IMAGINE H2O // ASIA

ADB ASIAN DEVELOPMENT BANK

Meet Four Imagine H2O Asia Startups Addressing Water Challenges in Southeast Asia

Supported By

Enterprise Singapore

suez

xylem

PUB

Kurita

WORLD BANK GROUP

hhh

TODAY'S SESSION

What is Imagine H2O Asia?

Meet our innovators

4 startups
5 min pitches
Q&A

WHO ARE WE?

Imagine H2O is a global NGO that helps early-stage, high-impact water technology startups launch, grow and scale

Imagine H2O Asia is our new ASEAN hub in Singapore

Our Funding & Program Partners

FOUNDING PARTNERS

Enterprise Singapore

suez

PROGRAM PARTNERS

KURITA

xylem
Let's Solve Water

PUB SINGAPORE'S NATIONAL WATER AGENCY

SWA
SINGAPORE WATER ASSOCIATION

WTAP PARTNER
(Pilot support initiative launched in April 2021)

WORLD BANK GROUP
Water

ASIA IMPACT PARTNER (2020)

ADB Ventures

PROGRAM SPONSOR (2019)

MAYA
Maya Holdings Asia Limited

THE CHALLENGE

Asia's businesses & utilities face common barriers to innovation access and adoption

INTRODUCTION

Why does innovation access remain underserved?

INFORMATIONAL

Lack of awareness of and/or ability to vet potential solutions

FINANCIAL

Budget constraints and lengthy approval processes

RISK AVERSION

Widespread perception of risk vs incumbent technologies

PARTNERSHIPS

Limited resources and channels available

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Building Transformative Solutions to the Region's Water and Wastewater Challenges

HOSTED AT PUB SINGAPORE WATER EXCHANGE

ACCELERATION

Mentorship & industry visibility

CONNECTIVITY

Intros to tech adopters (municipal & industrial)

MARKET VALIDATION

Pilot co-funding & in-country market advisory

SINCE 2009...

150+
startups

$1M
pilot funding awards (since 2018)

$600M+
raised by startups

IN THE PAST 2 YEARS...

100% *increase in Asia-Pacific-based startup applicants Y-o-Y*

SUEZ, Xylem, Kurita, ADB Ventures *joined as supporters*

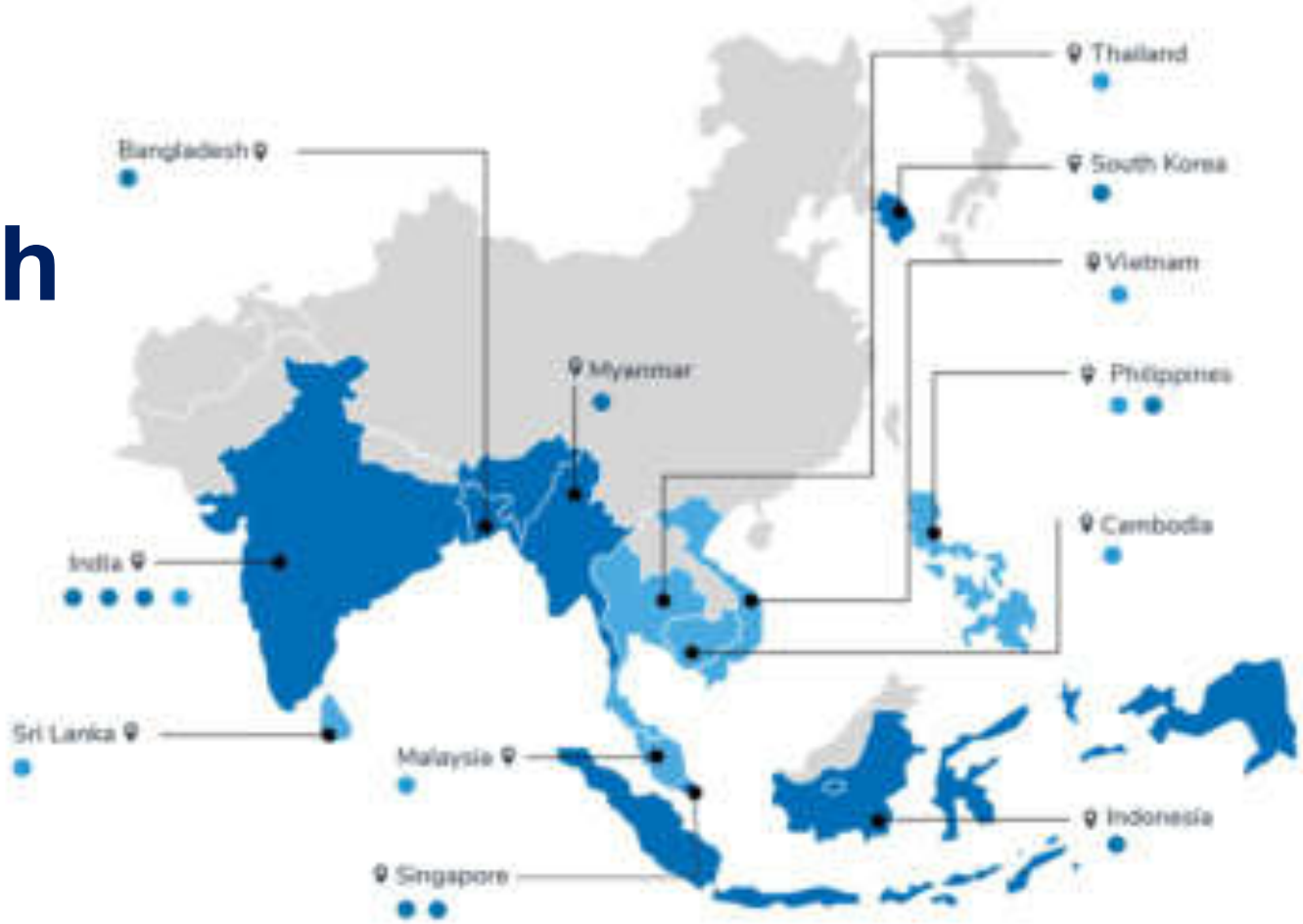
25 *startups from 10 countries in alumni network*

