

Introduction of AIoT Management Platform in water treatment plant

Dr. Shan-Shan Chou (周珊珊), Secretary General/WAOT
Dr. Bo-Chuan Cho (卓伯全), CTO/GSD

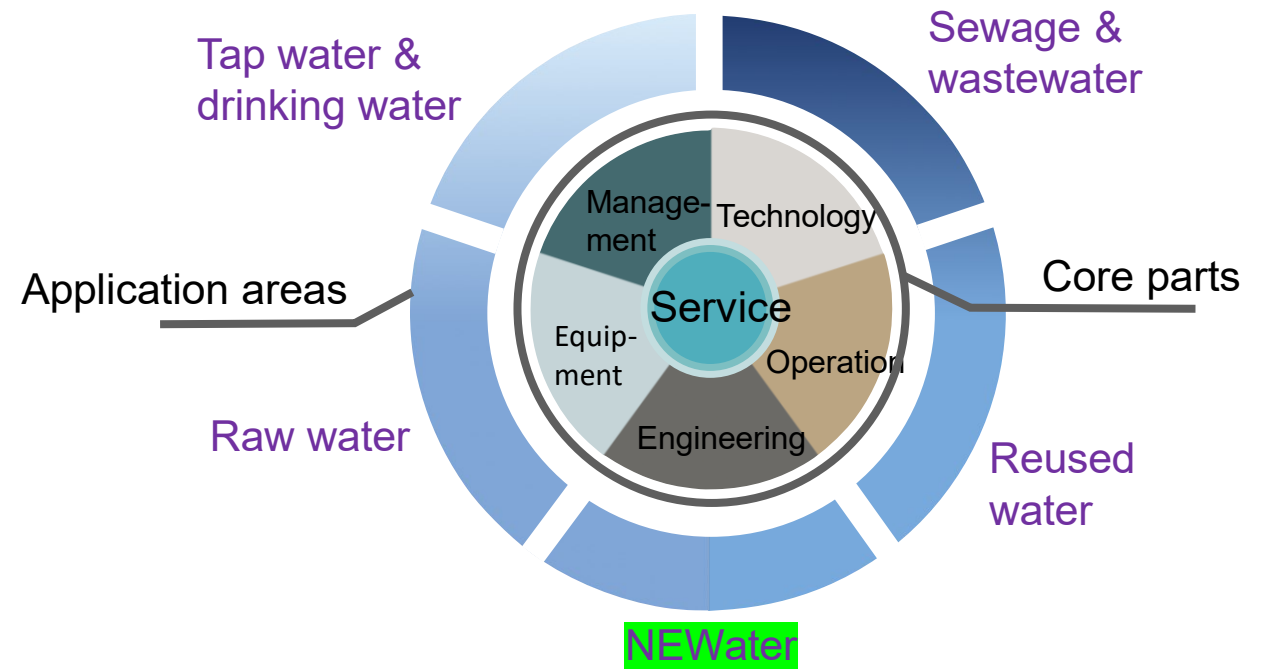


GSD Technologies Co., Ltd.
Taiwan Branch



Introduction of Water Affairs Organization (Taiwan)

- Close co-work partner with industry, government department, university, and institute to promote water industry
- Exchange platform of international and domestic water business
- Promotion of new technologies & equipments about water affairs
- Leverage bridge with supply and demand of water affairs



Information & technology exchange platform

We sincerely invite you to join the community



Water Resources AloT Management Platform

Complete
full-cycle
management of
water treatment
system

Purpose

Strategies

- ❖ Equipment Empowerment
- ❖ AloT Process Control

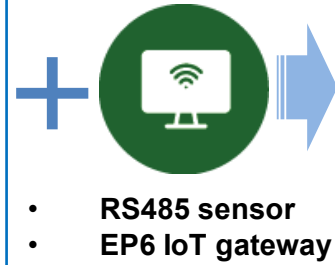
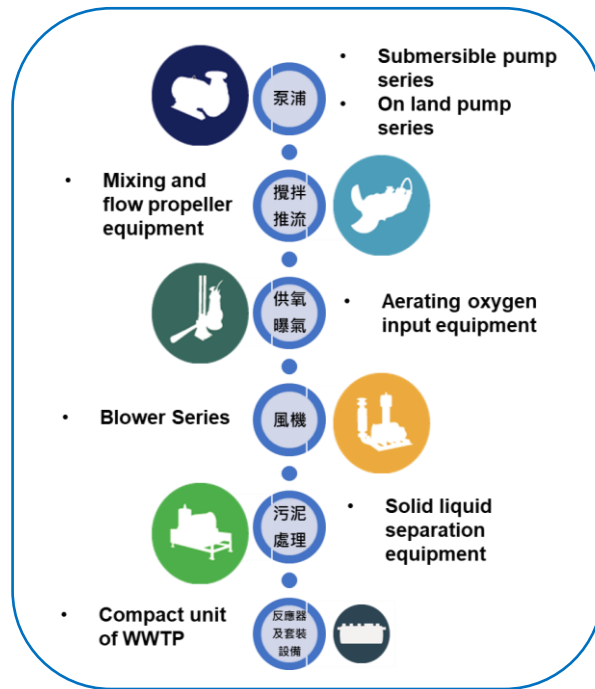
Objectives

