Arghyam

From Building Tools to Enabling Ecosystems

What we learned from investing in technology for water security

2018–2025

Manu Srivastava
Priya Sankar

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Acknowledgements

As we look back on our pivot to working with technology, we recognise that this entire body of work belongs to many people and institutions that contributed, built, questioned, and helped us learn alongside them.

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We are thankful to Anuj for stringing the pearls, translating techspeak into human narratives with fresh perspectives and steering the tech journey to new heights. This report and the journey would not have been possible without the contribution of our team members from the past and present who lived through the pivots, absorbed the uncertainty, refined our thinking and made the journey possible.

Most importantly, we are grateful to our water leaders in the frontline referred to as the Jal Mitras, Village Community Facilitators, Anurakshaks, Water Quality Champions, JalDoots, frontline workers, and community members from across the country.

2. Foreword

India's water challenge has never been only about scarcity. It is a challenge of scale, diversity, capacity, complexity, and coordination.

Over the past two decades, we saw that communities, when equipped with knowledge, data and science embedded in participatory models, are capable of managing their water sustainably. While localised success was possible, translating it into population-scale outcomes was far more complex than replication.

Our theory was that building local system capacity and enabling data at scale would create the conditions for these approaches to grow. The question was, how do we scale participatory and scientific approaches to every village in India to make them water secure?

This report captures the evolution of Arghyam's thinking around leveraging technology for impact at scale in three phases. The first phase tried to develop a capacity-building platform with the intent to make knowledge more accessible and scalable. While the idea had merit, what it required was outside Arghyam's core strengths, and not where we could add the most value.

In the next phase, we moved towards enabling. Rather than building solutions ourselves, we began working with organisations that had already developed tools designed for the first mile. These tools, when combined with strong facilitation and programme support, demonstrated that technology could meaningfully strengthen outcomes across states.

At the same time, this phase raised new questions. While individual solutions worked well within specific contexts, they did not come together as a system. Data remained fragmented. This was not just a limitation of tools. It pointed to a deeper structural gap.

Around the same time, the Jal Jeevan Mission had rapidly expanded drinking water infrastructure across rural India. The question was no longer only about access, but also about sustainability; ensuring that water flows regularly, safely, and reliably over time. If infrastructure could be scaled, what would it take to sustain service delivery at the same scale?

We began to look beyond the water sector. India's experience in other domains showed that large-scale change could be enabled through shared digital infrastructure. Over the next year, we engaged with ecosystem actors and the leadership of the Jal Jeevan Mission to understand whether a similar approach

could be shaped for water. These conversations were not only about adopting an existing model, but also about understanding what would need to be different. This marked the beginning of the third phase of our journey towards imagining a Digital Public Infrastructure for drinking water. Technology alone does not solve for scale. It must be embedded within systems that have the right capacity, incentives, and governance models to sustain outcomes over time.

DPI, in this context, is not a product. It is a way of thinking about how systems can work together, enabling coordination across a diverse and decentralised ecosystem while allowing for flexibility and local context. This journey is still unfolding.

This report is intended for practitioners, policymakers, technologists, and organisations working in the development sector. While grounded in the water sector, many of the questions and learnings are relevant across sectors attempting to work at scale.

Water security at scale cannot be achieved by any single actor. It requires collaboration across government, civil society, and technology ecosystems.

Anuj Sharma
Chief Executive Officer, Arghyam

3. How to read this report

This report is a synthesis of our work with technology over 7 years from 2018 to 2025 in the water sector. It is intended to explain why we do what we do. It covers the breadth of our technology work and the evolution of the strategy along with insights into what we learnt.

As they say, hindsight is 20/20, the key learnings are from this point of time and the conditions that exist today. In due course of time, when the conditions change, some of these learnings would also change. We believe any social sector organisation that invests in technology will find this report relevant as the journey would feel strikingly familiar.

It covers what to expect from tech investments in the water sector. An honest account of what works, what doesn't, and why. This is a learning story, not a success or failure story.The report documents what was built, what worked, and what did not. It names the tensions and the unresolved questions alongside the achievements. It will be evident that some of our aspirations move from imagination to operational evidence to institutional anchoring to honest reckoning. The trajectory is not always clean or linear.

Limitations of this report: This report is written by members of the Arghyam team based on our internal reflections and documents over the years. It does not cover every programme or partner or tool in Arghyam's portfolio. It is not a project report with details about each work and it is not an impact study. It focuses on the evolution of the technology strategy and the tools that express it. It is richer for some phases than others, and we acknowledge these asymmetries.

4. Executive Summary

Arghyam's shift to work with technology and government for scaling impact began in 2018 with the intent to strengthen the ability of the ecosystem to enable water security. These years can be traced back into three distinct phases. We identified knowledge and capacity building as key levers to bridge the gap between policy and execution.

The first phase was from 2018 to 2019 where we made a deliberate choice to build a capacity building platform. Arghyam built the Knowledge ForWater platform as a digital learning platform for CSO partners. Although the platform worked as intended, we realised two things. One, to create a significant impact in capacity building, working only with CSOs is not enough and we have to partner with the government. Secondly, building a tool and creating adoption are two entirely different things, and that a philanthropic organisation like ours is structurally ill-suited to be a long-term platform operator. It compromised Arghyam's neutrality and capacity to convene the ecosystem. In March 2019, Arghyam made a conscious choice to move away from building technology platforms.

The second phase, from 2020 to 2024, shifted to identifying and enabling tools already developed by ecosystem partners. Enabling means placing the digital tools within large scale government programs, funding the tools, their adoption and program management to improve the program's effectiveness and achieve outcomes. Some of the digital tools deployed during this phase are: CLART for scientific planning of recharge structures and interventions, iECHO for guided mentoring of functionaries, PDA for capacity building of frontline workers and generating data from the field, Avni for data collection and mGramSeva for tariff collection. While these tools worked successfully in improving the program's outcomes, we recognised some fundamental gaps in information that were repeatedly collected across programs. Lack of common standards and specifications for schemes and missions meant substantial efforts to replicate this process across states. We understood that enabling existing tools are necessary but not sufficient to address the structural gap in the water sector.

The third phase, from 2023 onwards, is Arghyam's response to address this structural problem. We imagine a digital public infrastructure (DPI) for the drinking water sector with shared registries, open APIs and interoperability standards as a foundation on top of which digital tools and solutions can be built and embedded. We are partnering with the Government of India's Jal Jeevan Mission to design a DPI for drinking water and with the state of Assam to create innovative solutions to enable the functionality and sustainability of drinking water supply schemes.

Key learnings from the journey

Technology development is only the beginning. The excitement around technology and development is generally high. It overshadows the mundane and challenging task of driving adoption. Near 100% adoption is when significant shifts emerge to make the tool effective in the program. Beyond the investment for technology development, there are elements that need funding. Deployment of tools begins with redesigning of the program with a first-mile lens, identifying internal champions and sustained facilitation. These are the invisible parts of the technology investment that act as a scaffolding necessary for technology to be effective.

Know your role and design the exit before you begin. Arghyam has played the role of a funder, builder, enabler, and architect over the years. Each role varies in its accountability, operating model and exit condition. Operating model refers to identifying different actors to play the roles of builder, funder, enabler, architect and user and their ability to continue or transfer seamlessly without affecting continuity. Unclear roles, lack of operating models and exit design becomes evident much later in the form of poor adoption, technology dependency and unsustainability in the long run.

Conceptual investment often precedes operational proof. Arghyam has always funded conceptual ideas before their evidence as a strategic funder leading the imagination. Ideas like Knowledge ForWater platform, Community Registry were designed much before proven models existed in the water sector. The DPI work was initiated before anyone was thinking of DPI in the water sector.

Measuring impact is messy. Embrace the ambiguity. Defining a picture of success before any technology work is crucial. While technology makes data and metrics will show where the problems exist and what to solve and does not necessarily solve the problems. Knowing which problem to solve before solving the problem means outcomes on water will come much later. The risk of not naming this distinction upfront is that technology gets evaluated against outcomes it is not equipped to achieve and declared a failure.

5. Introduction

Why Arghyam, a water focused philanthropy invested in Technology?

ears of work in participatory groundwater and springshed management taught us that communities closest to the water are best placed to manage it. Building local capacities through knowledge and awareness around water and scientific approaches improved participation and played a pivotal role in ensuring water security and safety in the community. How to scale this participatory and scientific approach to every village in India to make it water secure?

In 2018, during a partners' meeting in the Springs initiative, we realised if all of us continue to do what we are doing and assume things do not get any worse, we would cover all the Springs that needed intervention in about 35,000 years give or take! That was indeed a moment of awakening for us.

"The problems on the ground are fast outpacing our ability to build and sustain solutions. Knowledge and data needs to travel faster, cheaper, with less friction. We need a digitally supported societal platform for water to catalyze a significantly higher order of scale."

Jayamala Subramaniam,
Former CEO - Arghyam

Because of this need for speed, programs were placing impossible expectations on available resources. With no other change in the equation, the same resources were expected to achieve 20-50x outcomes. We were primarily working with CSOs across India at this time. Despite the power and scale of networks and partnerships, climate change was exceeding our collective abilities to solve. We understood that the status quo is not an option. We felt we have to address some of the key limitations in the current approaches in solving the water crisis.

We recognised the need to partner with governments, the largest stakeholder who has a mandate to reach every citizen in the country.

Framing the problem

India's water crisis is both a problem of knowledge and scale. The country does not have enough experts, trained professionals, and institutions to reach all the six and a half lakh villages in our country despite decades of research, thousands of practitioners, hundreds of civil society organisations.

The problem was more than insufficient resources. Capacity building was happening across India but the knowledge generated was locked in organisations and programme silos. Trained frontline workers were invisible beyond their own organisation. Water security plans could not be found or reused by adjacent programmes and institutions. Monitoring data was collected for compliance and not for decision-making. Every new scheme by the government started capacity building from the basics as if there were no built capacity. There was "a societal memory loss" at the heart of the water sector's conundrum.

In 2019 the largest drinking water scheme JJM was launched by the government to provide safe drinking water to every citizen. To solve water problems at scale, we understood that it was necessary to partner with the government and support them to deliver their objectives in water. And to serve at this scale, technology became an obvious choice of strategy.

In government missions, people, knowledge and data are typically locked in silos. They have to become much more easy to find. Monitoring has to be more real time and less resource intensive and enable many more people to want to participate in solving the water problem.

Arghyam's reflection and pivot

2017 and early 2018 were spent in consultation with our partners and the tech ecosystem. The question was whether technology could genuinely address the scale problem and if so, what should be Arghyam's role.

The country was transforming around us. The smartphone and mobile internet revolution connected remote corners of the country and made them accessible. Mobile applications and digital tools became more commonly used by citizens. Technology promised to enable resolving water problems at scale and speed without a proportional increase in cost. Digital platforms could deliver knowledge to frontline workers at any time, in any place, in their languages without dilution. Digital attestation could make trained people visible and their credentials reusable. Digital data collection could generate trusted evidence from field interactions rather than from programme reports.

Inspired by the 'societal platform' framework, we imagined a shared, open, interoperable digital infrastructure that multiple organisations could build on to serve the entire sector the way roads or electricity serve us. Rohini was shaping this framework at a national level through the EkStep ecosystem. We imagined a similar one for the water sector in early 2018.

The imagination of a shared digital infrastructure that any programme could build on, generate data from, and contribute to is the beginning of Arghyam's scale ambition and technology leap.