1,500+ *attendees at virtual program events (2020)*

Unlocking Market Access Across South & Southeast Asia

Imagine H2O Asia Portfolio Traction (2019-21)

- *Active Deployments*
- *Active Customer Discussions with IH2O Asia Partners*



The Ecosystem Partners Network

SELECT ECOSYSTEM PARTNERS

Enterprise Singapore
suez
SWA
PUB
MEYA
MANILA WATER
Safe
KURITA
ST Engineering
South East Water
SJ
Marubeni
VISHVARAJ
sembcorp
GEORGE KENT
K water
SCG
Sumitomo Corporation
WORLD BANK GROUP
RTS

OTHER GLOBAL CUSTOMER PARTNERS

PEPSICO
xylem
Let's Solve Water
ARCADIS
dc

Meet a few of our innovators

ADB 2ND E-MARKETPLACE

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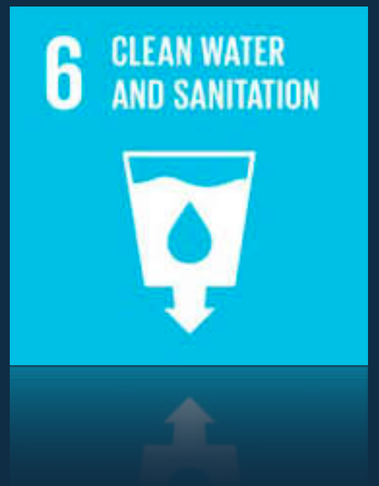
How can sewer network surveillance help cities optimize wastewater infrastructure performance?

fluid robotics

fluid™ robotics

Building a unique wastewater surveillance ecosystem



Asim Bhalerao | CEO | asim@fluidrobotics.com | +1(415)644-8276 | +91 9869685029

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SANITARY SEWER OVERFLOWS (SSO)

