reporting for rural water supply projects. The module is fully integrated with procurement, inventory, HR, O&M, and asset management, ensuring a seamless flow of financial data across functions. Payments to vendors, contractors, and staff are automated with built-in checks for approvals, compliance, and audit trails. The system supports statutory requirements such as GST, TDS, and state treasury reporting. Dashboards and MIS reports provide real-time insights into fund utilization, cash flows, liabilities, and project-wise financial health. Automated reconciliation with bank accounts and treasury systems minimizes errors and delays. By digitizing financial operations, the module enhances transparency, reduces leakages, and ensures the timely availability of funds for scheme execution and maintenance.

Operations & Maintenance Module

Operation & maintenance module manages the life cycle of agencies and maintains their information.

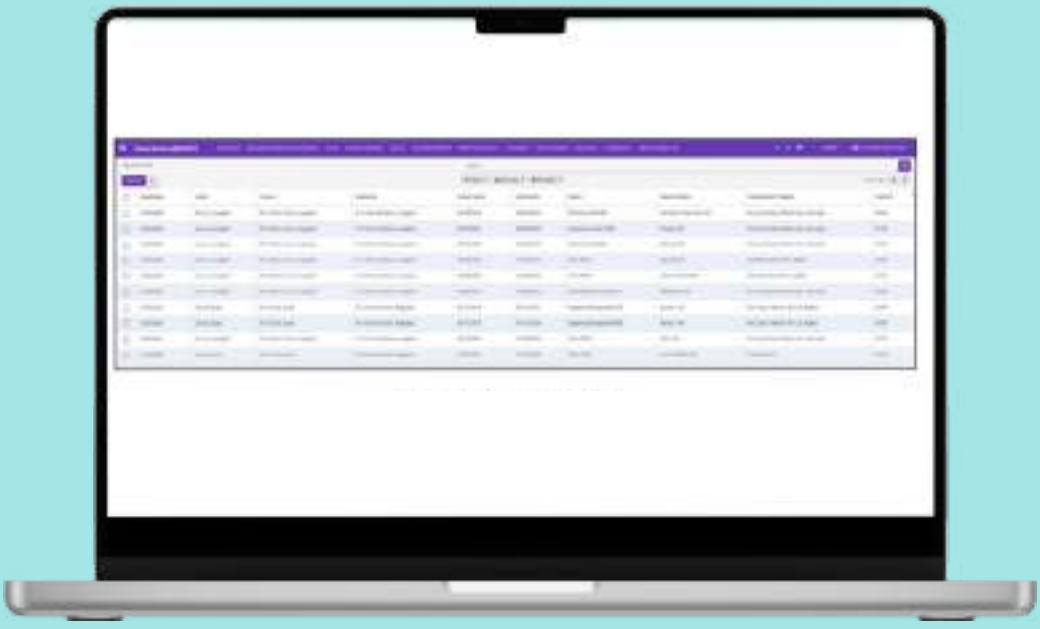

Figure 19: O&M Agreements View

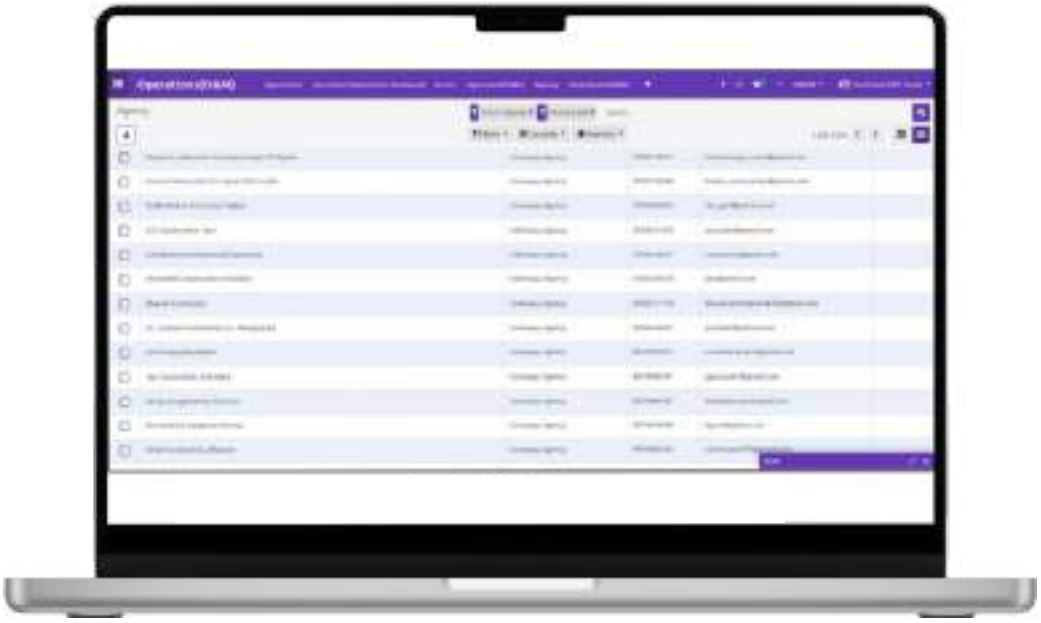

Figure 20 : O&M Agencies List

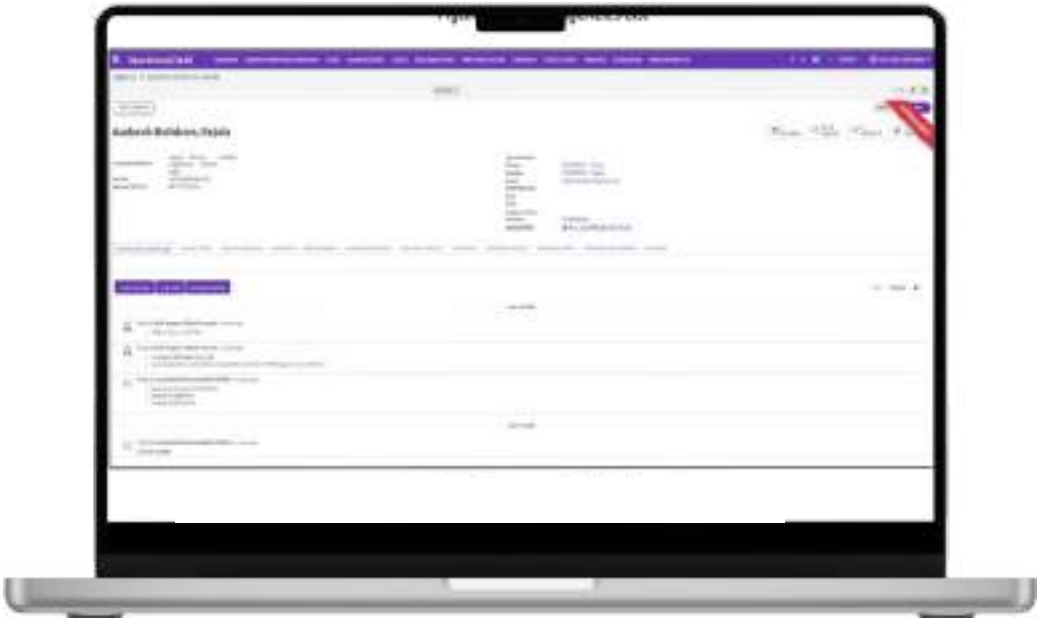

Figure 21: O&M Agency Detailed Information

Procurement Module

The Procurement module of Gujarat GWSSB's ERP system streamlines the end-to-end process of material and service acquisition for rural water supply projects. It manages procurement planning, requisition generation, tendering, bid evaluation, purchase order creation, and vendor management in a transparent and standardized workflow.

The system is integrated with finance and inventory modules, enabling real-time budget checks, fund allocation, and stock updates against procurement requests. E-tendering features ensure competitive bidding, audit trails, and compliance with state procurement norms. Vendor performance, delivery timelines, and payment statuses are tracked digitally to minimize delays and disputes.

Automated alerts and dashboards support monitoring of active tenders and contracts. The module reduces paperwork, improves accountability, and accelerates procurement cycles—ultimately ensuring the timely availability of pipes, pumps, chemicals, and other essentials critical for an uninterrupted water supply.