6. Technology strategy evolution at Arghyam

“We are now in a phase of Arghyam’s work which takes us right outside our comfort zone, and invites us to be more accountable and take more responsibility. We are attempting to build a technology-enabled infrastructure for the water sector, built as a public good, a shared infrastructure which allows the samaaj, sarkar, and bazaar to co-create and collaborate to amplify the ability of the ecosystem to secure safe water at scale”

— **Rohini Nilekani,**
Founder and former chairperson - Arghyam

Arghyam is not a newcomer to technology. We have been funding and working with digital technology and tools for years before the strategic shift in 2018. Our earliest investment in digital technology started way back in 2007 with the India Water Portal, a free and open knowledge repository of articles, studies, research papers and information on all things water.

6.1

Early Foray: Technology work before 2018

India Water Portal: An Open, Free Knowledge Repository

Arghyam's longest-running technology investment is the India Water Portal (IWP), a public knowledge platform established in 2007 under the encouragement of the National Knowledge Commission (NKC) to disseminate knowledge and create awareness regarding the scale and seriousness of water and related issues in the country. IWP hosts articles, studies and research papers, policy insights on water, in Hindi and English. It hosts more than 26,000 content pieces contributed by experts and practitioners across the country. It has continued to be a thriving portal read by over 65 million people since launch.

Through IWP, we learnt how to build and maintain a digital public good over a long period of time. It serves as the first and important step in solving water problems: empowering researchers, policy makers, practitioners and citizens with knowledge on water and related issues and solutions.

Open-Source Data Collection: Kobo and ODK

Before any proprietary or sector-specific tool, Arghyam advocated, promoted and trained the CSO partners and Govt functionaries in the use of open-source data collection tools such as Kobo and ODK for field work. These tools enabled data capture for various use cases like conducting PGWM Surveys, collecting data from field sites to assess programmatic impacts, springshed management and governance in settings without reliable connectivity. This established a familiarity with open-source technology. These were general purpose tools that required partners with some level of technical capacity to configure the tools for their needs, most of which the sector lacked during the early days of 2017-2018. Some of these tools continue to be used by our partner networks.

6.2
Three Phases of Technology Investment

Arghyam's technology journey from 2018 onwards can be traced along three distinct phases. Each phase brought successes and failures. It enriched the institution with lessons to understand the problem and the approach more closely, to confront our own limitations and move forward. It has been a continuous learning exercise for our team and our partners in this journey.

We began with building a platform, shifted to identifying existing tools in the ecosystem and adapting and enabling them, and then to designing and architecting shared digital infrastructure. The pivots have changed but the problem remains the same. How to enable the ecosystem to solve water problems at scale?

2018–19
Build

Developed the ForWater Knowledge platform for capacity building using Sunbird/Ekstep infrastructure.

2020–24
Enable

Enable existing tools in the ecosystem such as PDA, CLART, Avni, mGramseva, iECHO.

2023 onwards
Design

Design and architect Digital Public Infrastr ucture for the water sector.

6.2.1 Build Phase (2018–19)

We built the Knowledge ForWater platform on Sunbird infrastructure developed by EkStep Foundation. It is a digital learning platform to enable partners to create, curate and offer bite-sized, task-oriented learning modules on water management in multiple languages for frontline water practitioners.

What problem did we try to solve

CSO partners with deep knowledge and field expertise worked with communities to build capacities around water management and governance. We decided to focus on the content and its distribution. A few expert organizations had the knowledge and expertise that needed to be distributed to a wider ecosystem of practitioners and the training content was the vehicle of this dissemination. We observed some common patterns with the content across institutions working in the water sector:

1. The training materials were locked in silos within organisations. Knowledge generated from one institution was not available to the other. Even when made available, it was not easily discoverable by other organizations.
2. Training material was largely printed notes or presentations. They were monolithic in structure. Large, indivisible modules that could not be picked, adapted, and reused across different partners, programmes, or contexts.
3. The training material was also mostly concepts, theory, facts and knowledge. They had to be reimagined to be more practitioner oriented to be of use to the frontline workers.

The result was a sector that kept reinvesting in the same starting point. We focused on the content part of the knowledge and capacity building of our partners.

Why We Chose To Build

Technology, specifically a shared digital platform that can enable atomised, multilingual, reusable content could address all these three problems simultaneously.

In 2018, it was a deliberate choice to build. Sunbird, the open-source learning platform developed by EkStep Foundation, was promising. It is the same infrastructure behind India's DIKSHA platform for school education. It offered a headstart where we could build a separate instance for the water sector on this existing foundation rather than starting from scratch.
The intent was to create a platform that would outlast any single programme, be freely available to the entire ecosystem, and generate reusable assets from every training interaction.

What we built

The Knowledge ForWater platform was built on Sunbird infrastructure. It enabled the creation, curation, and consumption of atomised, bite-sized, task-oriented learning modules in multiple languages. Four partner organisations were onboarded into the platform: ACWADAM for participatory groundwater management, INREM Foundation for water quality and fluoride mitigation, PSI India for springshed management, and PRASARI for watershed and springshed management.

By December 2018, the platform was live with 126 Reusable Learning Objects or content modules, four training events completed, and telemetry dashboards tracking usage. A mobile application, ForWater App was developed alongside the platform. The four organisations were creating structured digital content on water that had never existed in this format before. They started using the platform wherever they were working. Content was deployed across trainings in Nagaland, Meghalaya, West Bengal, and other states.

INREM continues to use this concept at scale. The Water Quality Management course across the states in the country could be customized and adapted to the participants. This also allowed them to distribute the translation of the course modules to volunteers, CSO's and government functionaries based on their capabilities and interest.

While the platform and digital content had usage, the platform required significant efforts for onboarding every time when a new partner. Maintaining the infrastructure was intensive in terms of time, cost and efforts. We realised that for this small scale of operations (5-6 CSO's, 30-40 trainers and 2-3000 front line workers) working a few hundred content, the platform was resource

intensive. The platform, though highly modular and scalable, was not the right choice for our partners whose scale of training was a few hundred front line workers and community resource persons. The cost of maintaining the platform at this scale was relatively high and could not be justified.

What We Learned

1. **Building a tool is not the same as creating adoption.**

   The adoption of the ForWater LMS platform required continuous support, onboarding, and customisation and operations that a philanthropy-funded infrastructure was not able to sustain. Building/maintaining a tool and driving adoption require different skillsets and investments. We were not prepared for these.

2. **Tool complexity must match the ecosystem's readiness.**

   The civil society organisations at this point of time in the water sector were nascent in their technology journey. They needed simpler, more purpose-built tools for simpler onboarding and content creation.

3. **Working with the government is the path to scale.**

   The realization that NGO-led deployment would never match the scale of government-led programs like MGNREGS, JJM and other large state led programs. The tools have to be designed for government adoption from the beginning.

Why did we pivot

First, we recognised that to make a significant impact on capacity building, working only with CSO partners will not be enough. We have to engage with the government who is the largest investor in water.

Second, building technology in-house would compromise Arghyam's neutrality and capacity to convene the ecosystem. Arghyam made a conscious choice to remain a funder and system leader, not a platform provider.

In March 2019, we decided to move away from technology building to an ecosystem enabling role.

6.2.2 Enable Phase (2020–24)

What problem did we try to solve

The need to engage with the government became obvious to create impact at scale. The focus continued to be knowledge and capacity building only at scale and designed for the first-mile practitioners in large scale government programs.

As governments and multilaterals started investing large sums of money on water, we realized that these resources could be more efficiently and effectively deployed in strengthening the capacities of government functionaries and frontline workers. The intent was to strengthen the ecosystem of government and non-government institutions committed to water security.

The existing models of capacity building were resource intensive. We understood from our work with CSOs how building capacity was more than training and developing technical skills. It involves building confidence, soft skills through more interactions with the experts. With the scarcity of water experts, we need a way to move expertise.

As we started working on this problem, a more fundamental limitation became apparent. When the trained frontline workers went to the field to perform tasks, they collected and reported data on the work, programme managers could not trust the data and spent a considerable amount of time in validating and verifying them.

How can field workers generate trusted data from the work that communities, programmes and governments can actually use? The Enable phase approached the capacity building problem along with building a trusted data architecture. The idea was to generate data from the point of interaction of the first mile as the work happens without the need for entering data post-facto. We call it the "Data as exhaust" principle.

Some of the gaps in traditional capacity building in government programs were as follows:

1. Training sessions are conducted physically once or twice a year over a few days. Most of the resources are spent on travel and logistics and very little on actual training.
2. Training programs were trainer-led. Lack of customisation and localisation to meet the needs of the first mile workers.

3. Training content was locked within physical reports and not accessible when they needed it. It is also not always available in their own language.

4. It was not possible to establish credibility of the training content.

5. Information on trained people, content and knowledge assets were locked within respective programs and not available to other programs and departments severely affecting convergence.

6. Given that water management requires sustained efforts on the ground, there are no pathways for livelihood for frontline workers to seek opportunities and continue to work in the sector.

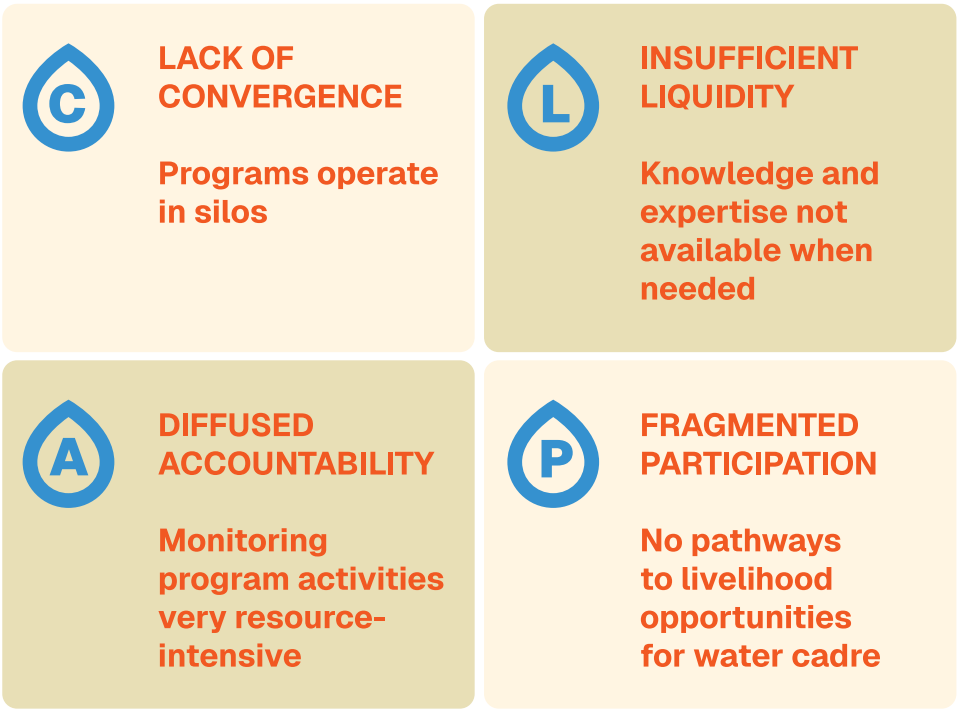
7. Programs could not identify already trained people in the community when a new program started. Even if they could, the burden of proof rested predominantly on the participants that they are trained and they did not carry any proof of the capacities they already possessed. Every program started capacity building from scratch.