- ❖ Equipment life extension
- ❖ Operational optimization
- ❖ Energy and cost saving
- ❖ E Inspection

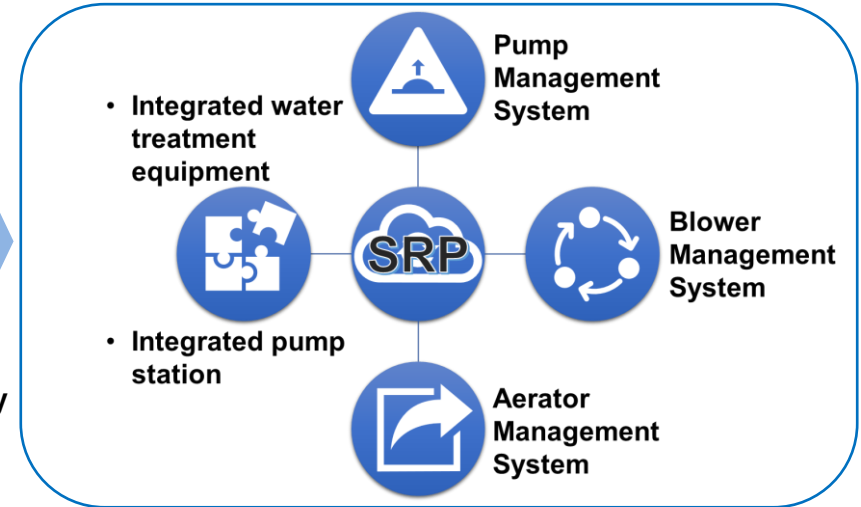
Programs

- ❖ Intelligent process remote control
- ❖ Equipment empowerment to improve efficiency
- ❖ Preventive maintenance & active warning
- ❖ Precisely dosing to reduce cost
- ❖ Trend analysis & full observation
- ❖ Safe water quality & stable water supply

