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Robotic Water Quality Monitoring and Information-as-a-Service (Iaas)

TracWater awarded as one of the top 10 utility technology providers for APAC in 2017

APAC CIO Outlook TOP 10
UTILITIES TECHNOLOGY SOLUTION PROVIDERS - 2017

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Global Water Quality Challenges

- Water scarcity
- Ageing infrastructure
- Rising costs
- Increasing regulations

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09 Water Storage
- Level
- Residual Chlorine
- Flow
- Turbidity

10 Pressure Boosting
- Level
- Presure
- Voltage
- Current
- Power
- Flow

11 Resident Meter
- Flow
- Residual Chlorine

12 Flow Meter Chamber
- Flow
- Presure

13 Fire Hydrant
- Presure
- Flow

14 Pipeline Network
- Presure
- Flow
- Turbidity
- PH

15 Sewerage
- Level
- PH
- Conductivity
- ORP(Oxidation-Reduction Potential)
- Turbidity

04 Pumping Station
- Level
- Presure
- Voltage
- Current
- Power
- Turbidity
- Flow

07 Sedimentation and Filtration
- Presure
- Level
- Differential Pressure
- Flow
- Turbidity

08 Treatment
- Level
- PH
- Residual Chlorine
- Temperature
- Turbidity

20 Aeration and Digestion
- Flow
- Dissolved Oxygen
- PH

16 Treatment Plant
- Level
- PH
- Conductivity

03 Deep Well
- Level
- Presure
- Flow
- PH
- Conductivity
- Salinity

05 Rainfall Monitoring
- Rainfall
- Air Temperature
- Barometer
- Humidity

17 Industrial Use
- Presure
- Flow
- Turbidity
- Residual Chlorine
- Dissolved Oxygen
- PH
- ORP(Oxidation-Reduction Potential)

01 Reservoir
- Level
- Turbidity
- Dissolved Oxygen
- Conductivity
- Temperature
- Suspended Solid

02 Water Intake
- Level
- Temperature
- Flow
- Turbidity
- Conductivity
- Dissolved Oxygen

06 Coagulation
- Level
- Flow

24 Dam
- Level
- Turbidity
- Dissolved Oxygen
- Conductivity
- Temperature

23 Final Discharge
- Level
- Flow
- PH
- Conductivity
- Water temperature
- Dissolved Oxygen
- ORP(Oxidation-Reduction Potential)
- Turbidity