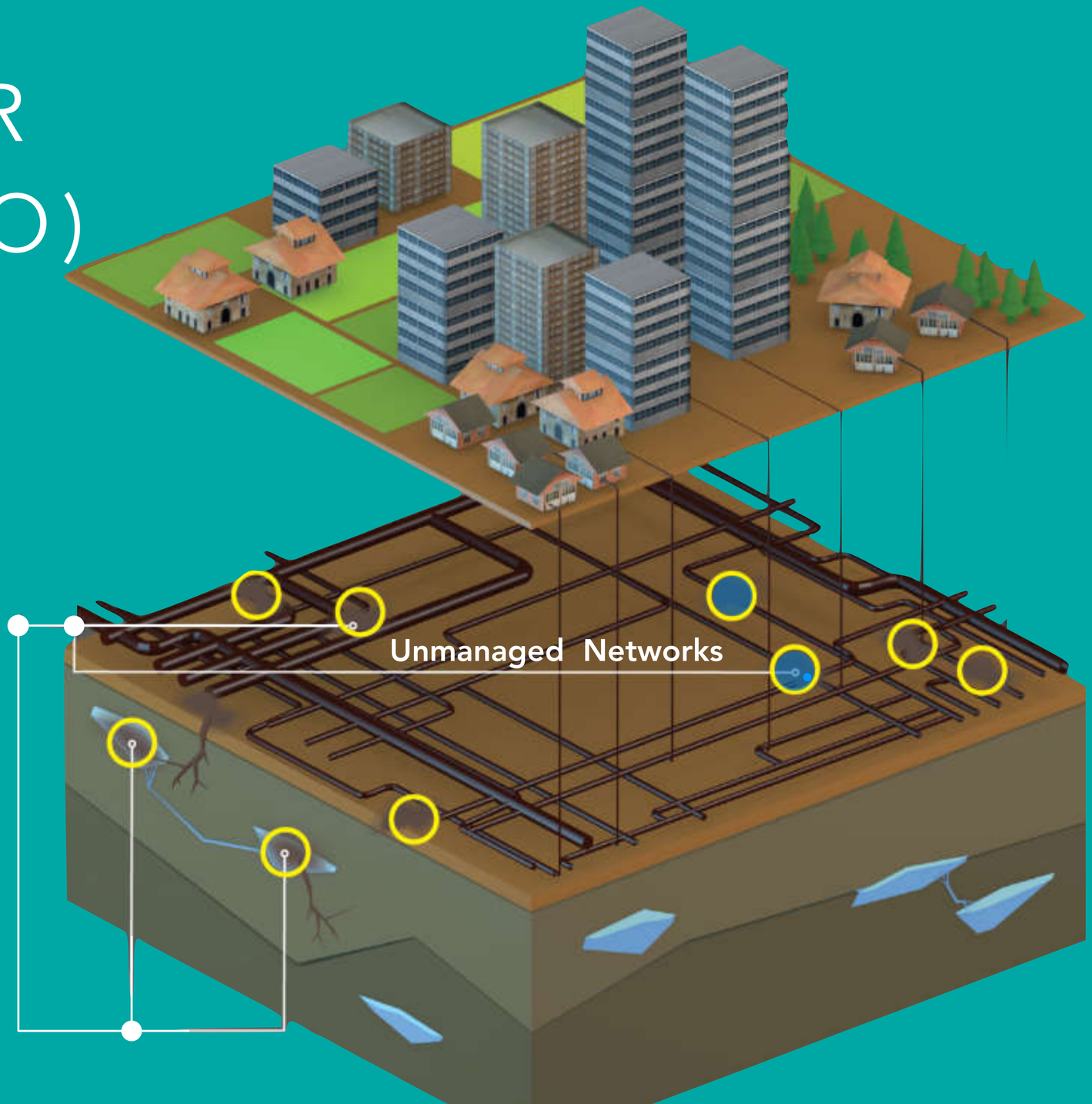
Have a huge environmental impact

50 BLD
Billion Liters a Day of SSO
In India

9 BLD
Billion Liters a Day of SSO
In US

Cause of SSOs

Wastewater Monitoring
20+ years old (US, EU, Singapore)
Non-existent (SA, SEA)