Equipment Empowerment



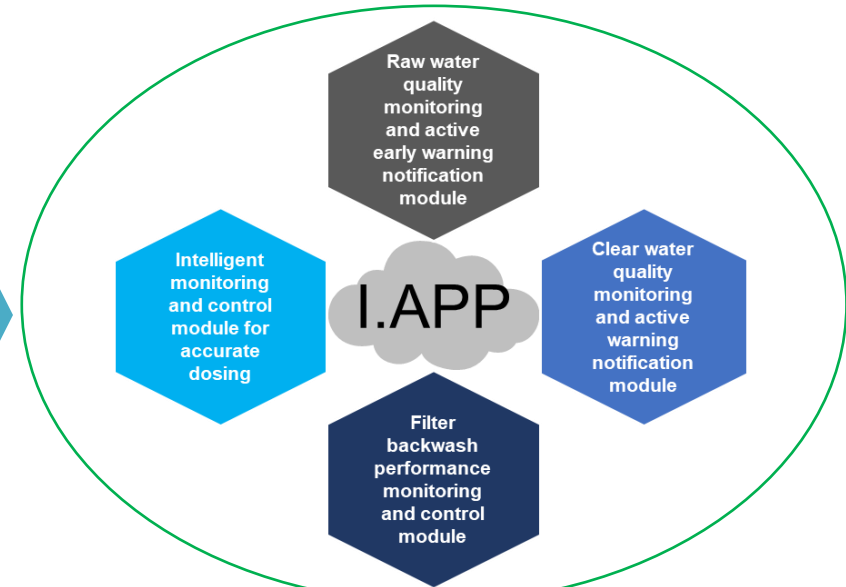
Equipment Management System



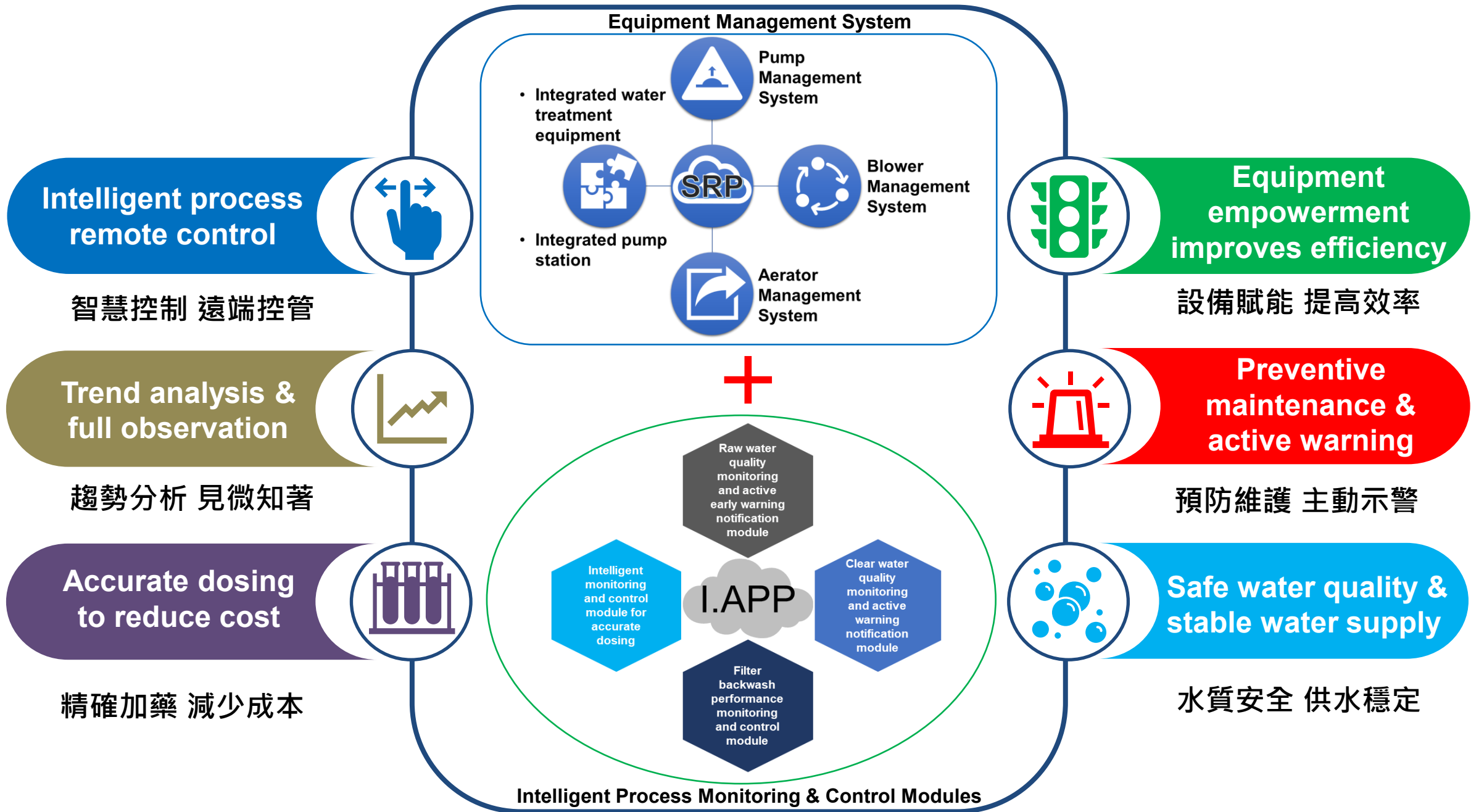
AIoT Process Control

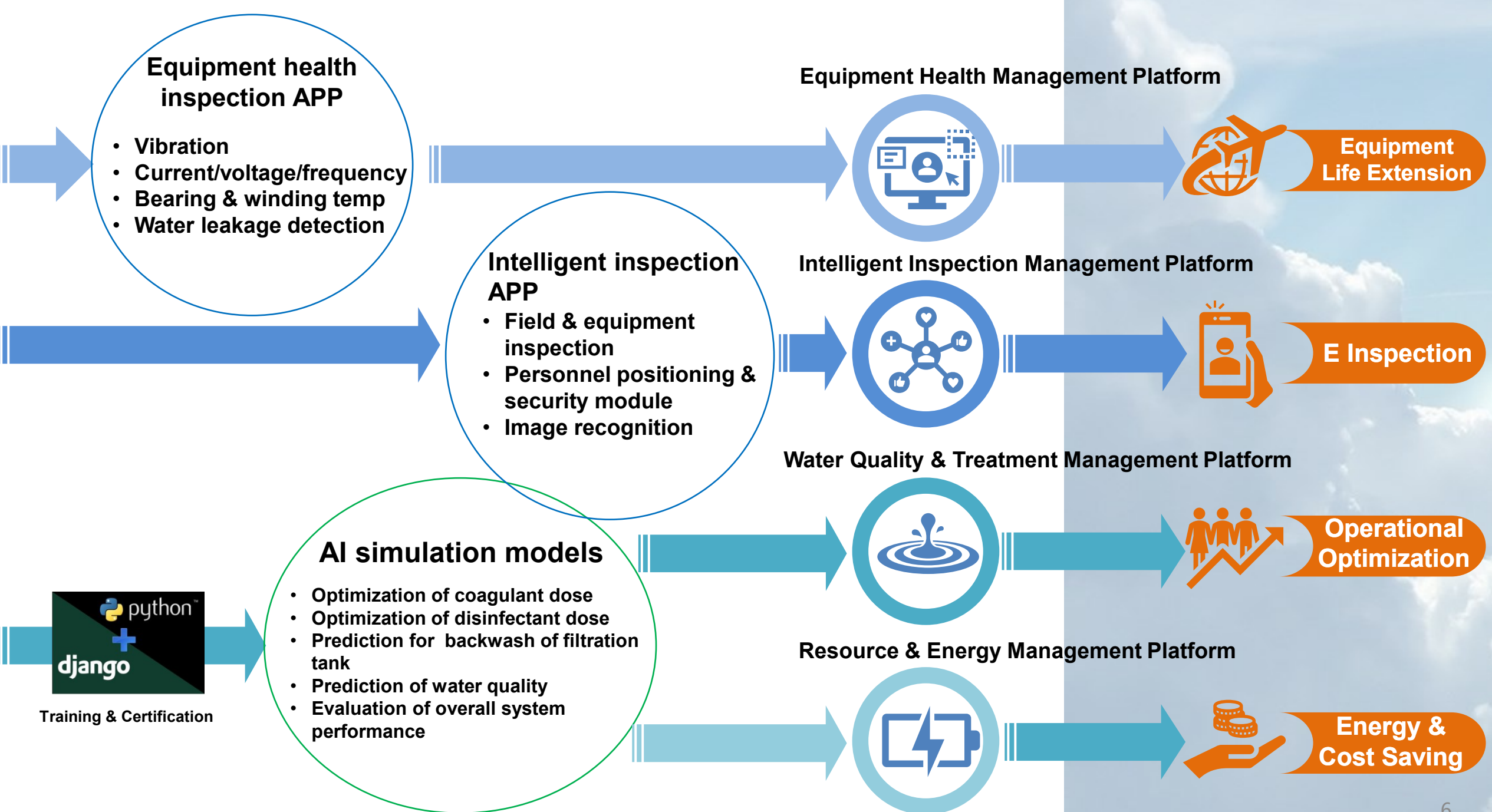
Water treatment processes

- Coagulation/flocculation
- Sedimentation
- Sand filtration
- Adsorption
- Disinfection
- Membrane treatment



Intelligent process monitoring & control modules







Decision-making Layer

- Water Resources AIoT Management Platform



Monitoring & Control Layer

- Central integrated management system

Control Center SCADA



Central integrated management system



GSD Situation Room (TW)



- Remote monitoring & control
- Equipment management
- Maintenance forecast
- Performance evaluation
- Energy optimization
- Cost optimization
- Intelligent monitoring and control / edge computing / AI control
- Visual monitoring control record display
- Abnormal diagnosis / exclusion record
- Equipment failure alarm / sign-off / maintenance record
- Real-time/historical data query and trend chart
- Big data archive



Transmission Layer

- IoT Monitoring & Control Management System

EP6 IoT Gateway



Adam 3600



Gateway



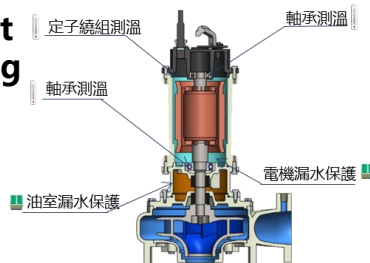
- Real-time data acquisition / storage / transmission / monitoring
- Automatic scheduling / SMS control equipment
- Get information/device status via SMS
- SMS alert notification