22 Sludge Incineration
- Flow
- Temperature
- Presure

21 Final Sedimentation
- Flow
- Temperature
- Presure
- Turbidity

19 Primary Sedimentation
- Flow
- Temperature
- Presure
- PH

18 Pumping Station
- Level
- Presure
- Voltage
- Current
- Power
- Flow

Reservoir-
pH, Turbidity, Temperature, Dissolved Oxygen

River-
pH, Turbidity, Dissolved Oxygen

Hotel-
pH, Conductivity, Temperature

Swimming Pool-
pH, Free Chlorine, Temperature

Water Treatment-
pH, Free Chlorine, Turbidity

Wastewater Treatment-
pH, ORP, Temperature, Conductivity, Suspended Solid

Fisheries-
pH, Temperature, Dissolved Oxygen, Salinity

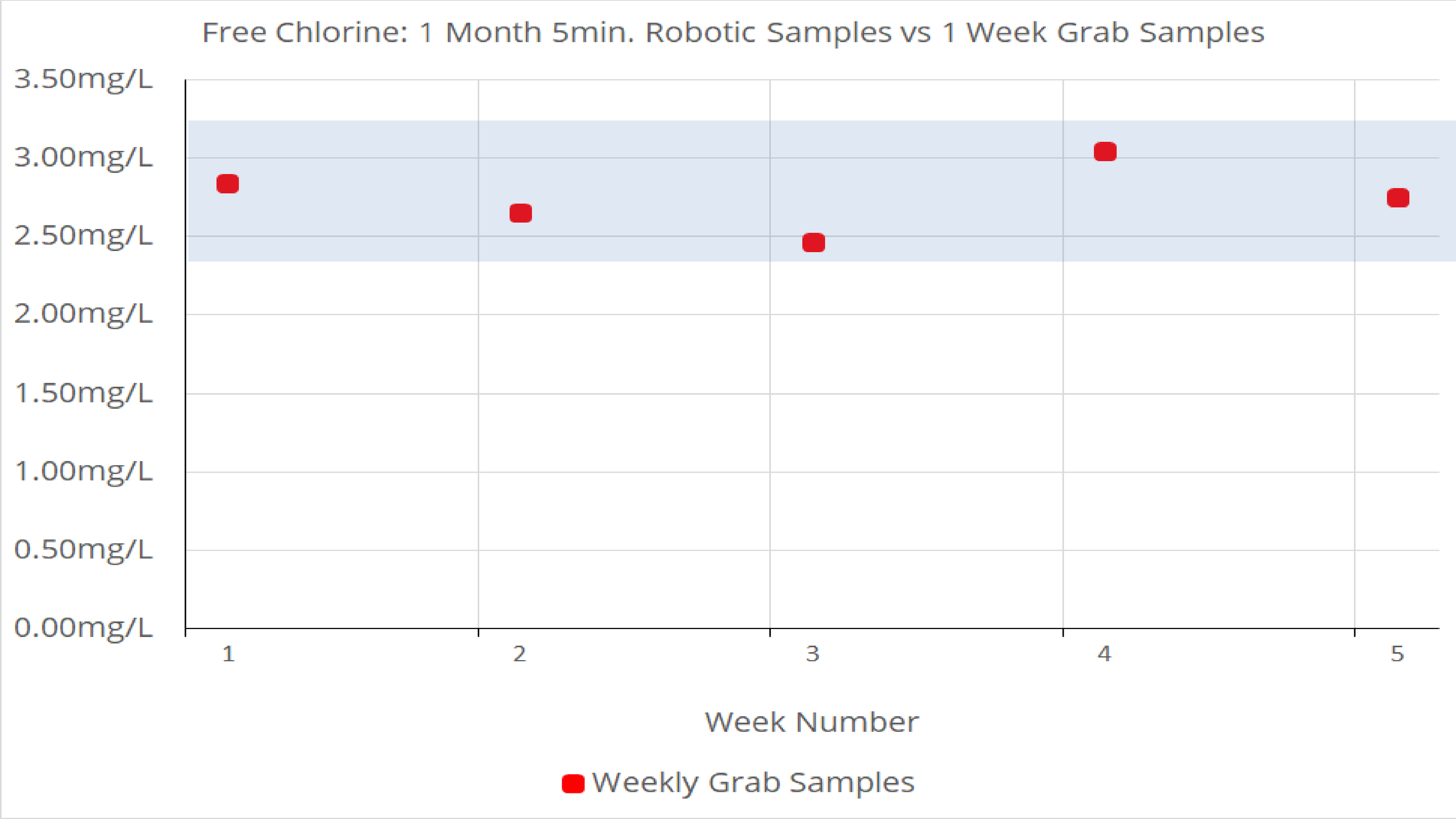
Building(Cooling Tower)-
ORP, Conductivity