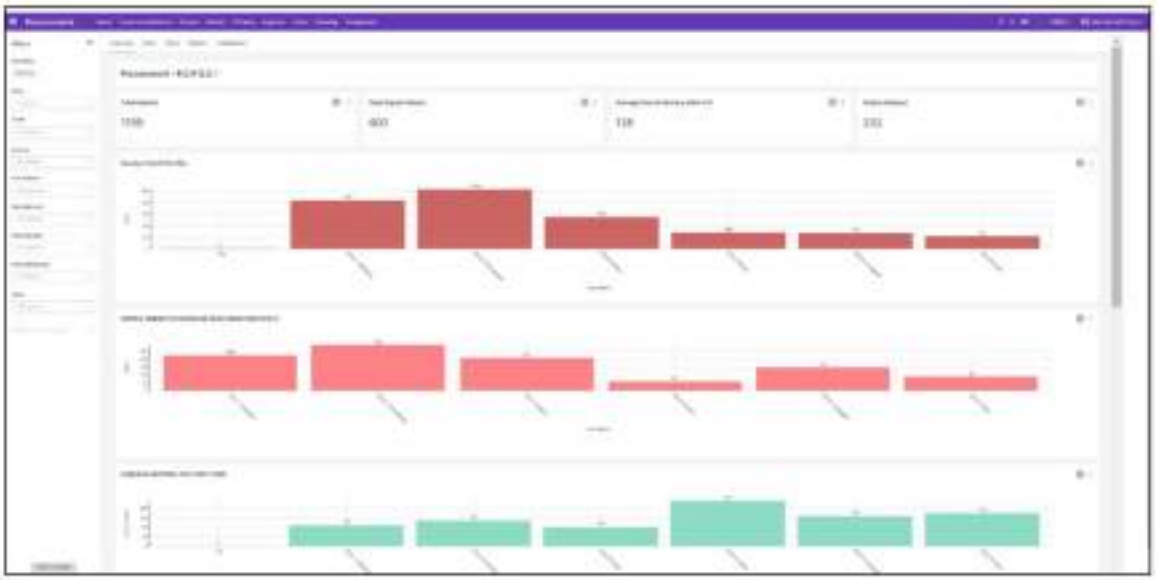

Figure 22: Procurement zone wise order supply summary

Figure 23: Procurement RC Vendors

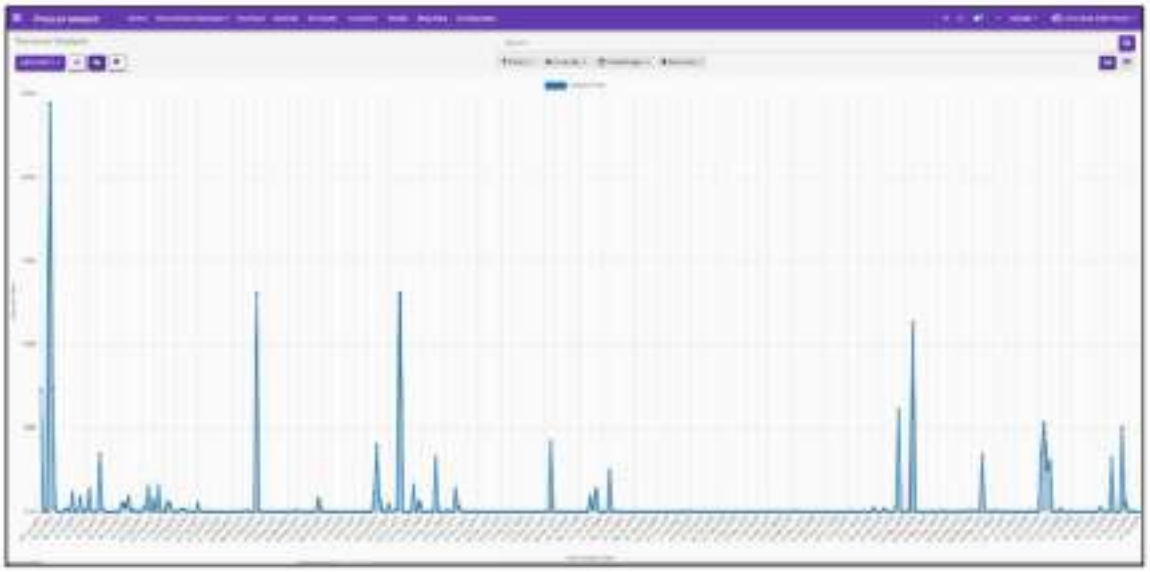

Figure 24: Procurement day to day Purchase analysis list view

Inventory Module

The Inventory module is designed to track, manage, and optimize materials used in rural water supply schemes. It maintains a digital record of all stock items—such as pipes, pumps, meters, valves, chemicals, and spare parts—across central and divisional stores. The module enables real-time stock updates, with inward and outward movement tracking, ensuring that availability is visible to engineers and procurement teams. Automated reorder-level alerts help prevent stockouts of critical items, while surplus or idle stock can be reallocated across locations. Integration with the procurement and finance modules ensures that purchase orders and payments are reflected directly in inventory balances. The system supports barcoding and asset codes for accurate identification and reduces pilferage and duplication. Inventory dashboards provide the management with insights into consumption patterns, slow-moving items, and future requirements.

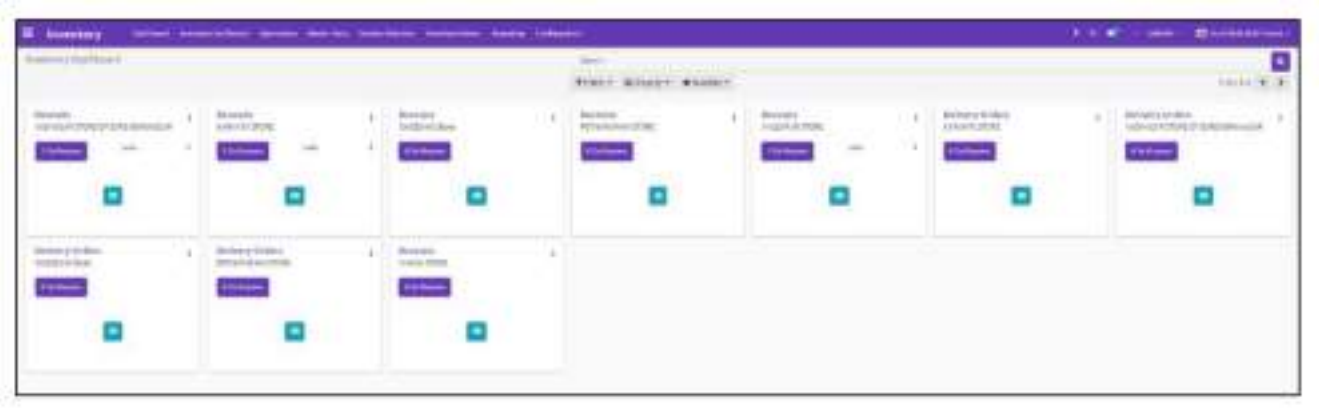

Figure 25: Inventory store wise receipts list view

By digitizing store operations, the module enhances efficiency, transparency, and timely availability of material, which is vital for uninterrupted water service delivery.