Perception layer

- Equipment Monitoring
- Water Quality Monitoring

Equipment Monitoring



Water Quality Sensors

pH



Residual chlorine



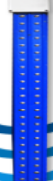
Turbidity



NH₃



Water & Sludge Level



Flow Monitoring



Equipment Layer

- Series of water treatment equipment

Submersible pump series



On land pump series



Roots blower series



Air bearings turbo blower



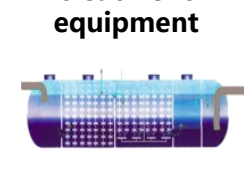
Aerator series



Mixer series

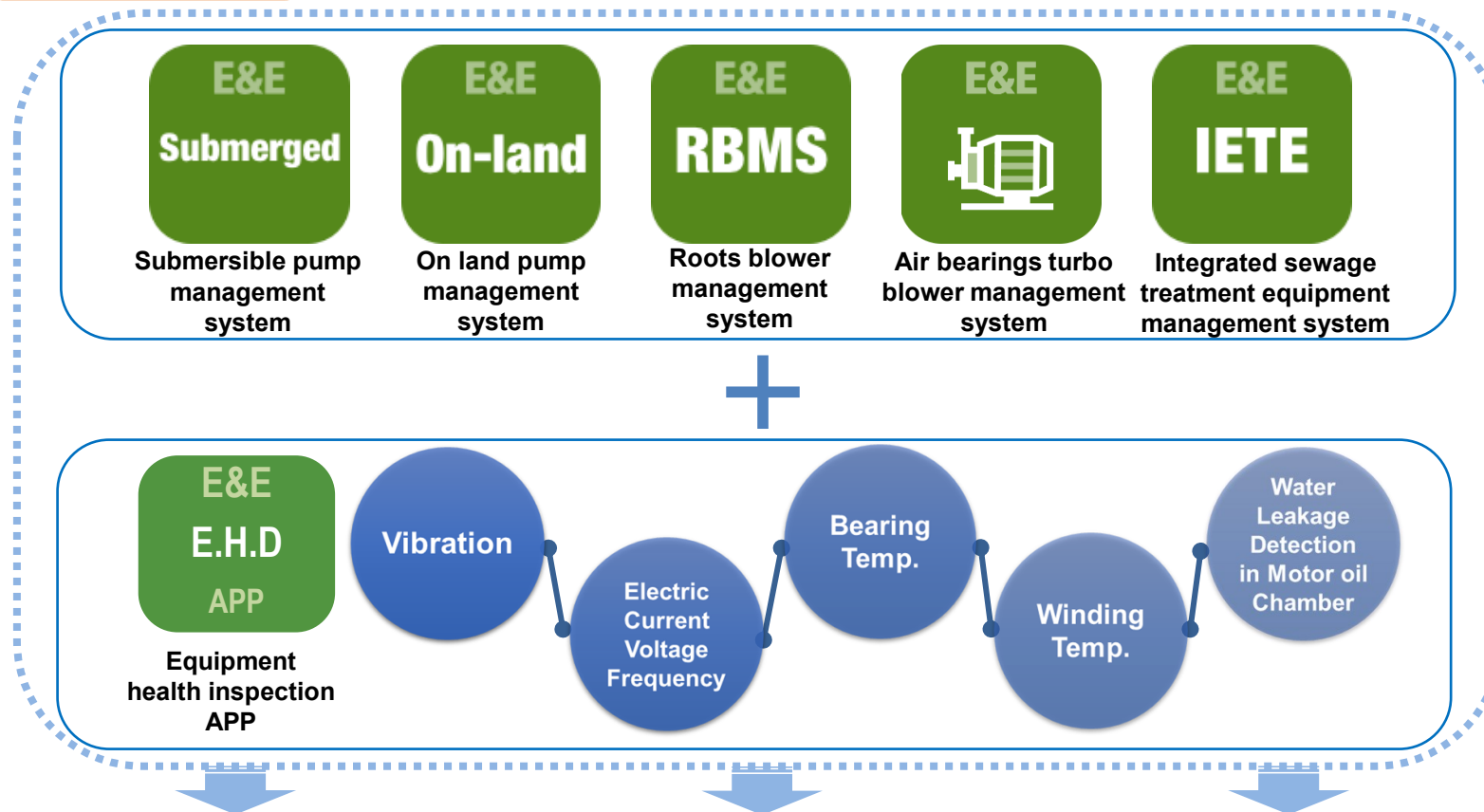


Integrated water treatment equipment





Equipment Life Extension



- Equipment operation record
- Equipment/consumable life estimation
- Regular maintenance execution
- Preventive maintenance bulletin
- Abnormal diagnosis suggestions
- Equipment energy saving optimization plan
- Equipment replacement plan

Stand-alone Equipment Management

- Real-time control of equipment status
- Before equipment failure, alarm to notify maintenance
- For professional technical service team to provide settings, maintenance, technical improvement, equipment optimization suggestions