These can be bucketed under the CLAP framework:

- **Lack of Convergence:** Programs operate in silos.
- **Insufficient Liquidity:** Knowledge, data and expertise are not available when and where they are needed. They do not move freely.
- **Opaque Accountability:** Monitoring program activities at granular level is extremely resource-intensive. Due to the lack of trusted data, states spend valuable time reconciling spreadsheets and trying to fix accountability instead of solving problems on the ground.
- **Inadequate Participation:** Conditions to enable large scale community participation are missing.

Scale. Speed. Sustainability

Current approaches have limitations

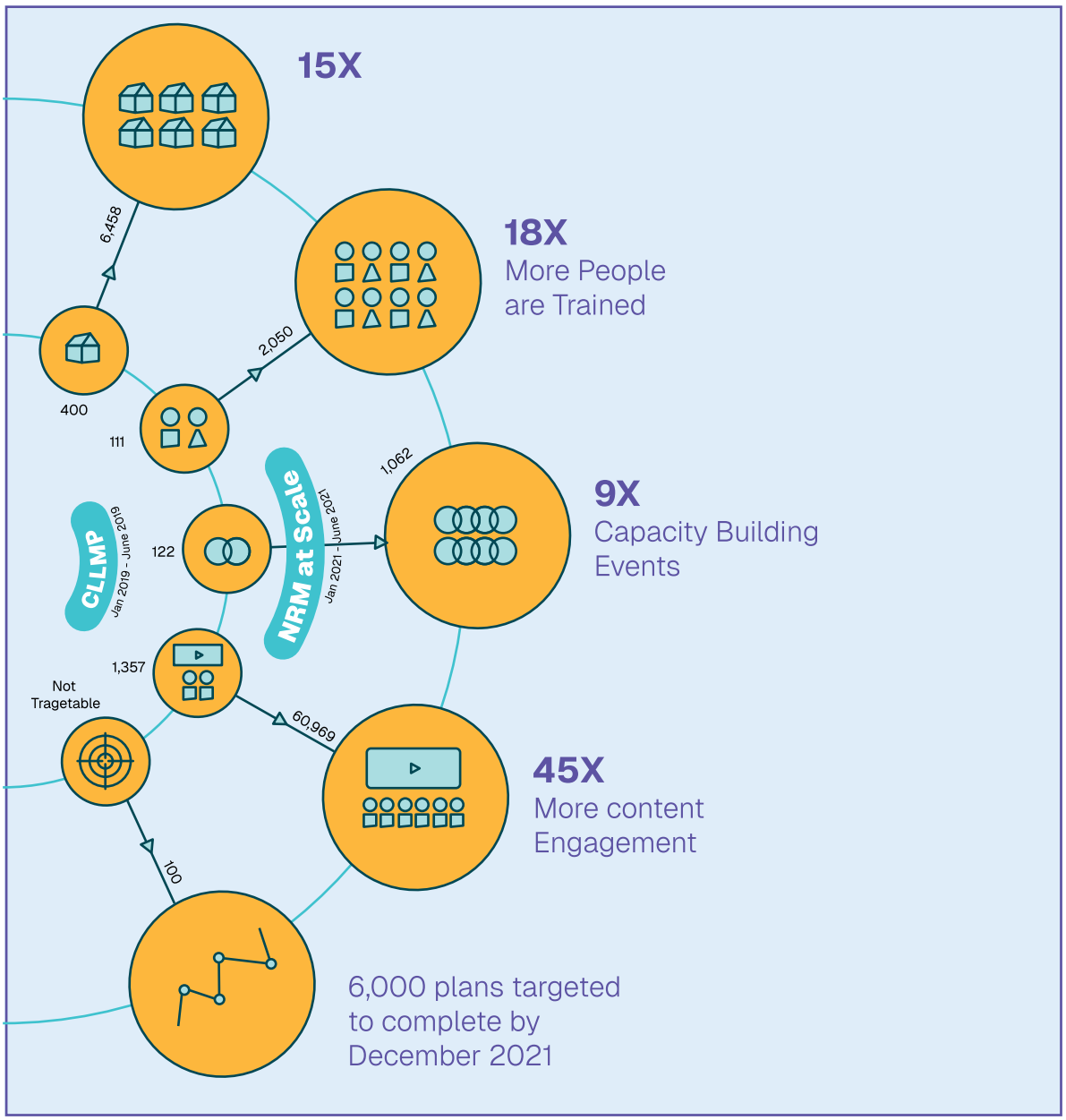


What We Enabled

As we began to wind down the Knowledge ForWater platform, we started scanning the ecosystem to understand what was happening around us. Borrowing from societal thinking principles, we understood that digital tools designed for the first mile can distribute the ability to solve. Not to build technology was a deliberate choice about where to focus Arghyam's energy and leverage our strengths.

Enabling involves identifying the right tools, connecting them to the right government programmes, investing in the adoption conditions such as redesigning programs with a first mile lens, capacity building, data-backed program management support and learning from the field. It is less visible, harder to attribute, and a major gap in investment in the water sector.

Building and operationalizing platforms were not our strengths. More importantly, we saw a risk beyond operational capacity. An organisation that builds and operates its own technology platform gradually becomes a service provider, and a service provider cannot be a neutral convener. Arghyam recognised its ability to convene samaaj, sarkaar and bazaar together as its most important strength.



The activities in this phase are divided into 3 overlapping areas:

- Design Thinking
- Digital Tools and Solutions
- Facilitation and Program Management

Design Thinking

Each phase started by understanding the overall system, the processes and activities needed to achieve the goal and how they interacted, the actors and their roles, the capacities they needed, redesigning programs with first mile and what digital tools could enable with scaling at its core.

Functional Grid: Establishing who does what

This is the preparatory phase of capacity building. We work with the program team to answer some fundamental questions: who are the actors in this program, what are their roles and responsibilities and what capacities do each of them need to perform their tasks? How will they capture the tasks digitally? A functional grid is a design tool which maps all the actors in the program starting from the smallest unit of change (a village or a habitation) to blocks, districts and the state along with the functions they are expected to perform and the knowledge, skills, information and tools each task requires. The detailed mapping of step-by-step of a program brings role clarity across the various actors. It highlights the gaps and missing actors to re-assign roles and actors as necessary. The current level of capacities of the different actors are assessed through consultations. This exercise of creating a functional grid makes designing capacity building concrete in terms of knowledge and skill gaps towards specific tasks to be performed.

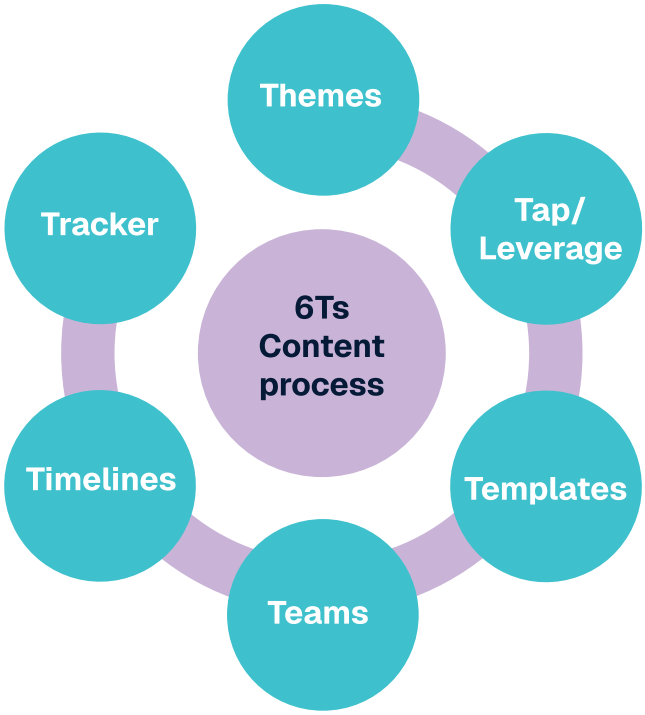
Reimagined capacity building for the first mile

The traditional capacity building involved physical training sessions, once or twice a year, was resource-intensive and trainer-led. A trainer arrived, delivered a session, and left. The frontline worker had no record of what they had learned, no access to the content afterward, and no connection to the next programme that might need their skills.

Content Grid: Atomising training content

The content grid is an exercise aimed to convert long, theoretical training content into small, bite-sized formats like presentations and videos that are simple, audio-visual, modular and easily consumable on mobile phones. The content development process is facilitated and done in-house by the department staff.

The content development follows a structured 6T framework: (1) Themes (defining the thematic areas or subjects, target audience, training objectives and the timelines by when the training has to be completed); (2) Tap into existing content (re-using, adapting existing materials); (3) Templates (standardised, modular formats for consistency and reuse across many programs); (4) Teams (assigning roles for compilation, scripting, translation, voice-over, review, and monitoring); (5) Timelines (planning a compressed 14-16 days writeshop from planning to upload); and (6) Tracker (monitoring for real-time tracking and course correction).



Capacity building was reimagined across three dimensions.

- **Low Dose, High Frequency:** Instead of long, infrequent training events, we found short targeted scope over many more sessions were more effective in building knowledge and confidence over time. Training content was atomised into bite-sized format in local languages for easy consumption.

- **Move expertise and not experts:** Through iECHO's guided mentoring model, domain experts could reach practitioners through structured weekly sessions, without anyone having to travel.

- **Make learning visible and portable:** Through PDA, every training interaction generated a digital credential owned by participants which they could carry across programmes and present as evidence of their capabilities.

Digital nutrients: leaving assets behind for the ecosystem

Across the Enable phase, an important principle was practiced: every programme interaction should leave behind something that the next programme can use. We called this idea digital nutrients and this included the content, plans, and data generated through programme activity that, when made openly available, enriched the ecosystem instead of disappearing into a programme's internal records.

In Meghalaya, the Centre of Excellence, a government-hosted website of trained Village Community Facilitators, became a living demonstration of this principle. Any programme operating in Meghalaya could access the portal, identify trained workers in a specific geography, and avoid starting from scratch. The centre of excellence outlasted the programme and an asset for the state.

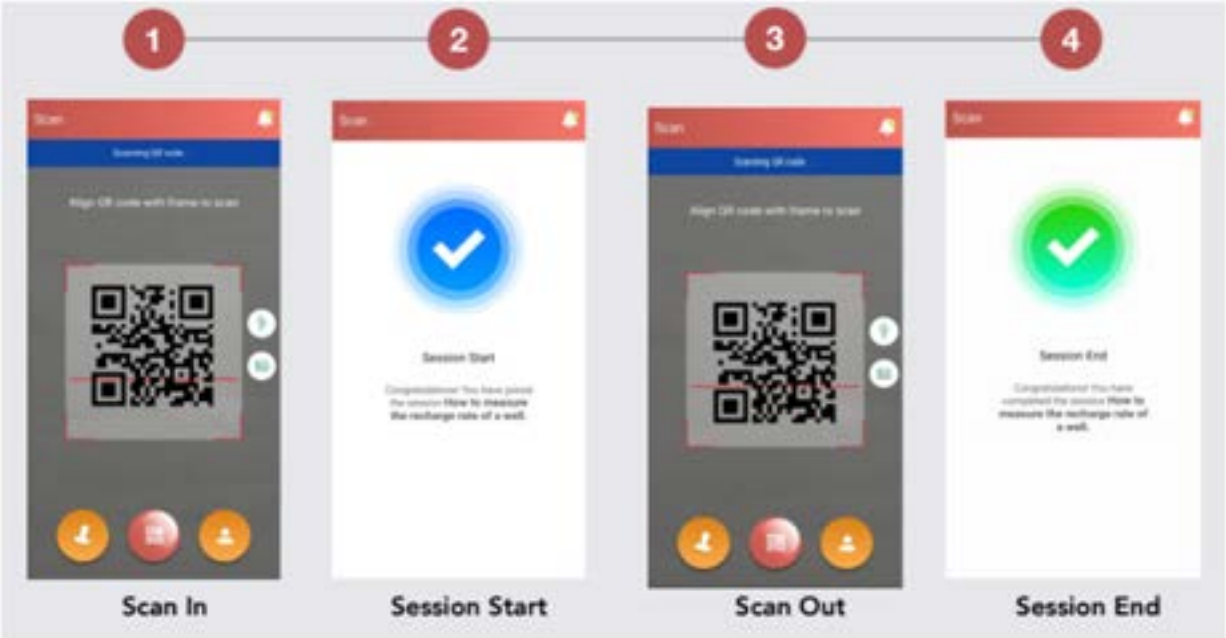
Water security plans produced through CLART were made publicly available on a state portal enabling any community member, engineer, programme manager, or researcher to access them, build on them, or use them as a baseline for the next intervention. Water Quality Champions trained through INREM's online course were made visible on a public-facing website, creating a discoverable cadre that adjacent programmes could draw from. Content produced through PDA interactions was stored and made accessible to partner organisations across the ecosystem.