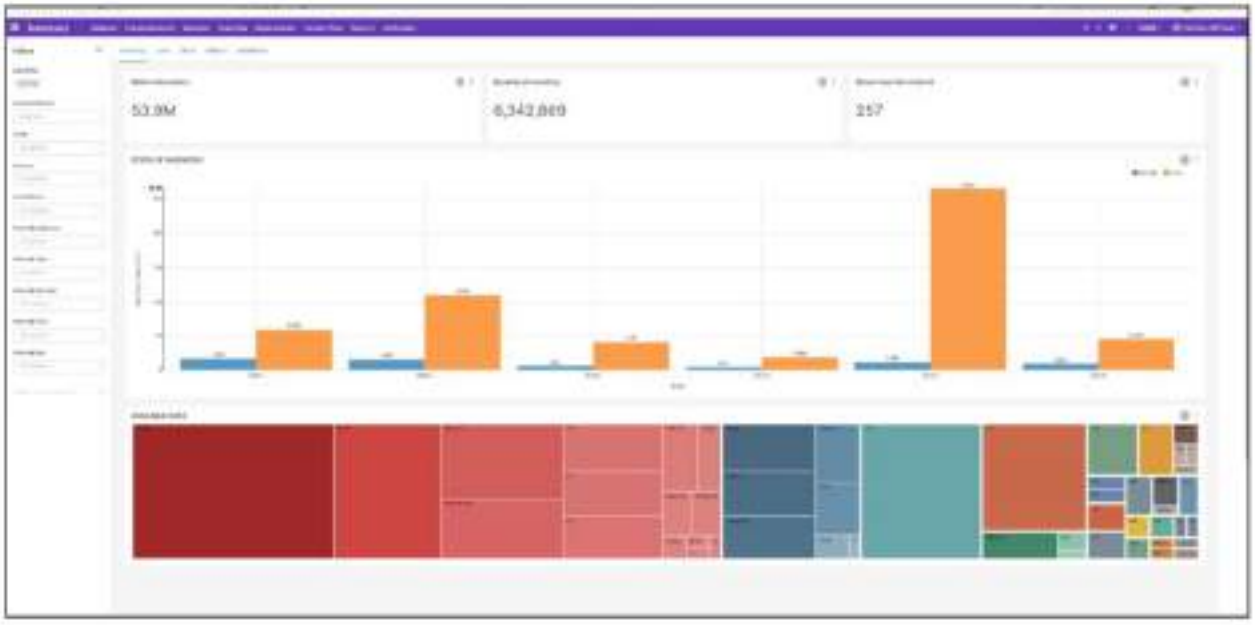

Figure 26: Inventory zone - wise summary list view

HR Module

The HR Module of Gujarat GWSSB's ERP system manages the complete employee lifecycle, from recruitment and onboarding to retirement and pension processing. It maintains a centralized database of staff profiles, designations, postings, qualifications, and service history across all districts and divisions. Attendance, leave management, and payroll are digitized, ensuring timely and accurate salary disbursement with statutory compliance. The module automates transfers, promotions, and performance appraisals through workflow-based approvals, reducing manual delays and errors. Employees can access self-service features for updating personal details, downloading payslips, or applying for leave. Integration with the finance module ensures seamless handling of payroll budgets and reimbursements. Training records and skill development activities are also tracked to strengthen workforce capacity. By bringing transparency, accountability, and efficiency in HR operations, the system empowers GWSSB to manage its large workforce more effectively and align staff resources with the demands of rural water supply delivery.