Multi-equipment Centralized Management

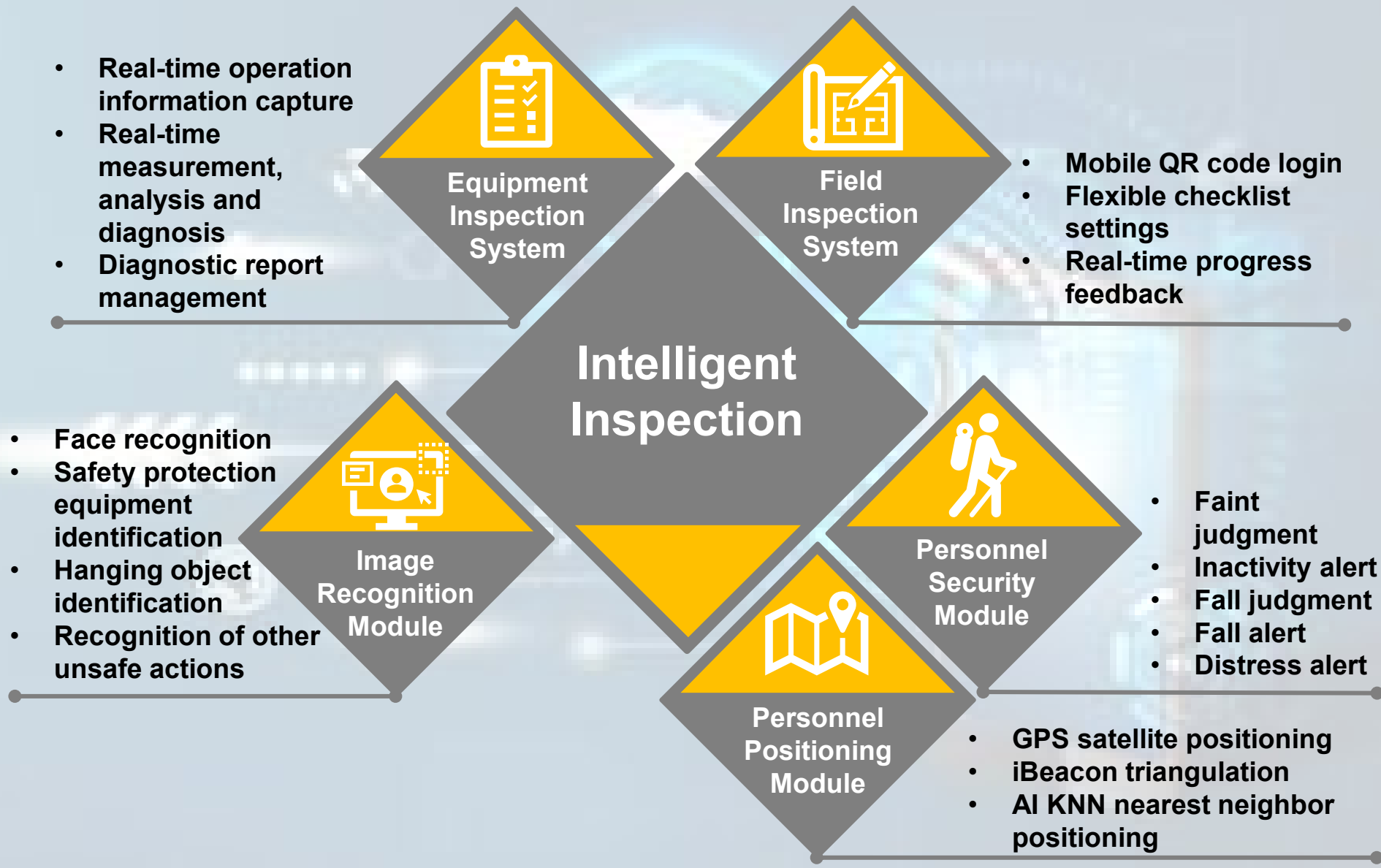
- Quickly build and manage multiple smart equipment.
- It saves time and efforts as there is no need for special software.
- Connecting with the PLC system, the existing control system is upgraded, with function of alarm and remote monitoring functions in case of abnormal events.

Integrated Equipment Management

- Achieving remote monitoring of processing equipment, abnormal alarms, to minimize inspection personnel or even unattendance.
- Built-in 4G module facilitates management of sewage treatment equipment in remote areas.
- Administrators can login to the web page to add new sites by themselves, with no specialist is required to modify program and proofreading.