The digital nutrients idea was also the conceptual foundation of what Arghyam was beginning to imagine as a Community Registry. It was imagined as a federated data layer that would hold all these assets together and make them accessible across programmes, departments, and geographies. The Registry was designed but never deployed. The ecosystem was not yet ready to hold it, and the operating model for who would own and maintain it was never resolved.

Digital Tools and Solutions

We identified platforms and tools that were first-mile centric and uniquely positioned to work in the water sector with potential to distribute the ability to solve and bring disproportionate positive impact at scale.

The Participatory Digital Attestation (PDA) platform developed by Socion allowed frontline workers to have agency over their capacity building and give programs real-time data on training and field action. iECHO offered a guided mentoring model from the health sector that could be adapted to the water sector. CLART (Composite Landscape Assessment and Restoration Tool), a GIS tool developed by FES (Foundation for Ecological Security) for deciding recharge structures and interventions. The tools were not perfect; none of them ever is. Clart could improve user onboarding, PDA could be more open and have features for assessing the users absorption of knowledge, mGramSeva could improve upon the user experience and make it adoption easy for the organizations. But each of them were designed with their organisations' deep contextual knowledge and backed by institutional commitment to their long-term development. By enabling these institutions and their digital platforms, the sector could gain from their expertise.



Participatory Digital Attestation (PDA) of trainings and tasks

PDA was the tool at the centre of the capacity building reimagination. Built by Socion and enabled by Arghyam across multiple state programmes, it used QR codes to create verifiable digital records of training interactions. In Karnataka, it reached more than 4,000 participants across 8 districts with 31,000 field activities recorded. In Meghalaya, more than 14,000 participants across 11 districts were digitally attested through the Community-Led Landscape Management Programme. In Gujarat, PDA data was linked to World Bank Program-for-Results disbursement indicators to enable verified data to trigger actual fund releases.

As the phase deepened, PDA evolved beyond training attestation into generating trusted data of the work frontline workers were performing in the field. Each task logged generated a timestamped, verifiable record at the point of action rather than reconstructed later from memory or paper registers. PDA was now also making the work those people did visible, in real time, in a form that programme managers and government functionaries could trust and act on.

CLART: A decision support GIS tool for the front line

CLART, developed by the Foundation for Ecological Security, gave frontline Gram Panchayat workers access to GIS-based planning tools that had previously required a domain expert to operate. In Meghalaya, approximately 14,000 Village Community Facilitators were trained across 6,500 villages. In Karnataka's Jala Sanjeevini programme, CLART was deployed across 1,589 Gram Panchayats, producing five times more works per district than comparable areas without CLART support.

CLART's remote vetting function was equally important. Experts could review and approve plans from anywhere in the country, eliminating the need for physical visits to verify community-level work.

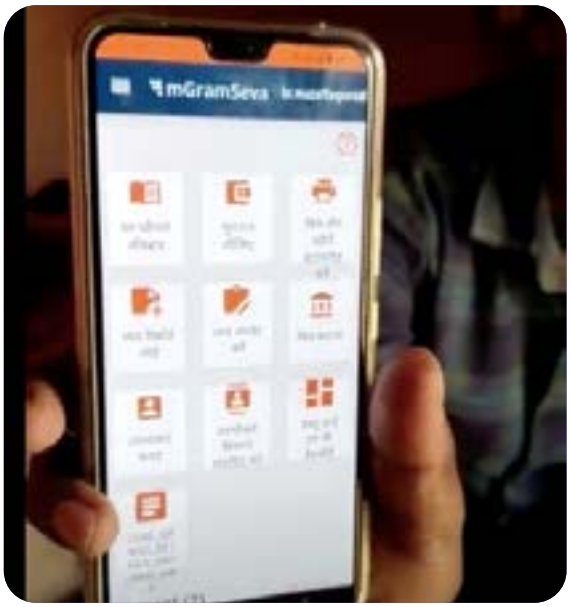
iECHO — moving expertise, not experts

iECHO adapted Project ECHO's health sector guided mentoring model for water. Regular structured video sessions connected frontline workers with domain experts, building communities of practice across geographies. More significantly, the JJM Digital Academy adopted iECHO as its guided mentoring format to national government infrastructure.

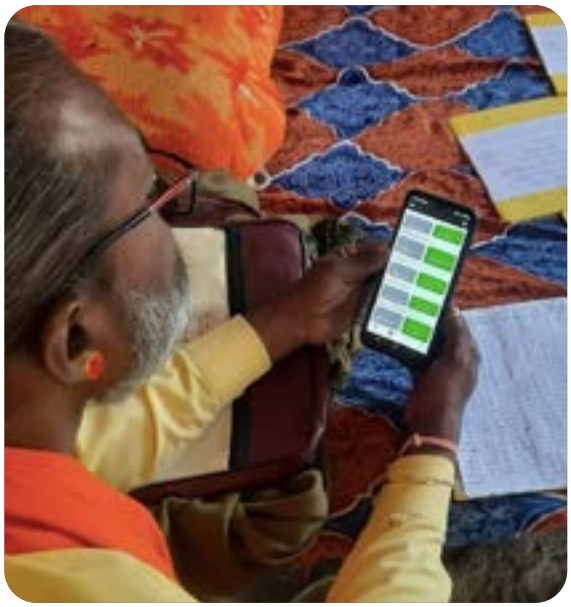
Avni and mGramSeva — trusted data from the ground up

As the phase deepened, the tools expanded from capacity building into operational data collection and financial management. Avni, an open source tool developed by Samanvay, enabled frontline workers in Bihar's Muzaffarpur to log tasks of water quality testing, tank cleaning, community meetings, and scheme inspections digitally. In 621 wards across five districts, 98 per cent of users reported improved ability to manage water supply operations.

mGramSeva, developed by eGovernments Foundation, brought financial visibility to Gram Panchayat Water Supply Committees by generating bills, tracking tariff collection, and producing financial reports. By 2024-25, it had helped collect Rs. 1.94 crore in cumulative user fees in Bihar.



mGram Seva

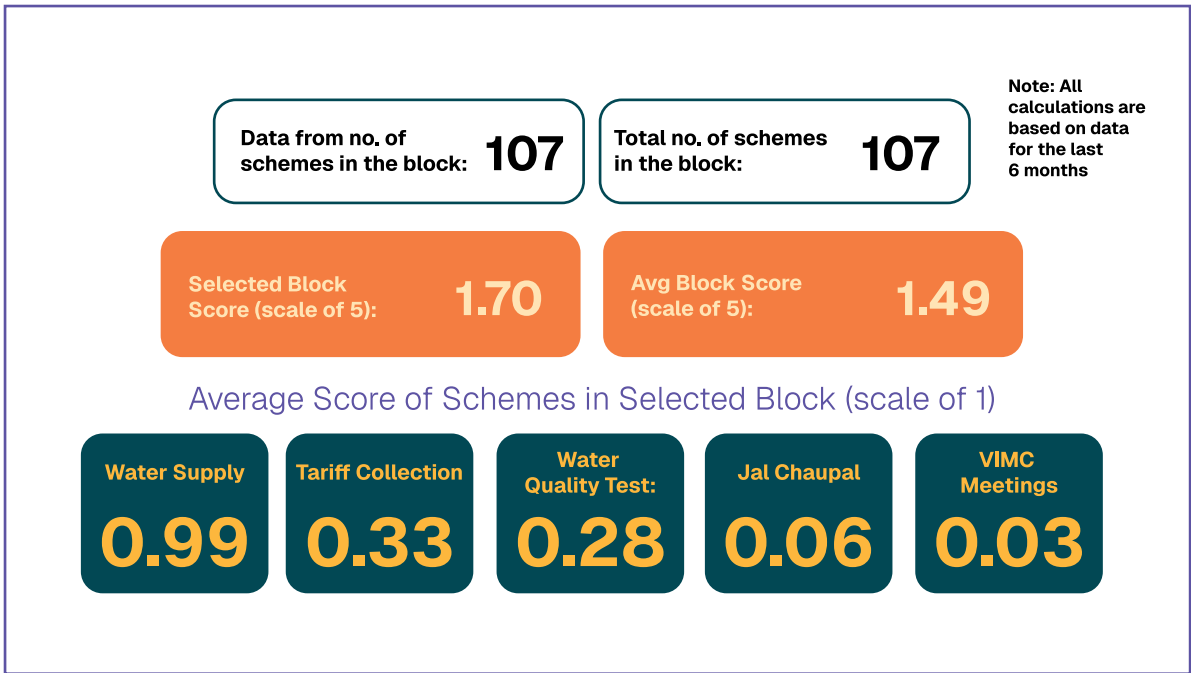

AVNI

Programme management support: the invisible investment

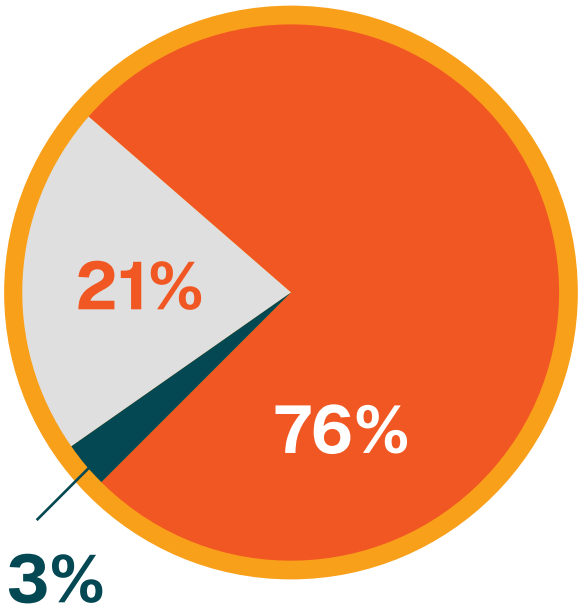
All the tools when deployed within programs required sustained programme management support. This was consistently the most underestimated investment. It involved programme redesign with the first mile at the centre, training, defining workflows around digital processes and regular data-backed reviews by the leadership.

We learned that deploying a tool and operationalising a tool are entirely different undertakings. Deployment means the tool is installed and training has been conducted. Operationalisation means the tool is embedded in the daily rhythm of the programme with functionaries using it without being reminded and that data from it feeds into decisions. Getting from deployment to operationalisation required dedicated programme management support, regular follow-up, data review cycles, and identifying adoption gaps and responding to them in real time.