Figure 27: HR Employees list view of department

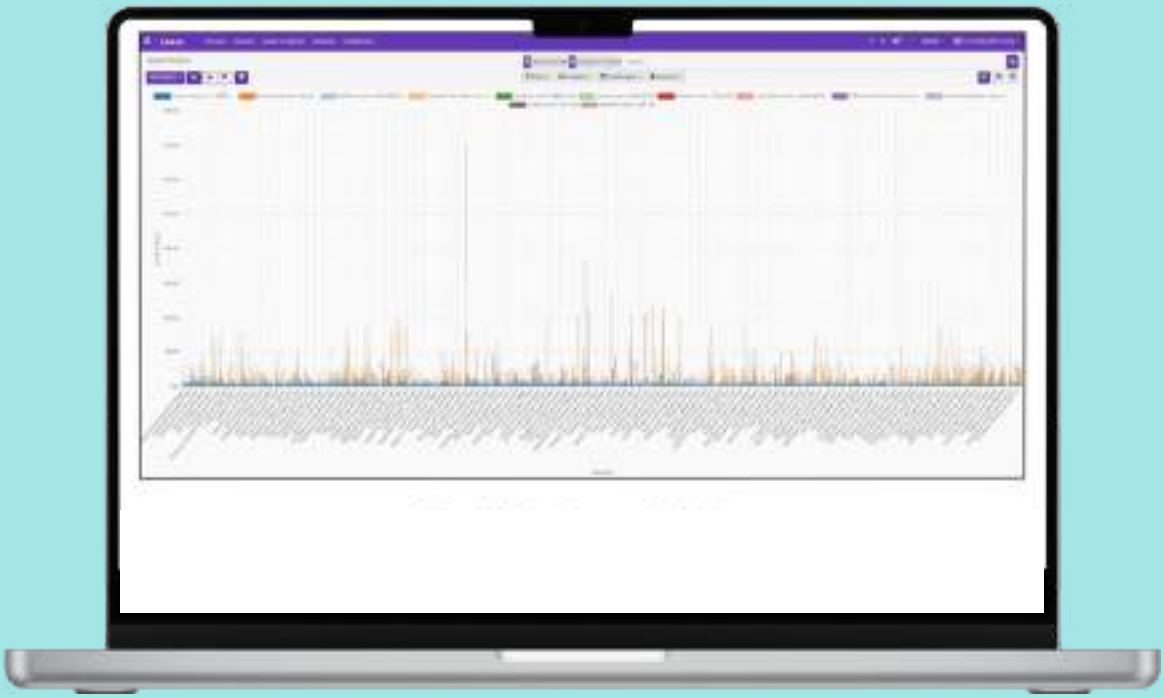

Figure 28: Employee leave analysis list view

Village Coding and Transparency in Gujarat ERP

In the ERP system, every village is tagged with multiple unique codes coming from different national and state-level systems. This ensures that data across platforms is interoperable, transparent, and consistent.

The Analytics Village Dashboard of ERP integrates the following identifiers:

1. **BISAG Code** – for GIS-based mapping by Bhaskaracharya Institute for Space Applications and Geoinformatics.
2. **IMIS Code** – used in the national Integrated Management Information System for Jal Jeevan Mission.
3. **NIC Code** – provided by the National Informatics Centre for IT-enabled government applications.
4. **LGD Code** – the Local Government Directory code that uniquely maps every village to its panchayat, block, district, and state hierarchy as maintained by the Ministry of Panchayati Raj.
5. **Census 2001 Code** – identifiers used during the 2001 population census.
6. **Census 2011 Code** – updated identifiers from the 2011 census.
7. **PDI Code** – project design and implementation codes used in departmental planning and execution.

By tagging all these codes for each village, the ERP builds a "**master village identity**". This makes it possible to reconcile data across GIS maps, census records, project documents, national dashboards, and state systems — eliminating duplication and ensuring consistency.

Gujarat Jalseva Training Institute (GJTI)

The Gujarat Jalseva Training Institute (GJTI) is a unit of the Gujarat Water Supply & Sewerage Board (GWSSB) under the Narmada, Water Resources, Water Supply & Kalpsar Department, Government of Gujarat.

It serves as the key state-level institute for capacity building and professional development in the drinking water supply and sanitation sector, and is also recognized at the national level.

The link to the YouTube page for online training is https://www.youtube.com/@gjtigwssb4024/featured

Role and Functions

- Acts as the nodal institute for the continuous professional development of functionaries working in water and sanitation.
- Organizes training programmes, seminars, and workshops on technical, managerial, and community-related aspects of water and sanitation.
- Provides orientation and exposure visits for stakeholders to strengthen field-level implementation.
- Supports Water Quality Monitoring & Surveillance (WQMS) by training community members and officials in the use of Field Test Kits (FTKs) and reporting mechanisms.
- Offers a wide range of lecture materials, training modules, and video resources, many of which are publicly available, including through designated YouTube links.

Recognition

The institute has been identified and recognized by the Government of India as a National Key Resource Centre (KRC) for rural drinking water, under the Ministry of Drinking Water & Sanitation. This recognition highlights GJTI's role as a knowledge hub for capacity building, innovation, and training in the sector.

Figure 29: GWSSB, GJTI learning portal

IoT device and Scada

To modernize bulk water management, Gujarat has deployed **IoT devices along bulk metering lines**, creating a digital backbone for real-time monitoring. These devices form the first layer of a **smart water grid**, enabling continuous oversight of both water quantity and quality.

At the core of this system are **smart sensors** that track critical parameters:

- **Flow and Pressure Sensors** – monitor water movement and quickly flag leakages or pipeline faults.
- **Water Quality Sensors** – measure **residual chlorine, turbidity, pH, and TDS**, ensuring that supplied water meets safety norms.
- **Pump Monitoring Units** – record pump on/off status, providing operational transparency.

The devices are installed **in front of pumping stations and at key nodes along the distribution network**, ensuring that bulk water transfers are measured precisely at the points where they matter most. Each unit transmits readings at **five-minute intervals**, creating a high-frequency dataset for continuous monitoring.

All devices are connected to a **central command centre housed at WASMO**, managed by the private technology partner **Endress+Hauser**, which also oversees maintenance and calibration. Integration with Gujarat's **asset mapping platform** means every IoT node is geo-tagged (by means of the pumping station), linking operational data with the state's GIS-based water infrastructure database.

Together, IoT devices and SCADA give Gujarat's water sector unprecedented visibility and control. The system allows proactive detection of leaks or water quality deviations, streamlines operations, and enhances accountability—marking a decisive step toward a smart, transparent, and efficient water distribution network.