E Inspection



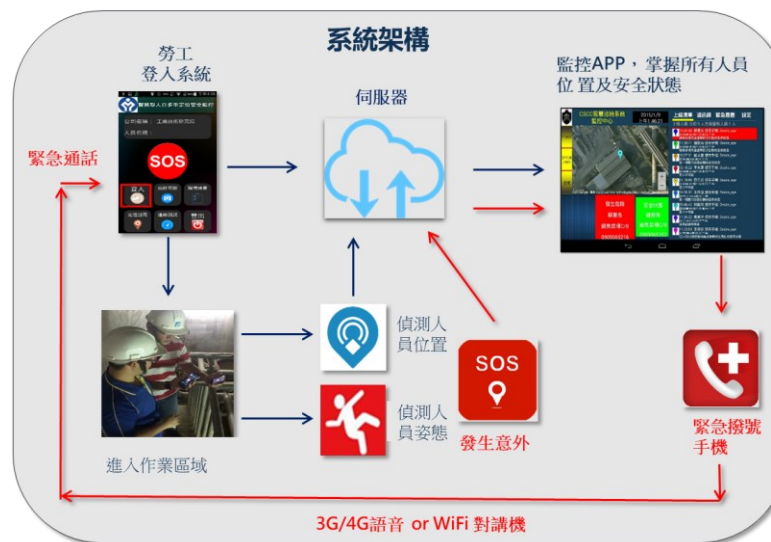
- ❖ Accurate detection failure factors hidden to arrange preventive maintenance in advance.
- ❖ Patrol inspection no longer just pass, but patrol according to items scanned.
- ❖ Precise positioning, toxic gas detection and safety risk control throughout full process to ensure personnel safety.
- ❖ Identification of identity/object/unsafe actions for quick detection of risk warnings.

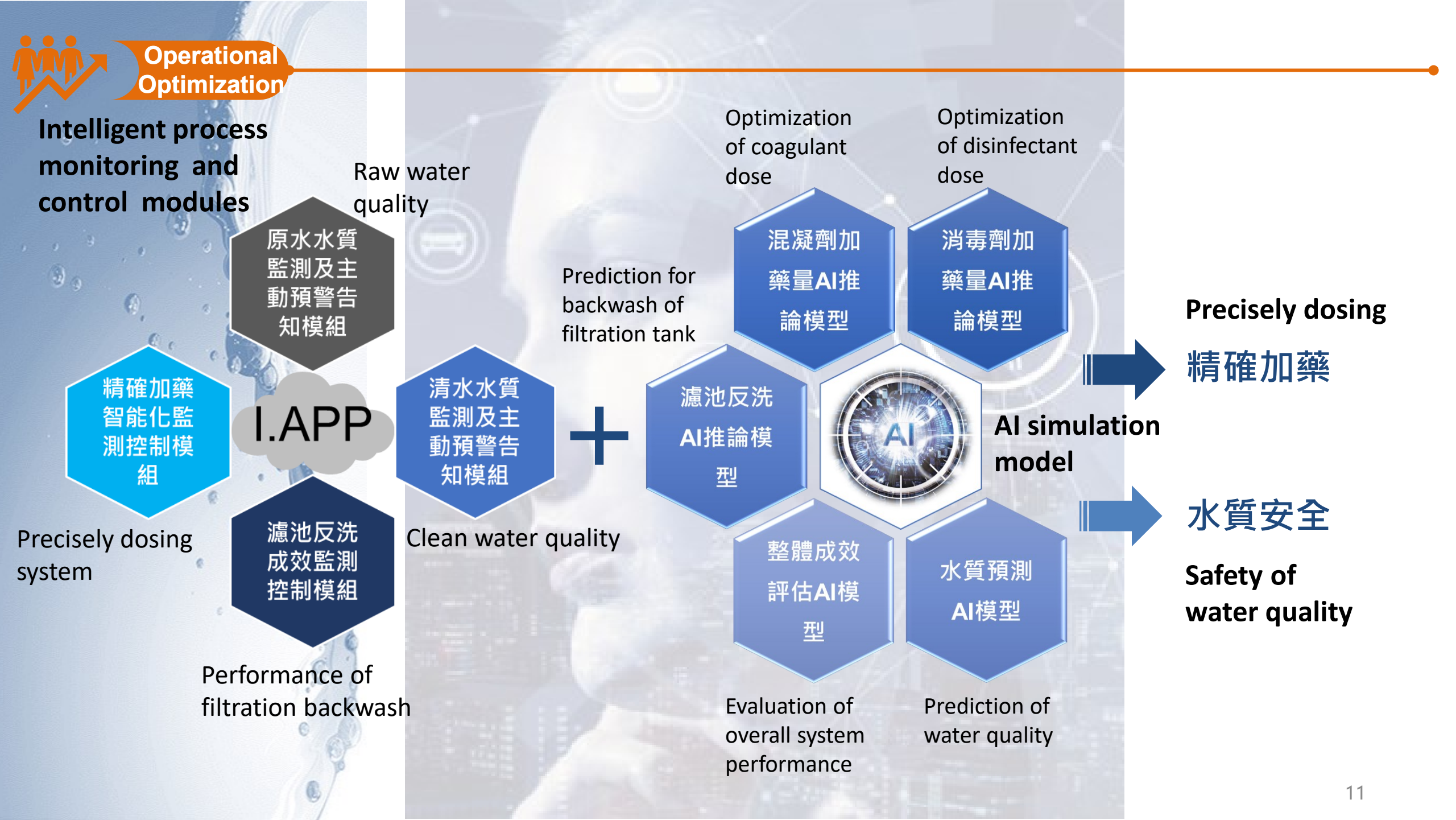
Intelligent Inspection Management Platform