The evidence from Karnataka MGNREGS showed that in districts where sustained facilitation and programme management support was provided, adoption of CLART was 100 per cent and 74 per cent of works were remotely vetted. In districts without this support, adoption was 39 per cent and only 5 per cent of works were vetted. The tool was identical in both cases. The programme management was not.



Performance of Schemes



High Performing Schemes (≥ 4)

Pirapur – W08 – Vinod Sahni
Munni Bangri – W10 – Rupa Kumari

Average Performing Schemes (≥ 2 and < 4)

Tepari – W09 – Amrendra Mahto
Bandra – W06 – Arun Barhi
Tepari – W04 – Chandeshwar Paswan
Pirapur – W06 – Dinesh Sahni
Pirapur – W07 – Durshi Devi
Sundarpur Ratanwa – W13 – Gunja Kumari
Tepari – W06 – Gujja Kumari
Munni Bangri – W05 – MD Tajim
Nuniya – W05 – Ranjeet Kumar
Munni Bangri – W09 – Ranjeet Sahni
Tepari – W10 – Rajneesh
Munni Bangri – W04 – Sakal Paswan
+more

Low Performing Schemes (< 2)

Tepari – W01 – Sanju Devi
Tepari – W02 – Sudha Kumari
Tepari – W03 – Nasira Khatoon
Tepari – W04 – Sumitra Devi
Tepari – W07 – Sakandar Kumar
Tepari – W08 – Mukesh Kumar S
Tepari – W12 – Baby Devi
Tepari – W13 – Tuntun Kumar
+more

Bihar brought these tools together in one geography for the first time. Across 548 villages in Muzaffarpur, PDA, Avni, mGramSeva, iECHO, and an integrated dashboard through DALGO ran simultaneously with the explicit goal of demonstrating a replicable O&M sustainability model. By February 2024, 91 per cent of schemes were functional, communities were paying user fees, and Rs. 1.94 crore had been collected. What Bihar showed, above all, was that people will pay for reliable water when the systems for accountability and collection are in place and that trusted data from multiple tools, brought together in a unified view, makes that accountability real.

What Bihar also showed was the structural limit of the phase. Five tools running simultaneously still could not produce a unified view of a single scheme without significant manual synthesis. The tools were not connected to each other. Data lived in separate systems. The absence of a shared infrastructure beneath them was a structural one and it led us towards the next phase.

Why did we pivot?

In our work in Bihar, Karnataka and Meghalaya, we were using multiple solutions on the ground. Each solution was solving a specific problem and adding value. But these tools could not talk to each other. While the frontline and decision makers could access dashboards of individual tools, they did not have a unified view of the scheme. Data remained fragmented, locked within individual systems. Building a unified dashboard, a prerequisite for understanding the overall system, across multiple tools was still challenging. Also, while the model worked within a programme or geography, replicating it across states required rebuilding integrations, data structures, and workflows each time, limiting the ability to scale efficiently.

Schemes, functionaries and household data was needed by multiple tools. Each of them had their own format and maintained it in their own systems. Availability of standards and specifications for technical and semantic interoperability, registries as trusted authoritative sources of truth on which all the solutions could tap into and open APIs maintained by an infrastructure could help in fast tracking the implementations.

6.2.3 Design Phase (2023 onwards) - The Evolution of DPI for Drinking Water

1. The Starting Point: Problem and Early Insights

Arghyam's journey toward a Digital Public Infrastructure (DPI) for drinking water began with a shift in perspective in how we think about technology itself. Until this point, the focus had been on identifying, adapting, and deploying existing solutions to address specific gaps. But as these solutions were deployed, it became clear that the question was not just about which tool to use, but how multiple tools could coexist, align, and evolve over time. The language of solutions and deployment started giving way to a language of systems, standards, and shared foundations. What was needed was an underlying infrastructure that could bring coherence to the ecosystem and enable innovations to scale by providing the fundamental building blocks and without repeated integration effort.

Simultaneously, the Jal Jeevan Mission (JJM) was launched in 2019 to ensure that every rural household in India has access to adequate, safe, and regular drinking water through functional household tap connections (FHTCs) had reached a critical point in infrastructure creation. In 4 years, over 65% of rural households were connected to taps. But as coverage increased, more fundamental questions started emerging: Are the taps functional? Is the water safe to drink? How will the sources sustain? How to ensure the O&M and long term sustainability of the schemes?

It was against this backdrop that we looked at other sectors for imagination.

2. Why DPI, and Why It Had to Be Different for Water

India's own experience offered a powerful reference point. Initiatives like Aadhaar, UPI, and DigiLocker had demonstrated that shared, open, interoperable digital infrastructure could unlock value far beyond what any single programme could achieve. Digital Public Infrastructure efforts in sectors like health and agriculture were beginning to take shape. The question, then, was whether a similar approach could be shaped for the water sector.

The Water Sector has its own unique complexities.

Water is not just a service to be delivered. It is a shared, common pooled resource, deeply tied to land, livelihoods, and the right to life. Questions of

access, usage, and quality are not only technical; they are also social, local, and often contested. This makes participation central. Systems cannot be designed only for reporting; they must be designed for engagement with communities that experience water daily.

The service itself is also inherently complex. Unlike other sectors, drinking water systems depend on physical distributed infrastructure like pumps, pipes, storage structures that interact with natural resources that vary across geography and time. Source availability fluctuates with seasons. Water quality issues emerge differently across regions. Service delivery is shaped as much by community behaviour and usage patterns as by engineering design.

The institutional structure of the sector adds another layer of complexity. Water is a state subject, with significant variation in how states design and implement programmes. Within states, rural water supply systems are owned and managed by local governance institutions such as Gram Panchayats and Village Water and Sanitation Committees. In addition, responsibility is spread across multiple departments: rural development, water supply, groundwater and health, each playing a role in outcomes.

All this creates a very different design context compared to other sectors. Experience from other sectors can offer valuable lessons, but also a clear insight: DPI cannot be transplanted to the water sector.

Another important factor shaping this shift was the opportunity for leapfrogging. Unlike sectors such as finance or health, where digital systems evolved over decades, the drinking water sector has seen relatively limited investment in digital technology until recently. While this has created gaps, it also presents a unique advantage. Without being locked into legacy systems, the sector has the opportunity to bypass intermediate stages of digitisation and move directly toward a more coherent, interoperable digital public infrastructure. This allows for designing systems with shared standards, registries, and interoperability from the outset, rather than retrofitting them later, potentially accelerating the path to scale and sustainability.

Arghyam did not develop this approach in isolation. The thinking was tested through deliberate conversations with people who had built national-scale digital infrastructure before. Board members Sunita Nadhamuni and Kiran Anandampillai had been closely associated with Aadhaar and health DPI journeys. Ecosystem leaders including Nandan Nilekani, Shankar Maruwada, Pramod Varma and Jagdish who have imagined, designed and shaped the DPIs in multiple sectors. These conversations were not endorsements. They were stress tests. They reinforced the importance of open standards, federated design, and public good thinking with ecosystem innovation. They also clarified that these principles could not be transplanted from finance or health into water without significant adaptation. The water sector's physical complexity, fragmented ownership, and federated ownership across states demanded a different expression of the same underlying logic.

They also warned us. This will be a long journey unlike the programmatic approaches. We need to have the patience and staying power for the long haul.

3. From Thinking to Strategy and Partnerships

Based on the inputs received, we decided to approach it with a clear three-fold strategy.

Approach

Center - Design DPI

- Define Registries
- Design Open Interoperable APIs
- Define Standards for devices and sensors
- Build Reference Implementations
- Advocate to the ecosystem

2–5 States - DPI Adoption

- Identify & evangelise to 3–5 states
- Strengthen their IT Systems
- Advisory role for adopting DPI
- Guide states in designing contextual, custom solutions leveraging the DPI

Develop Innovations

- Conceptualize & build innovative digital solutions as reference implementations
- Deploy & test innovations with field partners
- Demonstrate value for scaling up and building new solutions

Realizing the strategy required formal partnerships with the center and states to create the institutional conditions under which we could support the government in design, advocacy, and co-creation.

Center - Support the architecture and design of DPI for drinking water.

Between December 2023-2024, these ideas were formally discussed with the Secretary and Mission leadership of JJM. Arghyam was designated a lead partner for DPI and Artificial Intelligence at the Rural Wash Partners forum in Feb '24. Further discussions with the team at NJJM validated some of our hypothesis of siloed solutions, lack of standards and issues around service sustainability, we also learnt the the issues around the interoperability with the state solutions, the need for infrastructure mapping and the confusions/errors arising from the lack of semantic standards. Recognising the importance of this work, the department and Arghyam decided to formalize this partnership with a separate MoU with SPM-NIWAS (Dr. Syama Prasad Mookerjee National Institute of Water and Sanitation) detailing the roles and responsibilities of both the partners.

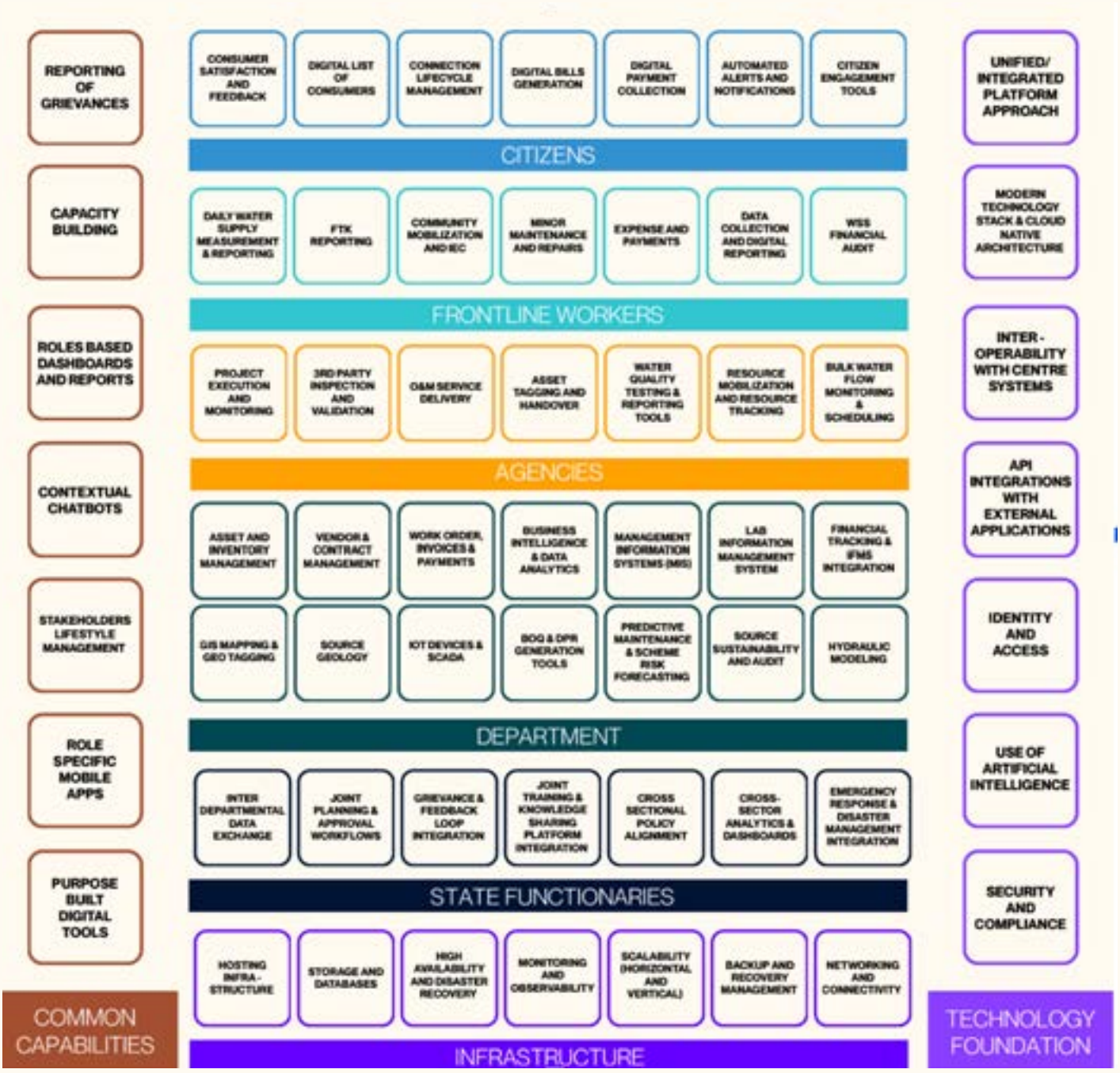
SPM-NIWAS sits at the intersection of the Ministry of Jal Shakti and the National Jal Jeevan Mission, and is the institution most directly responsible for building the technical capacity of states under JJM. Arghyam became the DPI design and advocacy partner at the national level.