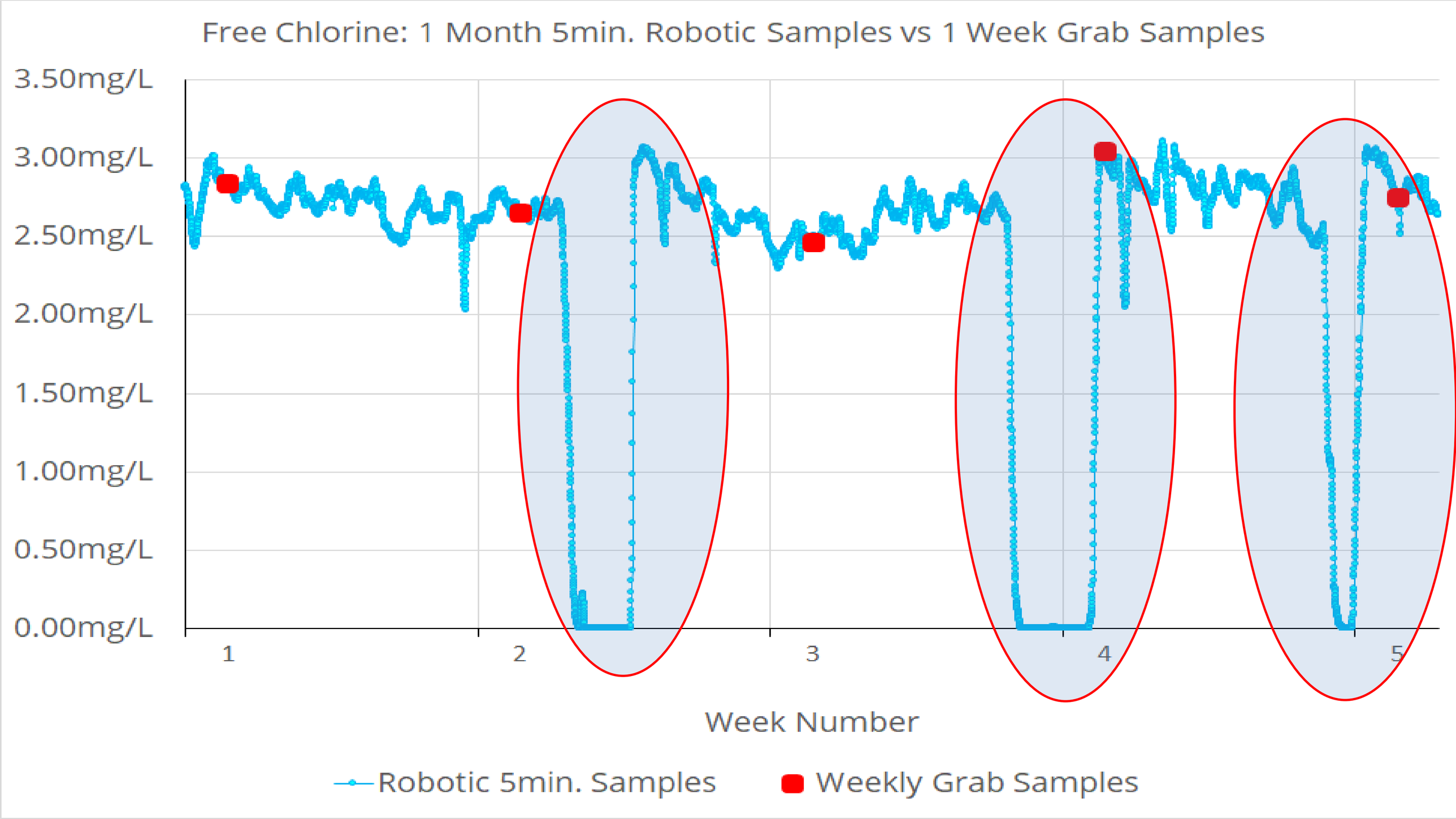
Aquaculture-
pH, Temperature, Dissolved Oxygen, Turnidity