Components:

- **Smart Water Meters:** Monitor water usage in real-time.
- **Sensor-Based Water Quality Monitoring:** Checks parameters like pH, turbidity, chlorine levels.
- **Automated Flow Sensors:** Detects leaks and pipeline issues.

LAYER	TOOLS & DEVICES
Source-to-Tap Telemetry	Low-power IoT nodes measuring flow, pressure, residual chlorine, pump status and groundwater level.
SCADA for Bulk & Urban Grids	PLCs and RTUs along transmission mains and WTPs feed real-time flow data to municipal and GWSSB control rooms.

Following are the figures from the WASMO command control center, showing the realtime data from the IoT Sensors.

Figure 30 : Command & Control Center housed at WASMO

Figure 31 : Command & Control Center housed at WASMO

Water-Quality & Laboratory Information System

Ensuring safe drinking water is a critical component of Gujarat's rural water supply program. To achieve this, the state has established a **multi-tier water quality testing and reporting framework** that combines **field-level surveillance through FTKs (Field Test Kits)** with **scientific verification through laboratories**.

Testing Infrastructure

- **WQMIS (Water Quality Management Information System):** Gujarat is integrated with the national WQMIS platform, through which **80 laboratories across the state** report their results.
- **Block-Level Laboratories:** A total of **283 block-level labs** are operational, serving as the first tier of scientific testing beyond FTKs.
- **District-Level Laboratories:** Each of Gujarat's **33 districts** hosts at least one water quality laboratory for detailed chemical and bacteriological analysis.
- **State-Level Laboratory:** A **central state laboratory** oversees monitoring and acts as a reference lab, consolidating results from all districts.

Testing Approach – 80:20 Rule

The state follows the **80:20 principle** for water quality testing:

- **80% of samples** are tested using **FTKs** by community members, Pani Samitis, and field-level staff. FTKs are portable, easy to use, and allow for frequent testing of parameters like chlorine, turbidity, and bacteriological safety.
- **20% of samples** are tested in laboratories to confirm FTK results and detect more complex contaminants, such as fluoride, nitrate, arsenic, and heavy metals.

This approach balances **coverage and scientific reliability**, ensuring that large numbers of samples are tested cost-effectively while maintaining accuracy through lab validation.

Reporting Tools

- **WQMIS Portal:** Lab test results and FTK reports are uploaded into the WQMIS platform, enabling **centralized monitoring and national-level integration**.
- **WS Software:** Gujarat also continues to use its **older Water Supply (WS) software** for water quality reporting at the state level. While functional, this legacy system is gradually being supplemented by WQMIS for standardized reporting and interoperability with national databases.

Water Quality Monitoring and Surveillance (WQMS)

Ensuring safe and potable drinking water is a critical objective of the **Jal Jeevan Mission (JJM)**. To support this, the Government of India has introduced the **Water Quality Monitoring and Surveillance (WQMS)** programme, under which **3% of the total allocation** to states is earmarked for water quality-related activities. In Gujarat, the funding is on a **100:0 ratio (GoI:GoG)**, meaning that the entire cost is borne by the Government of India.

Institutional Roles in Gujarat

- **Gujarat Jalseva Training Institute (GJTI):** Plays a central role in **capacity building**. It trains community members, local caretakers, Pani Samitis, and frontline workers in the use of **Field Test Kits (FTKs)** for water quality testing. Through hands-on sessions, GJTI ensures that non-technical users in villages can independently monitor bacteriological and chemical parameters of their drinking water.
- **WASMO (Water and Sanitation Management Organisation):** Facilitates the **implementation of water quality surveillance** at the community level. It supports FTK distribution, organizes awareness drives, and ensures that trained members regularly conduct tests. WASMO also channels these results into the monitoring system and provides feedback to higher authorities when water quality issues are detected.

Program Implementation

- **Surveillance at the Village Level:** Using FTKs, villagers can test their drinking water sources for common contaminants such as **coliform bacteria, fluoride, nitrates, salinity, and iron**. This creates **ownership and accountability** at the grassroots level.

- **Training & Awareness:** GJTI's training programmes ensure that even in **remote and tribal villages**, local community members have the knowledge and confidence to conduct tests and interpret results.

- **Monitoring & Reporting:** While FTKs serve as a first line of defence, suspicious or unsafe results are flagged for confirmatory testing in laboratories. These results are integrated into the **Water Quality Management Information System (WQMIS)**, a national portal that enables centralized monitoring of water quality across states.

Figure 32 : Lab Information System Dashboard

State Functionaries

Capability Matrix

Below table outlines the mapping of a Capability from DMM to the Gujarat IT systems for State Functionaries.