Fluid Robotics | info@fluidrobotics.com

fluid|health™

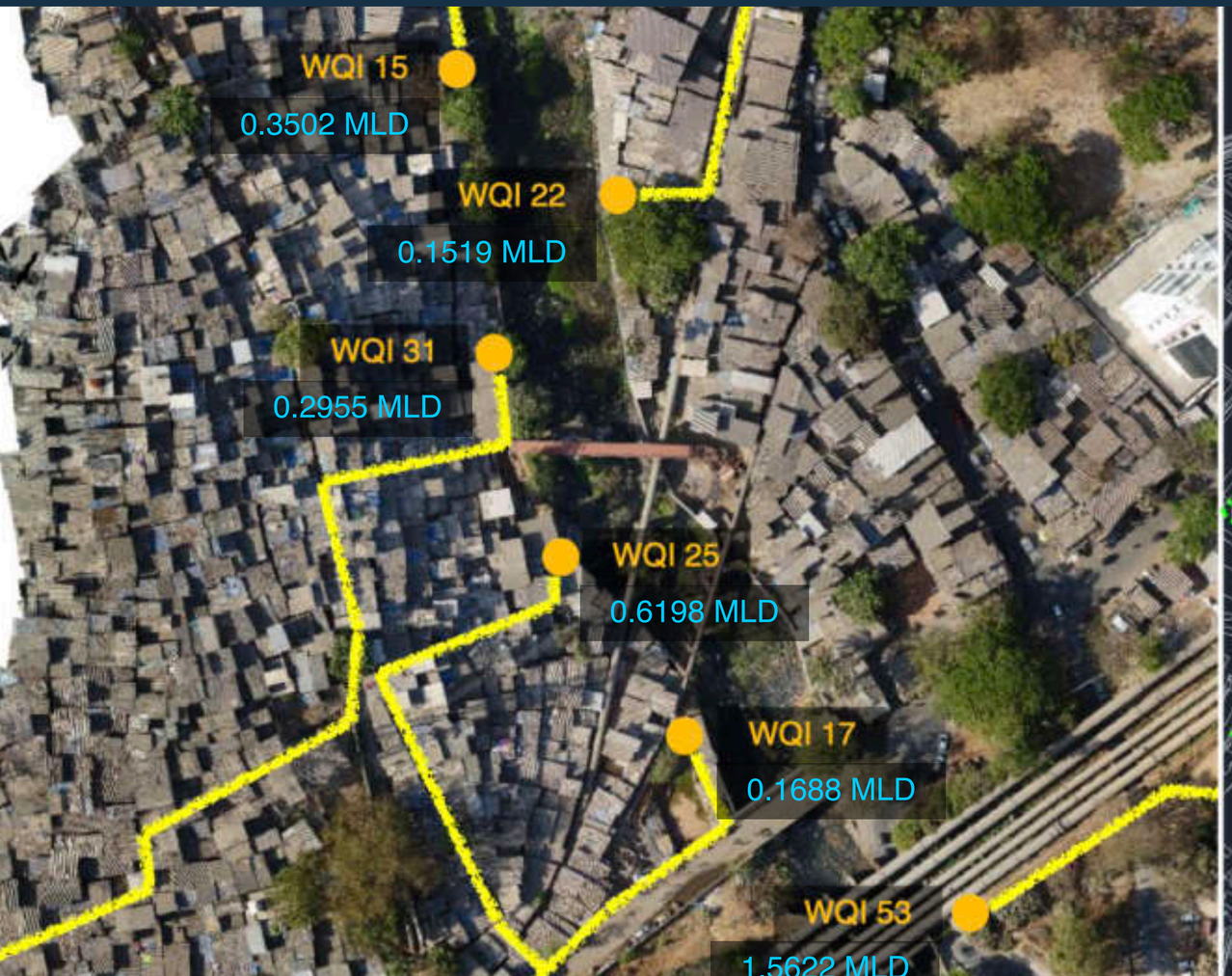
WASTEWATER MONITORING SENSORS & DEVICES

fluid|ai™

AI-BASED DECISION SUPPORT SYSTEM

1 Billion Liters of Urban Pollution

Quantify urban water pollution → Wastewater pipeline network optimisation → Sustainable reduction of untreated wastewater entering waterways

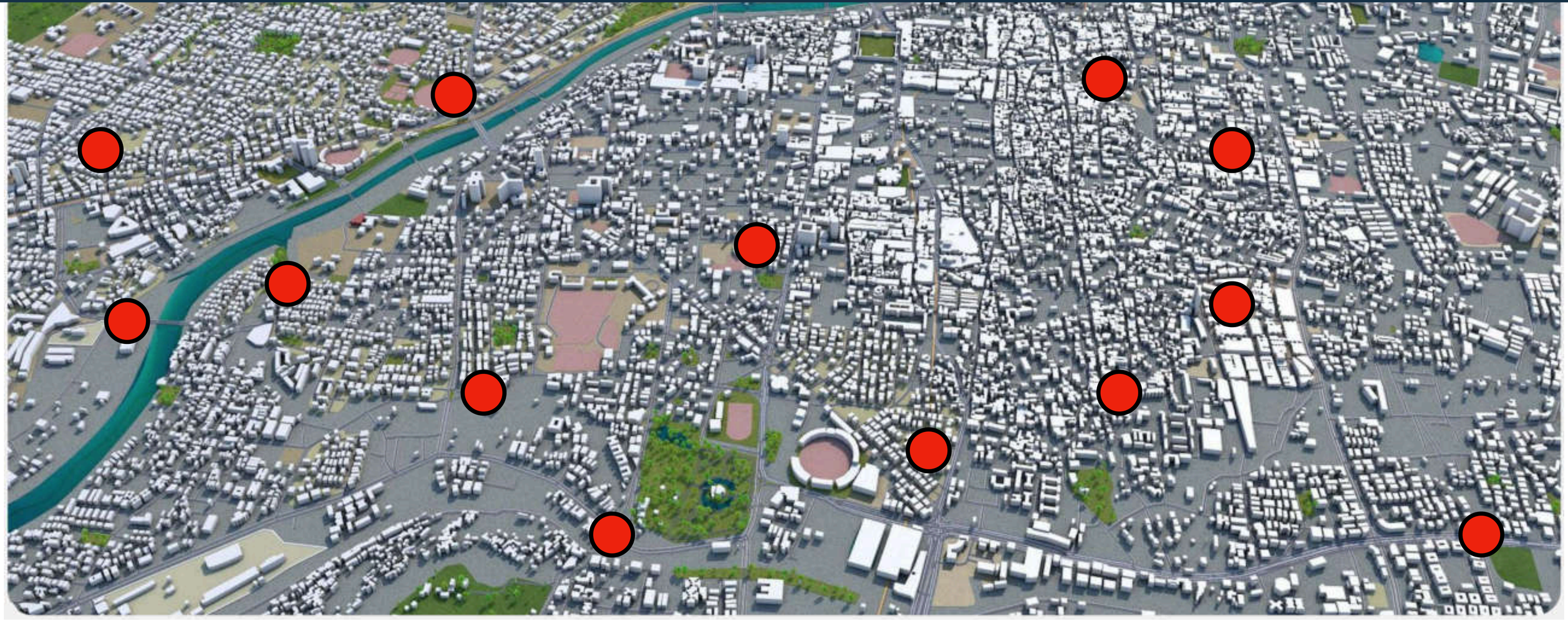


8.5M Population for Covid-19

Automated Sampling of Wastewater

Covid-19 Detection (RNA Extraction/ Measurement)

Genomic Sequencing for Variants of Interest/ Concern



4

Countries

1B+

Litres of Urban Pollution Monitored

1.5M+

Feet of Sewer Inspections FY 2021-22

8M+

Population being monitored for Covid-19

fluid™ robotics

Global Wastewater Infrastructure Assessment and Analysis

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How can we better detect toxic heavy metals to identify illegally discharged wastewater?