As Is Reports

As a first phase of discovery, SPM-NIWAS and Arghyam studied the existing JJM IT Systems in 5 states to understand the state's current IT systems, their capabilities, identify best practices and assess the readiness toward DPI adoption. We developed the Department's Information Systems Capability Maturity Model (CMM) to systematically measure, improve, and manage the States/UTs IT Capabilities in the rural drinking water sector. The model would provide structured inputs in IT governance and strategic digital transformation planning of States/UTs.

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

The study highlights a fragmented and uneven digital ecosystem across states, with wide variation in maturity and architecture. While some states have built integrated platforms, many rely on siloed, application-specific systems, leading to duplication and inconsistent user experiences. Interoperability remains limited, with weak integration both within state systems and with central platforms, resulting in manual processes and data inconsistencies.

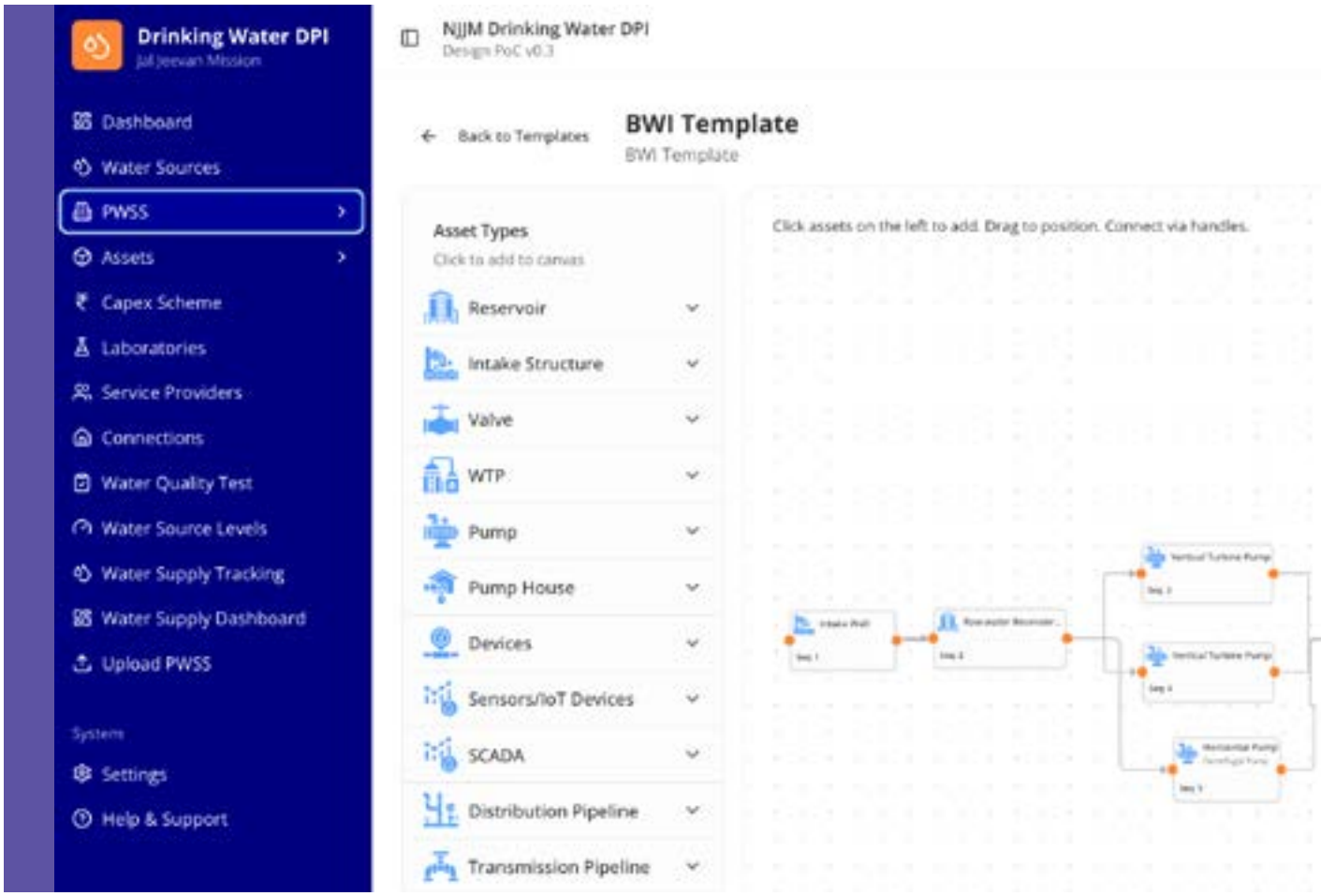

REPORTING OF GRIEVANCES
CAPACITY BUILDING
ROLES BASED DASHBOARDS AND REPORTS
CONTEXTUAL CHATBOTS
STAKEHOLDERS LIFESTYLE MANAGEMENT
ROLE SPECIFIC MOBILE APPS
PURPOSE BUILT DIGITAL TOOLS
COMMON CAPABILITIES
CONSUMER SATISFACTION AND FEEDBACK
DIGITAL LIST OF CONSUMERS
CONNECTION LIFECYCLE MANAGEMENT
DIGITAL BILLS GENERATION
DIGITAL PAYMENT COLLECTION
AUTOMATED ALERTS AND NOTIFICATIONS
CITIZEN ENGAGEMENT TOOLS
CITIZENS
DAILY WATER SUPPLY MEASUREMENT & REPORTING
FTK REPORTING
COMMUNITY MOBILIZATION AND IEC
MINOR MAINTENANCE AND REPAIRS
EXPENSE AND PAYMENTS
DATA COLLECTION AND DIGITAL REPORTING
WSS FINANCIAL AUDIT
FRONTLINE WORKERS
PROJECT EXECUTION AND MONITORING
3RD PARTY INSPECTION AND VALIDATION
O&M SERVICE DELIVERY
ASSET TAGGING AND HANDOVER
WATER QUALITY TESTING & REPORTING TOOLS
RESOURCE MOBILIZATION AND RESOURCE TRACKING
BULK WATER FLOW MONITORING & SCHEDULING
AGENCIES
ASSET AND INVENTORY MANAGEMENT
VENDOR & CONTRACT MANAGEMENT
WORK ORDER, INVOICES & PAYMENTS
BUSINESS INTELLIGENCE & DATA ANALYTICS
MANAGEMENT INFORMATION SYSTEMS (MIS)
LAB INFORMATION MANAGEMENT SYSTEM
FINANCIAL TRACKING & IFMS INTEGRATION
GIS MAPPING & GEO TAGGING
SOURCE GEOLOGY
IOT DEVICES & SCADA
BOQ & DPR GENERATION TOOLS
PREDICTIVE MAINTENANCE & SCHEME RISK FORECASTING
SOURCE SUSTAINABILITY AND AUDIT
HYDRAULIC MODELING
DEPARTMENT
INTER DEPARTMENTAL DATA EXCHANGE
JOINT PLANNING & APPROVAL WORKFLOWS
GRIEVANCE & FEEDBACK LOOP INTEGRATION
JOINT TRAINING & KNOWLEDGE SHARING PLATFORM INTEGRATION
CROSS SECTIONAL POLICY ALIGNMENT
CROSS-SECTOR ANALYTICS & DASHBOARDS
EMERGENCY RESPONSE & DISASTER MANAGEMENT INTEGRATION
STATE FUNCTIONARIES
HOSTING INFRA-STRUCTURE
STORAGE AND DATABASES
HIGH AVAILABILITY AND DISASTER RECOVERY
MONITORING AND OBSERVABILITY
SCALABILITY (HORIZONTAL AND VERTICAL)
BACKUP AND RECOVERY MANAGEMENT
NETWORKING AND CONNECTIVITY
INFRASTRUCTURE
UNIFIED/ INTEGRATED PLATFORM APPROACH
MODERN TECHNOLOGY STACK & CLOUD NATIVE ARCHITECTURE
INTER-OPERABILITY WITH CENTRE SYSTEMS
API INTEGRATIONS WITH EXTERNAL APPLICATIONS
IDENTITY AND ACCESS
USE OF ARTIFICIAL INTELLIGENCE
SECURITY AND COMPLIANCE
TECHNOLOGY FOUNDATION

Data is distributed across multiple systems without a unified architecture or strong governance, limiting the creation of a trusted and reliable single source of truth. Despite large volumes of data being collected, its use in decision making was limited.

We also discovered that there is a big opportunity of cross pollination of solutions among states and the willingness to share, learn and adapt. While every state IT system has its own nuance and long legacy to be the way they are, with shared digital rails in place, best practices, tools & learning can be shared across states creating a truly vibrant national water eco-system.