Pipeline(Hydrant)-
Free Chlorine

Hospital-
pH, Temperature, Free Chlorine, ORP, Turbidity

Aquarium-
pH, Temperature, Dissolved Oxygen, Turbidity


Free Chlorine: 1 Month 5min. Robotic Samples vs 1 Week Grab Samples
3.50mg/L
3.00mg/L
2.50mg/L
2.00mg/L
1.50mg/L
1.00mg/L
0.50mg/L
0.00mg/L
1
2
3
4
5
Week Number
Weekly Grab Samples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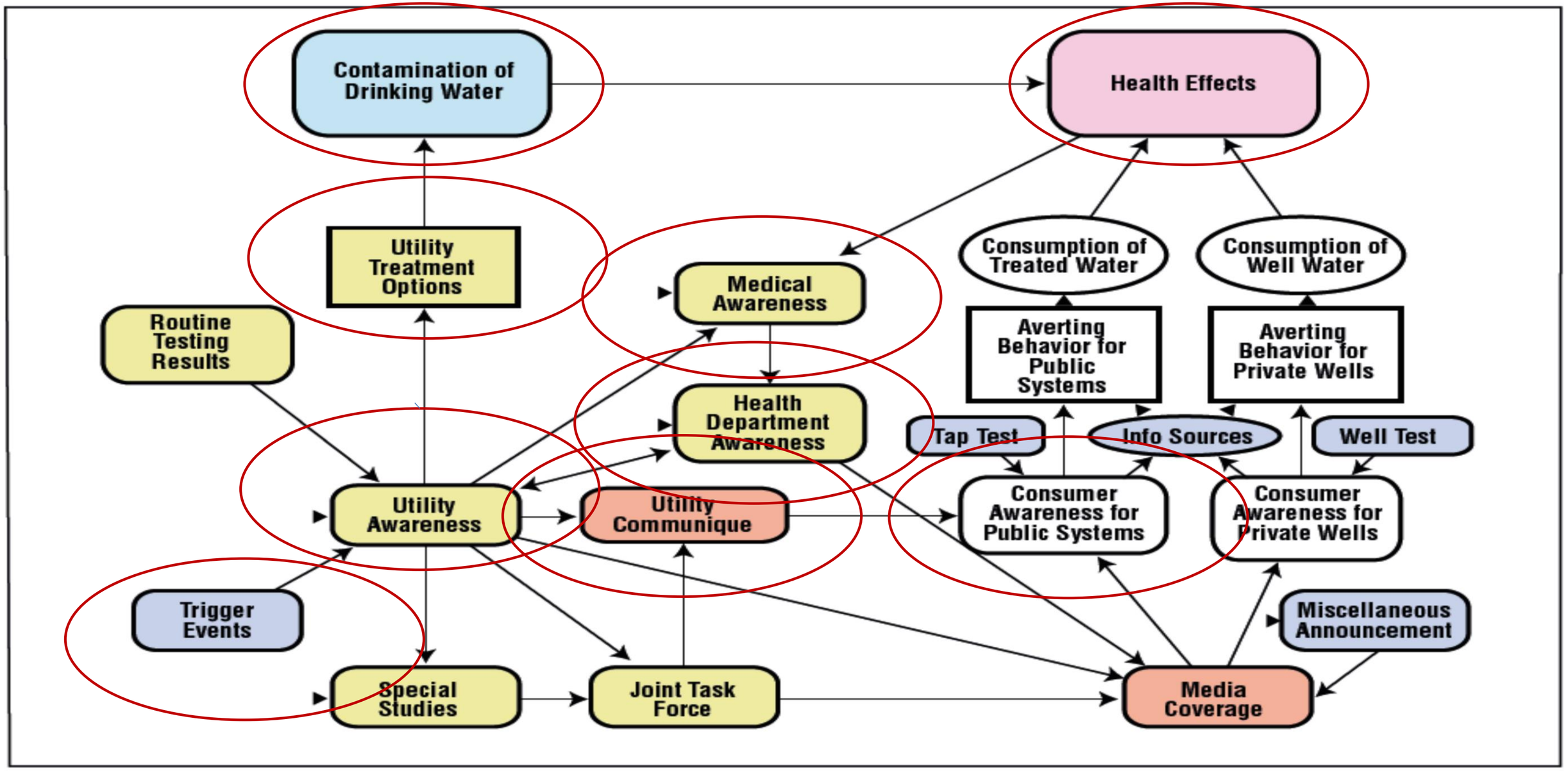
1.00mg/L
0.50mg/L
0.00mg/L
1
2
3
4
5
Week Number
Robotic 5min. Samples
Weekly Grab Samples

Figure 1. Model predicting the effects of measures to reduce health effects of contaminants in domestic water supplies