EnvironSens

EnvironSens

I2BioS (Intelligent Integrated Bio-Sensor)

Shailesh Kharkwal, PhD

Co-founder & CEO

Real-time Toxicity Monitoring || 100 + Installations in Singapore || Proven Track Record

Utilities across South & Southeast Asia are facing new pressures to monitor illegal/accidental discharge at the source

The Challenge

- 80% of wastewater enters waterways untreated
- Tougher effluent discharge regulations
- New fine/permit regimes
- Lack of low-cost early warning system

There is a need for solutions that can quickly identify WHERE, WHEN and WHO is discharging so that WRP operators can respond rapidly and strengthen enforcement capabilities

Current detection methods for heavy metals face limitations

Bioassay Indicators

- Incorporate test organisms
(fish, plants, invertebrates, microorganisms)

- Response could be accumulative effects of toxicants (not real-time)
- Difficulties in maintaining and storing organisms

Toxicant detection

Chemical analysis

(AAS and ICP-MS)

- Requires expertise in preparation & analysis
- Very expensive

Delay in response time (can't do real time analysis)

Accumulative effects of toxicants lead to inaccurate results

Expensive and high maintenance

Our Solution: I2BioS (Intelligent Integrated Bio Sensor)

An online and continuous monitoring system of heavy metal toxicity in water bodies and sewer network

EASY
OPERATION

Standalone I2BioS provides end-to-end solution to customer

ACCURATE
DETECTION

Embedded algorithm for accurate detection of toxic chemicals from 1-500 ppm

(i.e., copper, cadmium, chromium, nickel, zinc, lead, arsenic, cyanide, etc)

FAST
RESPONSE

Online continuous monitoring system with 24/7 AI-enabled dashboard

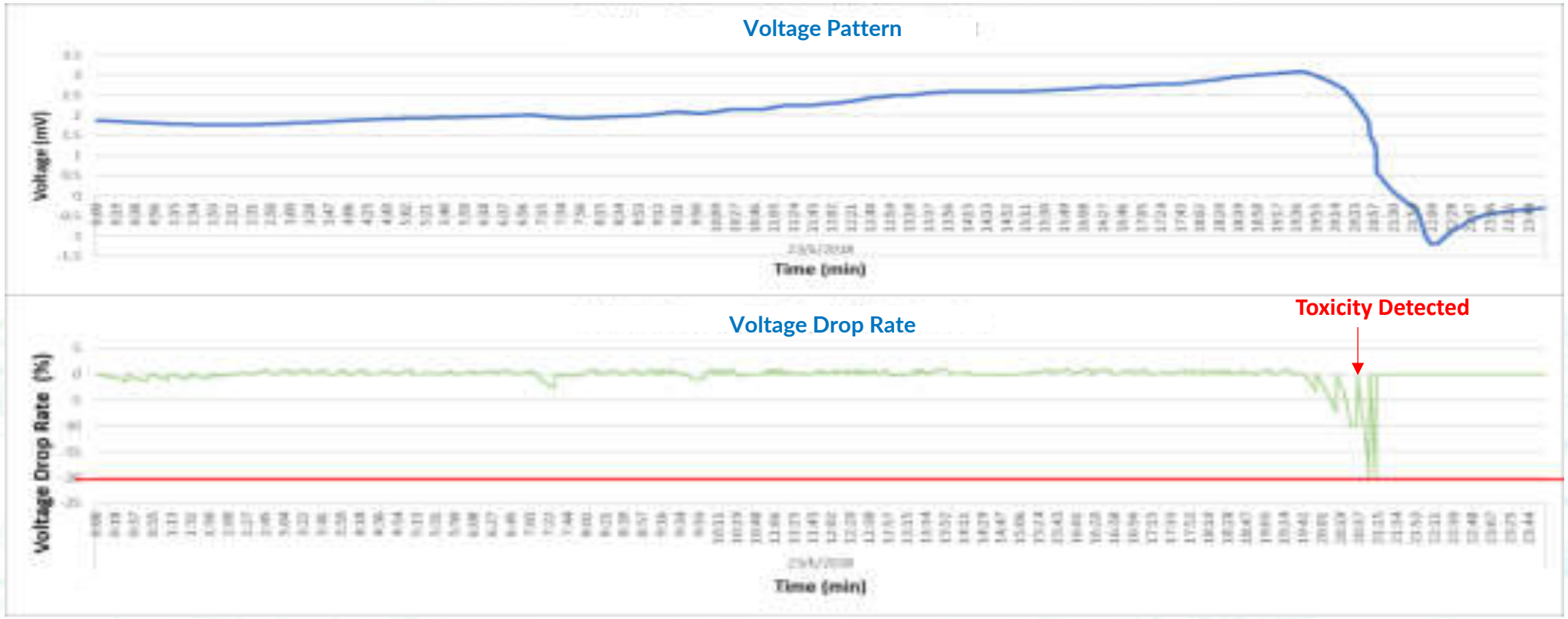
How I2BioS works

Bio-electrochemical technology

Voltage monitored as output signal for the growth of biofilm inside I2BioS

Presence of toxicity is observed based on the voltage drop determined by embedded algorithm of I2BioS

Case Study: Toxic events detected by I2BioS at different trade effluent locations



- I2BioS installed at last discharge point of a trade effluent site (electroplating company) detected heavy metal toxicity and autosampler was triggered
- Captured sample was measured to have **10.5 ppm of Cu (II) and 9 ppm of CN**