Jal Pravah - DPI Proof of Concept

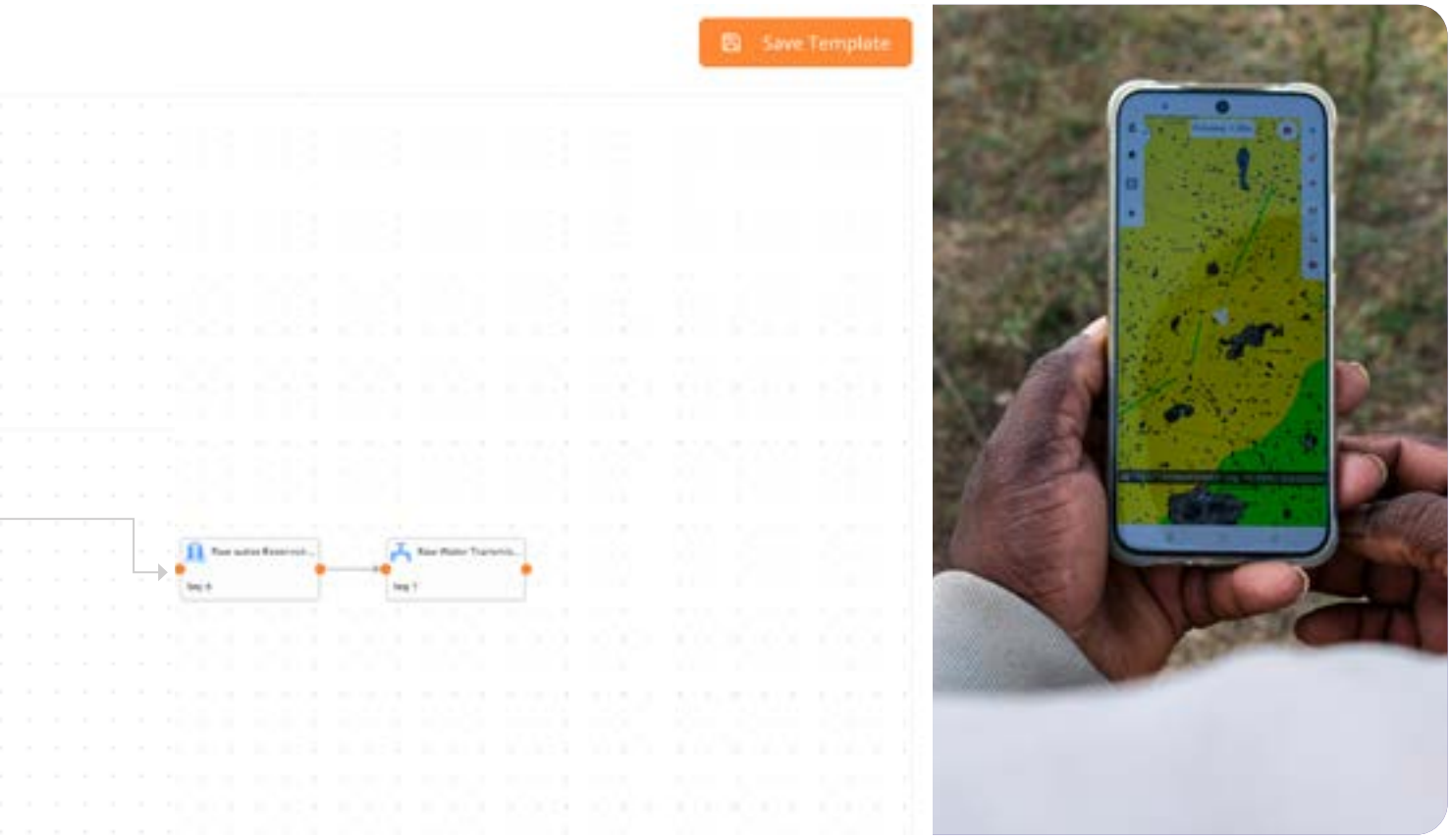
As a part of the Visioning exercise for the DPI, a visioning exercise for the DPI was conducted with the senior leadership of the JJM. The department overall liked the vision and requested us to visit the states to understand the physical complexity on ground and demonstrate how the DPI would look in the real world through a Proof of Concept (PoC). We built this Jal Pravah as the response of the department's request.



Jal Pravaah - Design PoC

The DPI Proof of Concept (PoC) is an early demonstration of technical feasibility and how Digital Public Infrastructure thinking can be applied to the rural drinking water sector to move from fragmented data systems to a shared, interoperable backbone. It brings together key building blocks such as registries, unique identifiers, and open APIs to create a unified view of water service delivery. Instead of data sitting in silos across systems and solutions, the PoC enables different systems to “speak” to each other—linking information on infrastructure, service delivery, and performance in a consistent and structured manner. This lays the foundation for a more reliable and real-time understanding of how water systems are functioning on the ground.

What the partnership also revealed is the gap between formal alignment and operational momentum. By December 2025, the DPI proof of concept had been completed and was well received by the states giving us confidence that we are on the right track. The MoU was productive. And yet NJJM had launched its own version of foundation registries with the Sujal Gaon and Swajalam Bharat IDs. This was driven by the department’s need to map the water supply scheme infrastructure to unlock the funding for the next phase of JJM. The government’s own implementation arm was moving faster, in a different direction, than the partnership anticipated. It made us realize the structural reality of working within government: formal alignment at one level does not guarantee operational alignment at every level. Holding the design position while the government moves is part of what the architect role actually requires.



States: Make state systems interoperable with the DPI, and demonstrate outcomes on the ground.

As a part of the DPI adoption strategy, Arghyam signed an MoU with Assam PHED in June 2024. With Assam we had an engaged state government, a champion senior leader, an existing JJM implementation (JJM Brain) rolled out at scale, and a specific set of sustainability challenges that mapped directly onto what the DPI architecture was being designed to address.

We realized that the responsibility of sustainability of O&M was shifting to the local institutions, the VWSC's and GPs which work closely with the Panchayati Raj and Rural Development Departments. Starting the discussions with them in early 2025, we signed an MoU with Assam's PNRD department, in December 2025 to support local institutions for sustainable O&M and improve source and financial sustainability of water supply schemes. Our earlier experiences in Bihar and Karnataka both with the technology tools and the processes for community engagement, local institutional strengthening and source sustainability would help us in this state wide engagement. Bringing both departments into the same partnership was an attempt to build the cross-departmental convergence that the CLAP framework had named as missing since 2019.

We are also in talks with 2-3 other states to formalize the partnerships to broaden our understanding and further stress test the DPI thinking, design and architecture.

Build Reference Solutions

The objective of the reference solutions was to demonstrate how the DPI building blocks could improve the speed of innovation while simultaneously building on the shared infrastructure could make the solutions easily scale and replicate across the country. The reference solutions were to be identified, designed and built in collaboration with states by identifying critical levers of change valid for large parts of the country.

As part of the Assam partnership, the state helped us identify two pivotal levers that could significantly inform and influence sustainability outcomes

1. Trusted data on scheme functioning through Jal Soochak
2. Community satisfaction with water services through Jal Ki Baat

JalSoochak

Jal Mitra taking the photograph of Bulk Flow meter on his mobile

Assam Deployment in Numbers

The problem JalSoochak addresses sounds simple. Bulk flow meters installed under JJM across Assam were not being read consistently, and where readings were submitted, the data was often not trusted. The result was that the most basic question any water system needs to answer — did the scheme function today, and how much water was supplied — could not be answered reliably.

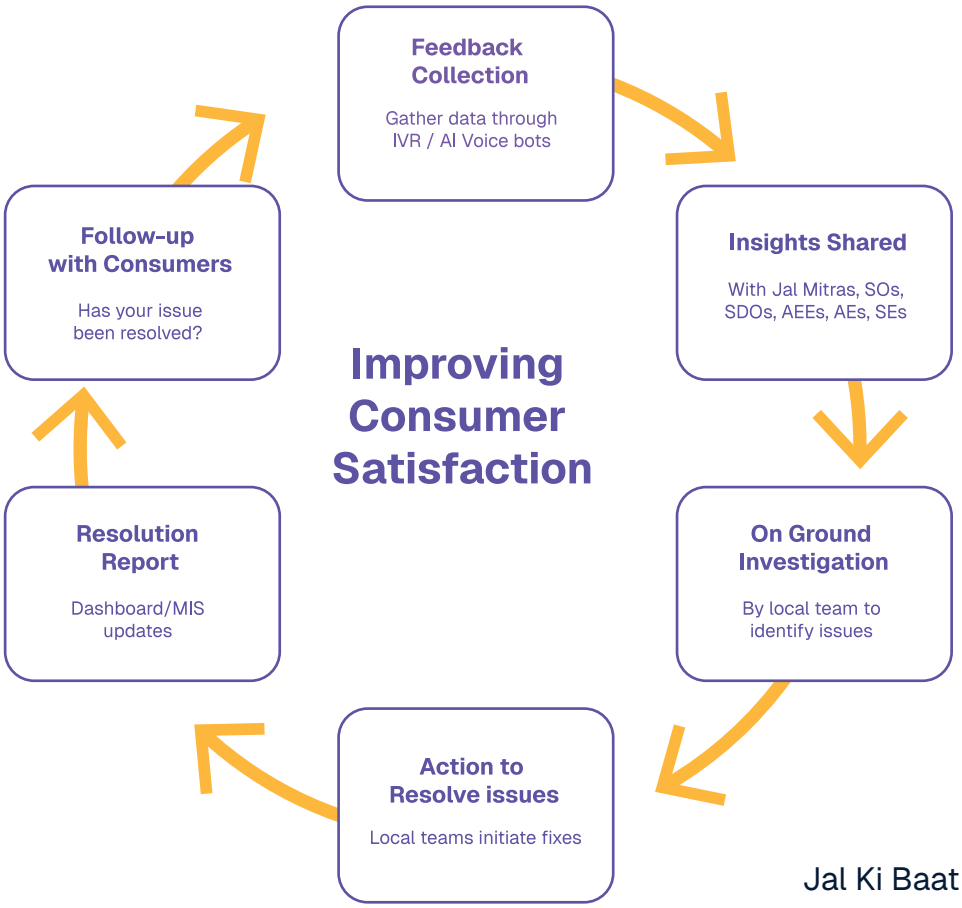
The normal approach would have been to build a new data collection application and train Jal Mitras to use it. JalSoochak made a different choice. Jal Mitras already had the Jal Mitra Mobile App on their phones. They photograph the meter and send the image. A custom AI vision model reads it, validates it, and submits the reading automatically into the scheme's data record, conforming to the standards and registries that the DPI architecture defines. The data is trusted and the dashboards and nudges inform the functionaries to understand where to focus their attention on. The entire system has the same view of the scheme functionality and Engineers now spend their time solving problems on the ground, not contesting data.

The accuracy trajectory is worth documenting. In August 2024, the first model achieved 55 per cent accuracy which was insufficient for operational use. By April 2025 after 9 months of intense efforts and collaboration with the department, a purpose-built computer vision model reached 97 per cent accuracy. Each iteration was driven and refined by field photographs consisting of worn meters, obscured displays, lighting conditions no lab test could anticipate.

The first version of JalSoochak was launched in January 2026. By End March, 10,135 Jal Mitras across Assam were active users with daily reporting rates reaching 75-80 percent; over 22 lakh bulk flow meter images submitted with an accuracy of 92%, recording over 37.64 MLD of water supplied to the households. JalSoochak (https://jalsoochak.in) product and AI model are openly available and offered as a reference implementation, a proof of what becomes possible when a tool is designed around the person using it rather than the system receiving the data.

Jal Ki Baat

Many of the states have well functioning inbound call centers. They also make outbound calls to collect citizen feedback. However making these proactive outbound calls at scale to every scheme is very resource intensive and was proving a challenge to the state. Jal Ki Baat was designed to solve the problem of listening to the customer at scale.



Jal Ki Baat Feedback Loop

1,55,427

Total calls made

14,188

At least 1 response (~9% response rate)

2/3

Avg. CSAT score across State

1,017

Grievance tickets logged for investigation

Highlights from Tickets:

- of tickets resolved: 599 (~59%)
- 49.3% tickets involve MULTIPLE interlinked root causes requiring coordinated responses across departments
- Root Cause: Leakage (29.6%), Power Issues (18.9%)

not, and what needs attention in their local water systems. In doing so, it shifts the focus from infrastructure alone to the lived experience of service delivery. In an early scale up, Across 2,721 schemes in Assam, over 1.55 lakh calls were made and we heard from over 14 thousand consumers. The findings were revealing: households receiving water daily were three times more satisfied with quantity and quality than those receiving it intermittently. Oversupply did not proportionally increase satisfaction, regularity mattered more than volume. Seventy-six per cent of underperforming schemes had identifiable and actionable causes. Government functionaries used that data to initiate corrective action. 75% of the complaints on irregularity were resolved by the government functionaries. The data was not just a report. It was a feedback loop.
As we write this, the second round of CSAT calls are being made and the early results are impressive.