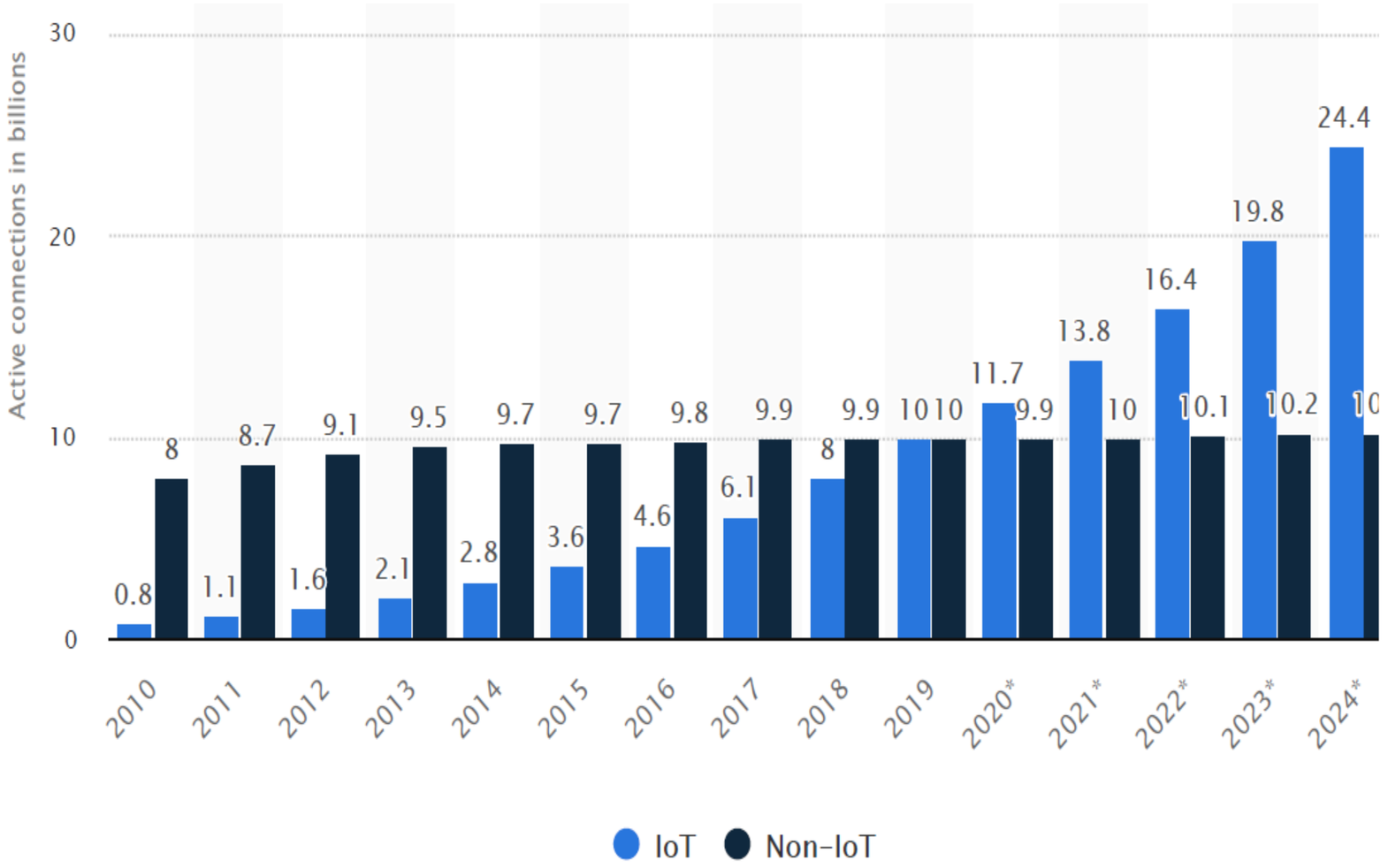


Source: Casman et al. (2000)[18]