A low-cost solution for faster and more accurate detection

Feature	I2BioS	Chemical Analysis (ICP-MS. AAS)	Other Methods
Concept	Microbial-Electrochemistry	Spectrometric Measurement	Bioassay Indicators (Fish, Plants, Invertebrates, Micro-organisms)
Continuous monitoring	✓	✕	✕
Measurement time/Sample Preparation	5 - 20 min / sample preparation is not required	90 - 120 min / Sample preparation is required	30 – 90 min / Sample preparation is required
Required Maintenance Level	Low	High	High
Cost	Low	High	Low
Pre-warning System	Yes	No	No
AI-enabled IoT Platform with Dashboard	Yes	No	No

A Journey from Lab to Market - Development of I2BioS in Different Phases

Lab-scale I2BioS developed at Centre for Water Research, National University of Singapore (2011)

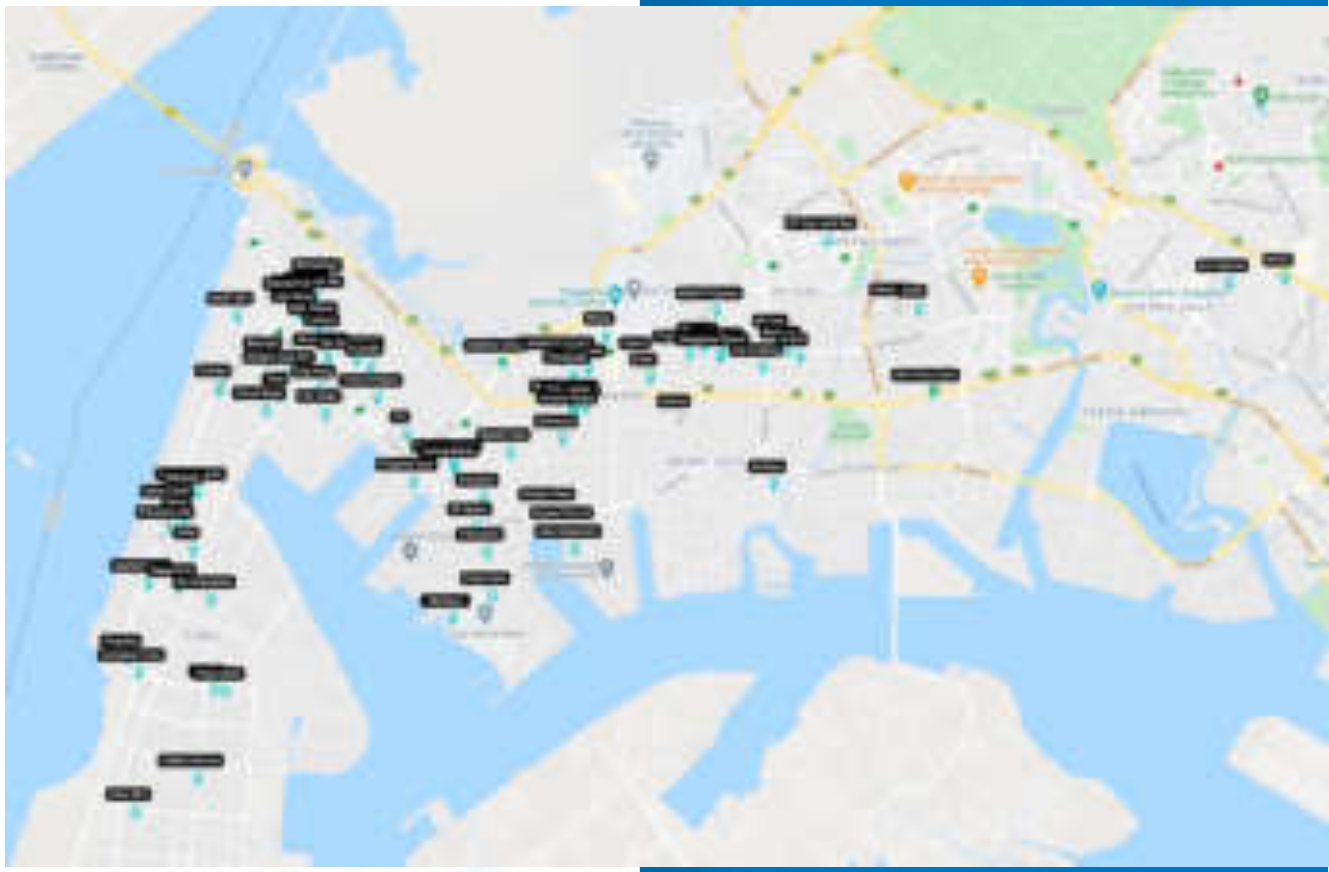
Field trial of pilot-scale I2BioS at a pumping station in Singapore (2013)

Compact I2BioS at the final discharge point of a factory located in Singapore (2016)

Standalone commercial I2BioS installed in a factory located in Singapore (R) (2018)

Proven track record in Singapore & awards

- **100+** installations to date
- **75+** additional installations by Q4 2021
- **50+** incidents reported
- Filed patents in Singapore, China, India, UK and USA
- Ongoing pilot projects in **China** and **India**
- Ongoing discussions in Southeast Asia – **Vietnam, Thailand, Malaysia**, etc.