INTER DEPARTMENTAL DATA EXCHANGE	No sufficient information is available in this area.
JOINT PLANNING & APPROVAL WORKFLOWS	Scheme approvals and workflows follow the **state-level committees (SLSSC/DWSM)** with inputs from WASMO, and other agencies. There is a unified experience across all three arms of the WSD — GWIL, GWSSB & WASMO — via the ERP, where actions can be assigned from a single interface workflow, across the three departments, but no evidence could be found for cross-departmental grievance and feedback loop.
GRIEVANCE & FEEDBACK LOOP INTEGRATION	While a feedback loop exists across the three departments of the WSD, no evidence could be found of cross-departmental grievance and feedback loop.
JOINT TRAINING & KNOWLEDGE SHARING PLATFORM INTEGRATION	The **GJTI** serves as the nodal training institute for water and sanitation, organizing workshops, exposure visits, and online resources. While training is effective, a cross-sectoral digital knowledge-sharing platform is not yet operational.
CROSS - SECTORAL POLICY ALIGNMENT	Insufficient information available in this area.
CROSS-SECTOR ANALYTICS & DASHBOARDS	Insufficient information available in this area.
EMERGENCY RESPONSE & DISASTER MANAGEMENT INTEGRATION	Insufficient information available in this area.

Technology Foundation

Capability Matrix

Below table outlines the mapping of a Capability from DMM to the Gujarat IT systems for Technology Foundation.

UNIFIED / INTEGRATED PLATFORM APPROACH	Instead of maintaining fragmented systems for projects, operations, finance, and citizen services, GWSSB has developed its Enterprise Resource Planning (ERP) system. However, several applications still do not talk to each other, requiring human intervention e.g. no integration between call centre application and grievance application, and analytics are done completely offline.
MODERN TECHNOLOGY STACK & CLOUD NATIVE ARCHITECTURE	Owing to multiple applications, a large set of technologies is used; the majority of them belong to open source categories like Odoo, python, PostgreSQL. Core IT Stack • Frontend: JavaScript-based responsive design, optimized for both desktop and mobile browsers. • Backend: Python, XML, and HTML for business logic and API integration. • Database: PostgreSQL – chosen for scalability, reliability, and open-source flexibility.
INTEROPERABILITY WITH CENTRE'S SYSTEMS	Interoperability with Centre's systems is minimal.
API INTEGRATIONS WITH EXTERNAL APPLICATIONS	There is no API integration with external applications.
IDENTITY & ACCESS	Gujarat operates its own **Single Sign-On (SSO)** portal, allowing state users (government officials and some citizens) to access multiple **state-level services through a single login.** Two-factor authentication + CAPTCHA for ERP Login.
USE OF ARTIFICIAL INTELLIGENCE	There is no use of AI currently in the department.
SECURITY AND COMPLIANCE	Role-based Access: Segmented as Viewer, Maker, Checker, and Admin to maintain accountability and data security.

Infrastructure

Capability Matrix

Below table outlines the mapping of a Capability from DMM to the Gujarat IT systems for Infrastructure.

 HOSTING INFRASTRUCTURE	The department uses the Gujarat State Data Centre (GSDC) for hosting all its major applications. The GSDC is a secure and centralized Information Technology (IT) infrastructure established to host applications and data related to e-Governance initiatives at the state level. This facilitates the efficient delivery of government services across various sectors. The GSDC holds the distinction of being the first State Data Center implemented in India under the National e-Governance Plan (NeGP). Established in 2010, it serves as a central repository for storing and managing all digital data, applications, and services pertaining to the Government of Gujarat.
STORAGE AND DATABASES	Not much specific information is available in this area.
HIGH AVAILABILITY & DISASTER RECOVERY	All applications are hosted on the State Data Center; high availability and disaster recovery of applications are as per State guidelines.
MONITORING & OBSERVABILITY	Could not gather information on this specific aspect.
SCALABILITY (HORIZONTAL & VERTICAL)	The ERP being a monolithic application, it has a provision for vertical scalability, but there does not seem to be an opportunity to scale the application horizontally.
BACKUP AND RECOVERY MANAGEMENT	All applications are hosted on the State Data Center; backup and recovery of applications are as per State guidelines.
NETWORKING AND CONNECTIVITY	All applications are hosted on the State Data Centre; therefore, networking and connectivity guidelines are as per State policies.

Conclusion

The As-Is Study of State IT Systems of the Gujarat Water Supply and Sewerage Board (GWSSB) highlights both the commendable progress made in digitalization and the areas where further enhancement is necessary to meet the evolving needs of rural drinking water supply management.

Over the past decade, GWSSB has steadily introduced digital platforms to strengthen scheme tracking, grievance redressal, laboratory testing, procurement, and internal administrative functions. These initiatives have laid a strong foundation by improving operational transparency, enabling monitoring of scheme execution, and facilitating interactions with citizens. The use of helplines, mobile applications, and Management Information Systems (MIS) demonstrates an organizational commitment to leveraging technology for service delivery. Moreover, alignment with national programmes like the Jal Jeevan Mission (JJM) has further accelerated the adoption of IT systems across rural Gujarat.

At the same time, the study reveals important challenges that constrain the full potential of these systems. Data silos persist across platforms, limiting the ability to generate integrated insights for decision-making. Citizen-facing dashboards remain absent, which restricts transparency and public participation in monitoring water supply and quality. While grievance redressal mechanisms exist, proactive citizen engagement and structured satisfaction measurement are still evolving. Water quality monitoring and scheme performance reporting need to be made more accessible, both to field engineers and rural households. Similarly, the adoption of advanced technologies such as IoT, predictive analytics, and mobile-first citizen applications is currently limited, creating a gap between the existing infrastructure and the digital service levels that citizens increasingly expect.