At its core, Jal Ki Baat is about making water systems more responsive and accountable to the citizens. The insights gathered are not just collected but translated into actionable information for the functionaries. We believe that over time it will build a culture where community feedback becomes an integral part of how water services are monitored and improved, strengthening both trust and sustainability in the system.

The same feedback loop is also being applied to the Jal Baithaks, structured quarterly community governance meetings to review scheme performance, surface technical and governance problems (such as tariff collection), agree on solutions, and track actions.

The CLAP framework named inadequate participation as a founding problem in 2019. Jal Ki Baat is the most direct operational attempt to address it through a feedback channel that any household with a phone can access, in their own language while also strengthening local institutions.

What We Are Learning

- **JDPI is not a product, but a process.** It requires co-creation with central leadership and the states, alignment across multiple actors, and continuous adaptation to ground realities. States are central to sustainability outcomes, which makes close collaboration essential.

- **Building infrastructure is fundamentally different from running programmes.** It requires patience, sustained capital, and a different kind of institutional capacity that can operate over longer time horizons.

- **Government alignment is both essential and uncertain.** Progress depends on alignment across multiple levels of government, which can evolve over time and requires continuous engagement.

- **Ecosystem participation is critical.** States, markets, and civil society actors are equally invested in solving drinking water sustainability. Strong architectural design and interoperability needs to be co-created and can enable wider participation and adoption. We need to focus a lot more on the socialization of the DPI idea to have more ecosystem actors building solutions for the water sector.

- **Sustainable service delivery requires more than infrastructure.** It depends on a combination of reliable data, responsive systems, and empowered institutions. The evolution of DPI for drinking water is therefore not about a single platform or solution. It is about building the conditions for systems that can learn, adapt, and sustain outcomes over time to ensure reliable tap water service every day to every household.

This marked an important shift in Arghyam's role. Moving beyond being a funder and enabler, the organisation began to take on the role of a designer and architect of systems. In parallel, internal capabilities were strengthened to take on the technical and architectural requirements of building such a system.

7. Core Principles behind our technology

7.1

First-mile primacy and trusted data. Design for the participant, not the programme.

Technology solutions that are typically used in collecting data are designed for the program managers and not the frontline practitioners. By flipping this approach, tools are designed to not only generate data but also empower the frontline workers to benefit and derive value.

When a tool requires hours of training to operate, when the practitioner has to use multiple tools and enter the same data multiple times, when the value of the tool flows only to the programme manager reading a dashboard, and not to the Jal Mitra or Bhujal Jankaar generating the data, it is not first-mile centric.

The water sector generates large volumes of data, much of which is not trusted. The reason is structural. When data is collected as a reporting requirement rather than as part of real work, people report what is expected rather than what is true.

Designing for trusted data at the point of interaction can address this issue. Trusted data is generated when real work is happening. It is verifiable. And it flows back to the person generating it. The interaction is the goal. The data is what remains when a meaningful interaction takes place.

PDA, CLART and mGramSeva demonstrated this principle by creating value for the participant first, and allowing data to emerge as a byproduct of their work.

7.2

Interoperability as a design commitment

Across all phases of the work, a consistent need that emerged was that the systems be designed for interoperability. This was also creating flexibility, resilience, and choice within the ecosystem.

In practice, most tools we use, such as CLART, Avni, mGramSeva, and iECHO, continue to be stand alone solutions. The value to the ecosystem can be enhanced greatly if these systems can coexist, exchange data through shared standards and APIs, and evolve independently over time.

Interoperability also ensures that no single tool becomes indispensable creating choice for the governments and implementers.They are not locked into a specific vendor, platform, or tool. Instead, they can adopt, adapt, or replace components based on context, performance, and need.

This principle also comes with its own learning. Interoperability must be designed at the point of investment. Retrofitting later incurs large costs.

7.3

Converting programme expenditure into ecosystem assets

There are hundreds of large water programs already executed and currently being run; there are thousands of smaller interventions across the country at any point of time.

Every program produces outputs, trained people, content, plans, and data. In most cases, these remain within the programme and disappear when it ends.
Yet, one of the structural gaps in the sector is the lack of granular, usable data of these outputs that can travel across programmes.

Data is often collected for a specific purpose and not designed for reuse. This limits its value and forces repeated data collection efforts.

The result is a recurring pattern: each programme starts from scratch, rebuilding data, knowledge, and capacity that already exists elsewhere in the system.
A key principle that emerged is to convert programme expenditure into ecosystem assets.

This means that every investment should leave behind digital nutrients: data that can be accessed, plans that can be built upon, content that can be used and people whose capabilities are visible and verifiable.

The idea of digital commons becomes important here. When data, plans, and knowledge are made openly available in structured ways, they become shared assets that strengthen the ecosystem rather than remaining locked within programmes.

8. Key Learnings

8.1

Technology development is only the beginning

The harder part of the work comes after the development. We identified three essential components for technology to be effective.

Redesigning pilots for scale

Pilots never fail. Also pilots never scale. The amount of resources allocated to a pilot are never available at scale. The pilot involves a dedicated team working in a specific geography dealing with limited complexity. A scaled deployment involves hundreds of field workers, multiple state and district officials, and a level of variation in context that no pilot can anticipate. The pilots need to be designed and implemented with the actual scale in mind and the programs need to be reimagined leveraging the learnings from these pilots.

Programme management support

Our experience showed us that digital tools could help address convergence, liquidity of knowledge when and where it is needed, establish accountability with trusted data, and enabling conditions for large scale participation. But it required programme management support to redesign workflows, identify critical levers and incentive mechanisms and, and drive adoption of technology. We found traditional program management units within large programs lack the capacity to facilitate and drive implementation.

Sustained capacity building

Training is not a one-time event. The evidence from Meghalaya CLLMP program and Water Quality programme showed that even when tools were well-designed and adoption was high, it takes time to build confidence. The guided mentoring approach of regular, structured interactions over time for sustained capacity building is an under-rated part of any technology work.

8.2

Know your role and design the exit before you begin

Arghyam is a funder and strategic partner, not an implementer. But across eight years it has occupied four different roles: funder, builder, enabler, and architect. Each role carries different responsibilities, different accountability, and different engagement levels.

Role
Funder

What Arghyam does
Provides capital to a partner who designs, builds, and deploys

What Arghyam owns
The grant relationship

Example
Most CSO grants across all phases

Role
Builder

What Arghyam does
Designs, builds and services the tool

What Arghyam owns
The tool and its architecture; Hosting; Feature updates and maintenance; Onboarding, Training and Adoption to the border ecosystem

Example
Knowledge ForWater platform

Role	What Arghyam does	What Arghyam owns	Example
Enabler	Places an existing tool from the ecosystem into contexts for scale	The adoption pathway, not the tool itself	Avni, CLART, Dalgo, Glific, iECHO, mGramSeva and PDA
Convenor	Brings diverse actors from Samaaj, Sarkaar & Bazaar together for a shared problem	The convening space, the relationships it produces.	Participatory approaches to water management, Water Quality networks, DPI consultation and adoption workshops
Architect	Support architecture and design of the infrastructure layer that others build on	The coherence of the system, not individual tools	DPI for drinking water, Strengthening State Systems, Reference Solutions.

Arghyam's greatest leverage has most often been as a convenor: of bringing government, civil society, and technology partners into the same room around a common problem. The Architect role is new to us. It carries a long time horizon and complements the Convenor role directly for the water DPI; designing infrastructure that necessitates multiple actors requires the trust that only convening builds.

8.3

Measuring impact is messy. Embrace the ambiguity.

Technology surfaced problems and made them visible. PDA made the built capacity visible. CLART showed which structures were technically valid. mGramSeva made tariff collection gaps visible at individual household level. Tools alone could not resolve the problems they surfaced.

The WELL Labs MEL study on Karnataka Jala Sanjeevani shows CLART improved planning quality but groundwater outcomes could not be established. The water outcomes have a longer causal chain involving government action, community ownership, and institutional continuity which are beyond the technology's remit.

Define what success looks like before the journey begins, and distinguish honestly between what technology will show and what it will solve. Technology is a diagnostic and enabling layer to surface the problems and make them actionable. It can also help to make the right decisions and improve resource allocation. The water outcomes depend on many other factors.The risk of not naming this distinction upfront is that technology deployments get evaluated against outcome standards they were never equipped to meet.

8.4

Conceptual investment often precedes operational proof.

For new ideas to take shape in the sector, there is a need for strategic funding and an ecosystem of actors willing to take the risk. As a philanthropist, Arghyam has tried to play the role of that strategic funder to identify big ideas, form collaborations, test the ideas and to generate evidence.

Looking back, some of the early bets have become normal. Online capacity building for frontline water workers, experimental in 2018, is now an accepted norm. Guided mentoring through iECHO, adapted from the health sector, increased interactions between the first-mile and experts to move knowledge and expertise. Verifiable, point of interactions can generate trusted data at scale as a replacement for self-reported monitoring data as a design principle is gaining traction in field data collection. And the Bihar programme's attempt to bring Avni, mGramSeva, iECHO and PDA together into a unified operational stack demonstrated that an integrated digital architecture for rural water management was possible, and what it would take to make it work.

Not all bets landed. The Community Registry, an infrastructure to hold the digital assets generated across programmes and make them reusable across the ecosystem, was designed but never deployed. It was ahead of its time. Without an operational owner, the governance model, and the ecosystem readiness to consume shared data, it was shelved. The idea is now gaining traction with many organizations.

PDA, the central technology investment of five years, reached a significant scale of 100+ districts, provided real value in specific deployments and seeded imagination and capabilities in the partner organizations and government systems. It could not achieve ecosystem-level adoption envisaged due to the operating model and procurement bottlenecks.

We believe risk taking as a strategic funder seeding imagination, challenging the status quo, demonstrating possibilities and shifting what the sector believes is tractable are as important as operational funding. The ideas that did not succeed have equally shaped our thinking to feed into the DPI architecture. We learned between the gaps of concept and proof.

9. Conclusion and future direction

Eight years ago, Arghyam decided to invest in resolving the water sector's problem at scale leveraging digital technologies. We have come a long way since then. We have learnt from our successes and failures.
The ForWater imagination, the societal thinking of 2018 for an open, interoperable, transparent platform, designed for samaaj-sarkaar-bazaar to build together, is feeding into the DPI architecture.
The DPI for drinking water, if it is to become real infrastructure beyond a well-designed proof of concept, requires patient capital at a scale and duration that is long term. It requires technology partners willing to build on open rails rather than proprietary systems. It requires civil society organisations with field presence in states. And it requires funders who understand that infrastructure investment looks different from programme investment: slower to show outcomes, harder to attribute, and far more consequential when it works.
As the architecture is being designed, solutions are being built, standards are being put in place, partnerships are being established in states, we seek collaborators in the ecosystem to design, invest and co-create this imagination into a reality.

Digitalisation of the rural water sector is inevitable. Keeping it inclusive is a responsibility and comes from choices made in the policy, architecture, design and governance decisions. We want to hold that choice publicly, and keep the community dimension alive within the design.
The ForWater imagination began as a vision for what the water sector could become if knowledge, people, and data moved freely. That vision is still unfolding. It will continue to unfold until every village is water secure and every household has reliable, safe water. It is also more achievable than it has ever been.

If this journey has taught us anything, it is that water security at scale is built together. We are in it. We hope you will be too.

Manu Srivastava, Chief Operating Officer at Arghyam, brings over 25 years of experience in architecting and delivering large-scale technology solutions for social impact. He leads the organisation's technology strategy and partnerships, driving the design and implementation of scalable, ecosystem-driven solutions.

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