APAC 25 COMPANY

IWA Project Innovation Awards

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Ask

A Common Problem Statement

- Utilities across South and Southeast Asia face similar sewer discharge challenges
- Potential customers have also shared an interest in monitoring surface water bodies

Seeking ADB's Support

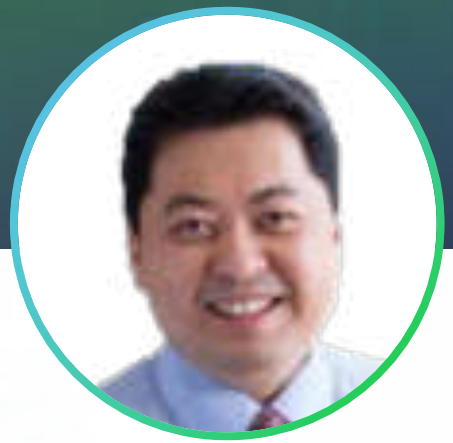
Primary Target

Early discussions for demonstration with utility in Philippines

Secondary Targets

Ongoing pilot discussions in India

The Team



Prof. How Yong Ng

Co-founder and Director, EnvironSens

Professor at NUS & Director at NUS Environmental Research Institute

EnvironSens

NUS National University of Singapore

Dr. Shailesh Kharkwal

Co-founder and CEO, EnvironSens

10+ years of experience in water sector
PhD from NUS

EnvironSens

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How can wastewater treatment plant operators optimize system health to save costs and prevent toxicity events?

sentry

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How can utilities effectively monitor and maintain remote infrastructure assets?

SpaceAge LABS

SpaceAge LABS

A ClimateTech Company

Enabling Sustainability
by **reimagining operations of remote and distributed assets**

ADB's e-Marketplace
Oct 2021

Leela Krishna Sriramula
Chief Business Officer & Co-Founder

Problem

Rapid growth and Climate Change causing tremendous stress on water infrastructure

- Lots of Distributed Assets, insufficient real-time data
- Increasing Demand, stress on current systems
- Silo-ed Solutions, need for Unified Data Platform

Urgent need of digitalization in urban water for data driven management

Image (on the right): Sewer networks in cities are under tremendous stress and can lead to sewage overflowing into streets. Real time sewer data and prediction of such overflows could be a gamechanger.

Solution

Enterprise Grade, Cost-effective, Data-to-Insight platform

rEye
Data-to-Insight Platform

- **Unified Asset Data Platform :**
  - ❖ **Single Source of Truth**
- **Cloud-Based SaaS :**
  - ❖ Secure, **Scalable, Convenient**
- **No-Code Interface** :
  - ❖ Easy to **Deploy, Use & Maintain**

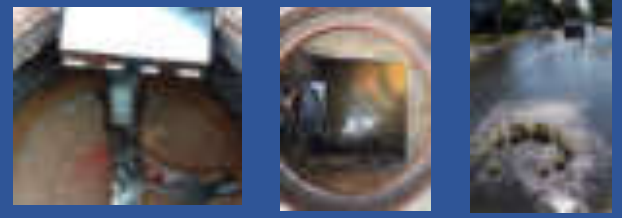
remoteEye

Full stack solution to connect any asset to IoT over low power wireless networks

Monitoring & Control of remote M&E assets

SewerEye

Low Power IoT Devices + AI/ML Software for holistic predictive maintenance of wastewater networks



Sewers, Drains, Grease Traps, Tankers, Pumps

How it works

Flow

Level

PLC

Quality

- Sewers / Drains / Pipes
- Decentralized Skids
- Tankers
- Remote Pumps
- Rivers, Lakes, Reservoirs

Insights / Visualization

- **Web / Mobile / GIS**
- SMS, WhatsApp, Email Alerts
- No-code, Customizable Dashboards

remoteEye
Basic Data Visualization & Management Tool

SewerEye
Advanced Tool for Wastewater Network Predictive Maintenance

Data Collection / Transmission

- Supports most industrial sensors
- Long Battery Life
- Rugged, Secure

- Global IoT Networks (150+ countries)
- Low-Cost Wireless Connectivity ($1/month)

LTE-M

NB-IoT

sigfox

3rd Party Data Source	SCADA / DCS /BMS Existing Sensors Historians, Rainfall Data

Proprietary AI / ML Algorithms for sewer blockage prediction

RESTful APIs

Rules Engine

Storage

User, Org, Access Management

Device Management

Multiple Connectors –
MQTT, HTTPS, Sigfox, FTP etc

Cybersecurity

aws

Azure

Google Cloud

rEye
Data-to-Insight Platform

Case Studies

- **remoteEye** – Improving efficiency by preventing water wastage and detecting leakages