The study underscores that GWSSB stands at a critical inflection point. With its strong foundational IT systems, it has the opportunity to transform into a data-driven, citizen-centric utility. By consolidating disparate systems into a unified virtual information store or data lake, GWSSB can harness real-time analytics for planning, operations, and monitoring. Building citizen-facing digital platforms—including mobile apps and dashboards—would not only enhance transparency but also foster trust and accountability. Integrating IoT devices and smart sensors can provide live visibility into flow, pressure, and quality, supporting predictive maintenance and ensuring service reliability. Finally, capacity building for staff and systematic change management will be essential to ensure that digital tools are effectively adopted and embedded into day-to-day workflows.

In conclusion, the As-Is Study affirms that while GWSSB has already made commendable strides in digitalization, significant opportunities remain to modernize its IT systems. The future direction lies in moving from fragmented systems to integrated platforms, from reactive grievance handling to proactive citizen engagement, and from manual reporting to real-time, analytics-driven decision-making. With strategic investments, robust governance, and sustained focus on user-centricity, GWSSB can set a benchmark for the digital transformation of rural water supply in India, ensuring that every household not only receives tap water but also experiences reliability, quality, and accountability in service delivery.

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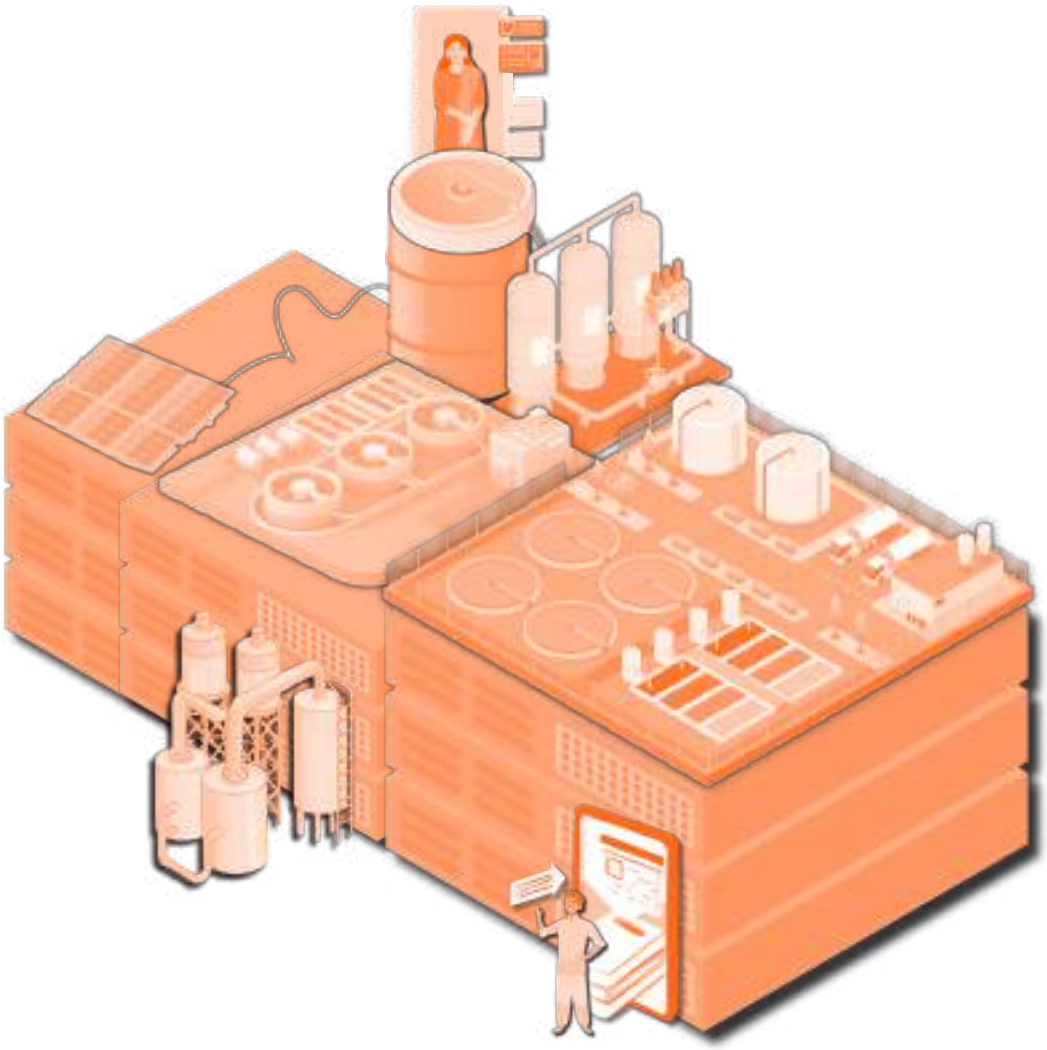

Arghyam

599, 12th Main Road, HAL II Stage, Indiranagar, Bengaluru - 560068.

info@arghyam.org

080 4169 8941

www.arghyam.org