physical and chemical water quality indicators measured in real-time

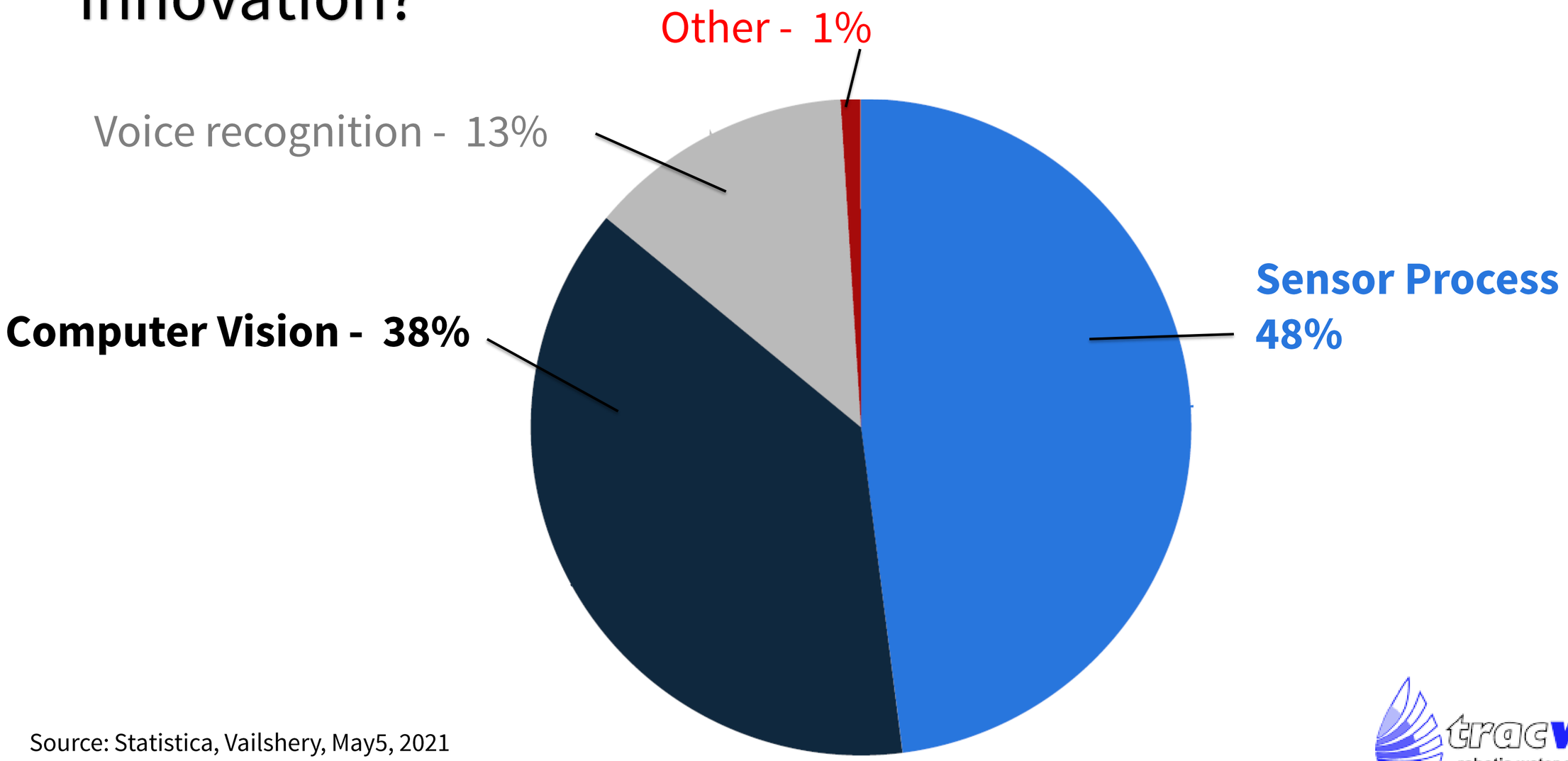
Annual spend on IoT hardware & services will reach one trillion dollars by 2035

- 2021 – 13.8 Billion IOT sensor devices
- **2025 - 30.9 Billion IoT connected devices**



Source: Statistica, 2021

What kind of IoT workloads will be key to future innovation?