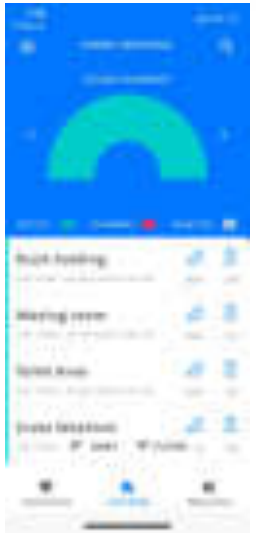
- **SewerEye** – Improving Operations and Compliance by Predicting sewer blockages and detecting illegal discharge

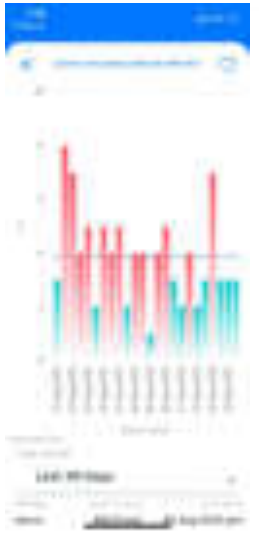
SMART WATER METER – Industrial / Facilities

Use Case:

- Real-time consumption data
- Improve water utilization efficiency by reducing wastage
- Leak Detection

- ***Up to 30% reduction in water Consumption***
- ***Helped Customer with real-time monitoring and Improved Efficiency***
- ***Auto-generation of weekly and monthly reports for regulatory and audit requirement***





SpaceAge LABS

WATER LEAK DETECTION – Industrial / Facilities

Early leak detection in underground pump pits

- *Identified 7 incidents in 6 months*
- *minimised water wastage due to leakage / flooding*
- *improved operations efficiency and reduced downtime*

SpaceAge LABS

3500 km of sewers

90,000 manholes

Overflow due to blockage leads to

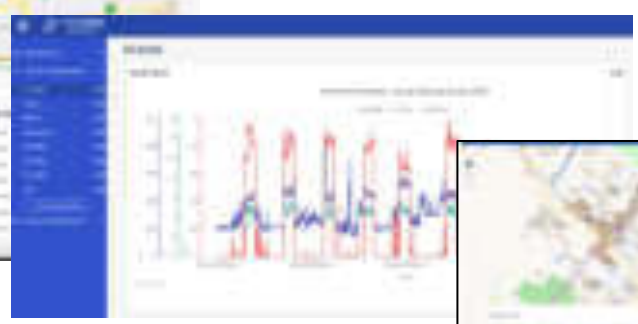
Monetary loss ($25k per overflow) , **EHS** issues and **public nuisance**.

Current solution is **reactive**, difficult to maintain and expensive.

Ideal Solution**: predictive**, low maintenance and easy to deploy.

Detected 7 Blockage events in the last 6 months

LTE-M



rEye IoT Device inside the Manhole Chamber

Normal Sewer level

Surcharged level due to blockage

- **2-3X Battery life compared to other solutions**
- Variable sampling rate based on actual conditions

Sewer Level Trend at 67 Kerbau Rd showing the increase of base flow level over time

One platform for managing the wastewater collection network

Industries

Sewer Illegal Discharge Alerts

Inspection Chamber

ISO Tank Level Monitoring & Tracking

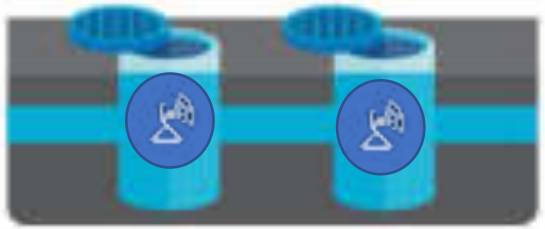
Greasy Waste Collection Tankers

rEye IOT Node
Sensors: Water Quality / Level / Flow

Households / Commercial Construction

Overflow Alerts

Grease Traps Holding Tanks



3500 km sewers
90k manholes

Sewer Blockage / Flow Monitoring

Wastewater Treatment Plant

Stormwater management

Rainfall Inflow

PUB · itc · NSL OilChem Waste Management · EnvironSens

SewerEye (Installation Photos)

WQ / Illegal Discharge Detection at Factories

Level / Flow Monitoring at Sewer Manholes

ISO Tanker Level Monitoring & Tracking

- **265 unique rEye Sensor Nodes** installed along the Sewer Network / manholes and ICs at factories and construction Sites in Singapore
- **7 Sewer Blockage Events** predicted
- **25+ Illegal discharge events** detected
- Substantial savings (~$25k per blockage) through prevention of pollution and sewer overflow events
- Predictive or condition based Maintenance instead of scheduled or break down maintenance

Creating Impact by Improving operations efficiency and regulatory compliance

750+ rEye IOT devices installed

1000+ Assets monitored

Monitoring 200+ Km of Sewer Pipes

Monitoring 80+ Sewer Manholes

Monitoring 185+ water skids

7 Sewer Blockage / overflow events predicted (~$175k direct savings)

25+ Illegal discharge events detected

Up to 30% reduction in water usage

Recipe for Success – Partnerships

PUB

EnvironSens

Thank you!

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Q&A

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Thank you

If you would like to learn more about the startups featured today or connect with Imagine H2O Asia, please contact us directly.

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