Source: Statistica, Vailshery, May5, 2021

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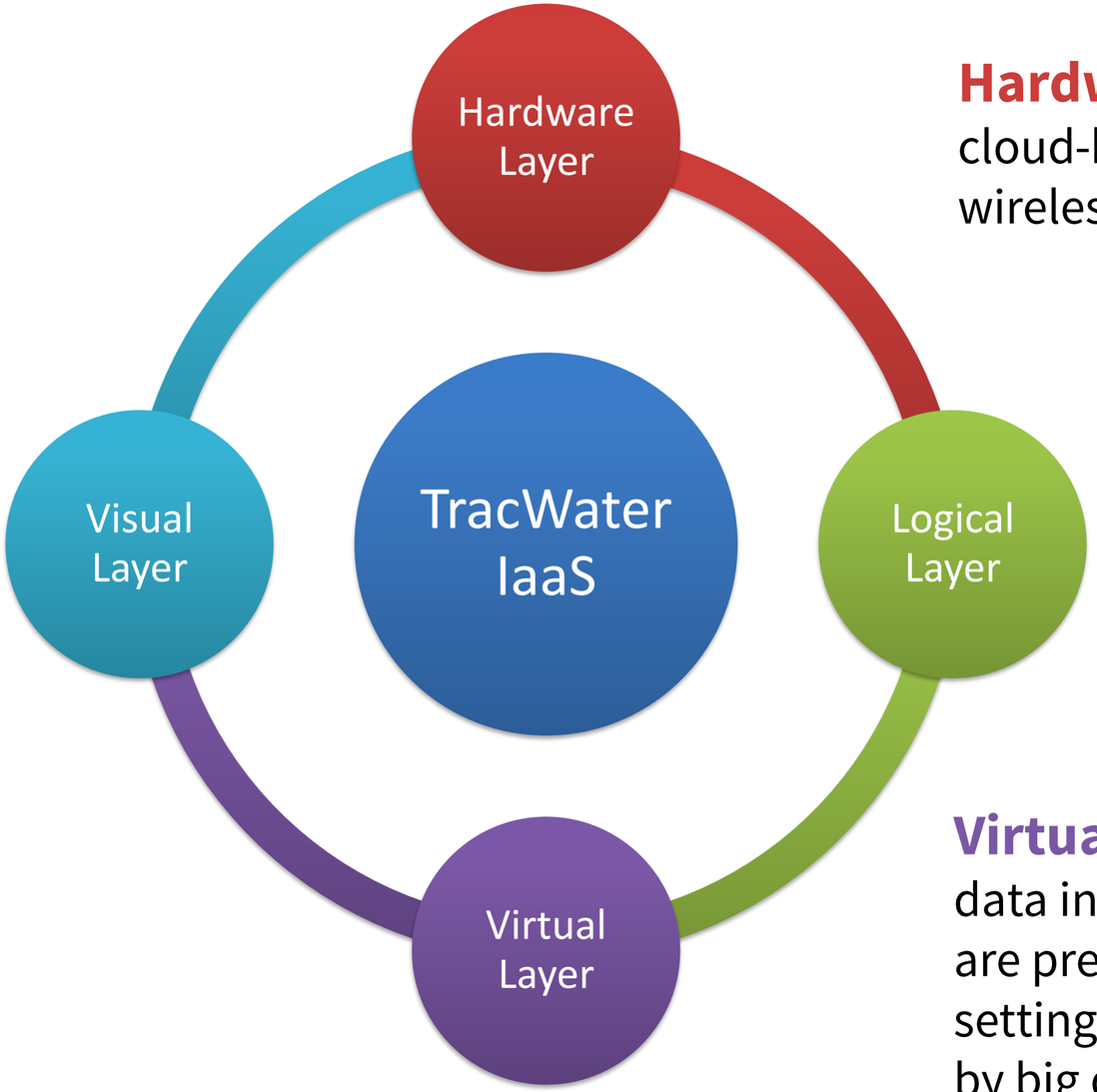
How TracWater real-time IaaS works



Hardware Layer – low-power, cloud-based sensor packages with wireless data communication

Visual Layer – high-speed fully user-inactive visual data on any internet-connected device anywhere in the world - at any time

Logical Layer – incoming data from any combination of inputs mapped to water networks so data can be analysed by automated algorithms

Virtual Layer – automatically convert data into actionable information. Actions are prescribed automatically based on alert settings and key critical indicators detected by big data algorithms.

Play video please

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TracWater Robots

- A family of cloud-based water quality robots
- Used by Australian water utilities for more than 5 years

Measurements they make:

- **Up to 10 water quality parameters:** Free Chlorine, pH, E.C, Turbidity, Colour, Salinity, TDS, ORP, Temperature, Pressure.
- **6 Heartbeat sensors:** Sample water flow (2 sensors), 4G signal strength, door security alarm, power- cell voltage and remaining life.
- **Realtime Transient Pressure**: Every TracWater robot senses transient pressure at 1,000 times per second and automatically records events in real-time at 100 time per second (around 4 times faster than most SCADA sensors)

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this replaced this

One cloud-based, self-powered TracWater DMA unit easily replaced this SCADA water quality measurement station and a mix of very expensive and high- maintenance sensors and systems from Siemens, Hach, Yokogawa etc.

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operating in very remote places

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TracWater Solves Water Quality Monitoring

Real-Time IoT

New technologies and high-speed data platforms

Power of Cloud

Using cloud and edge computing to provide actionable insights immediately

Device Longevity

Billions of data points collected without failure, with with minimal intervention or maintenance.

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Thank you

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