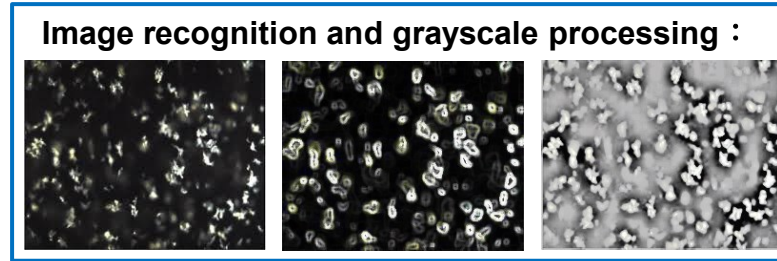
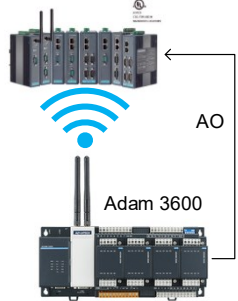
安全智能-人員安全監測系統:有限空間場所作業危害預防

全球第一套依照 ISO 標準與受限空間法令要求設計的人員安全警示系統





Precise dosing intelligent control module



AI module of
coagulant
dose

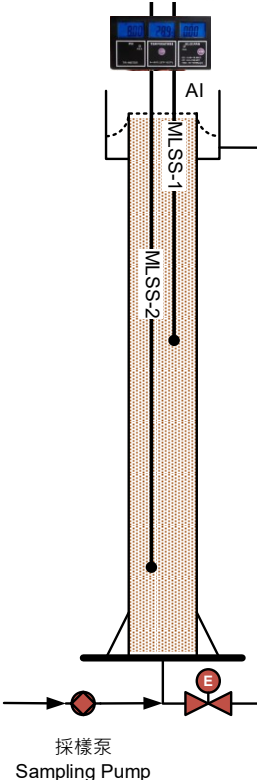
Coagulant
dosage control



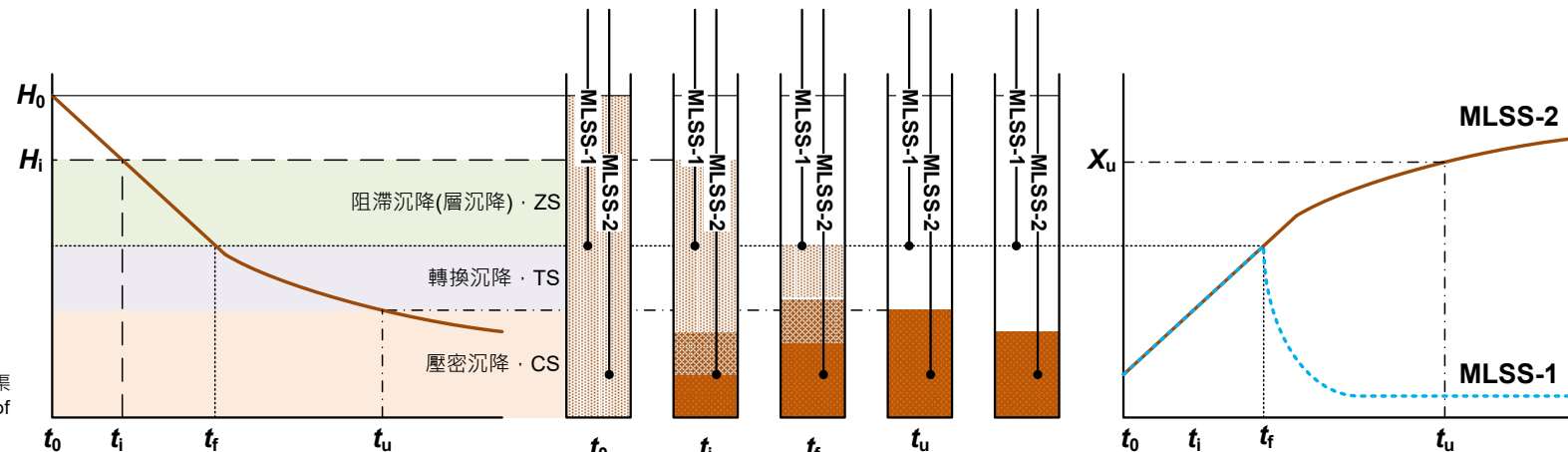
Optimization
of coagulant
dose

污泥沉降性監測

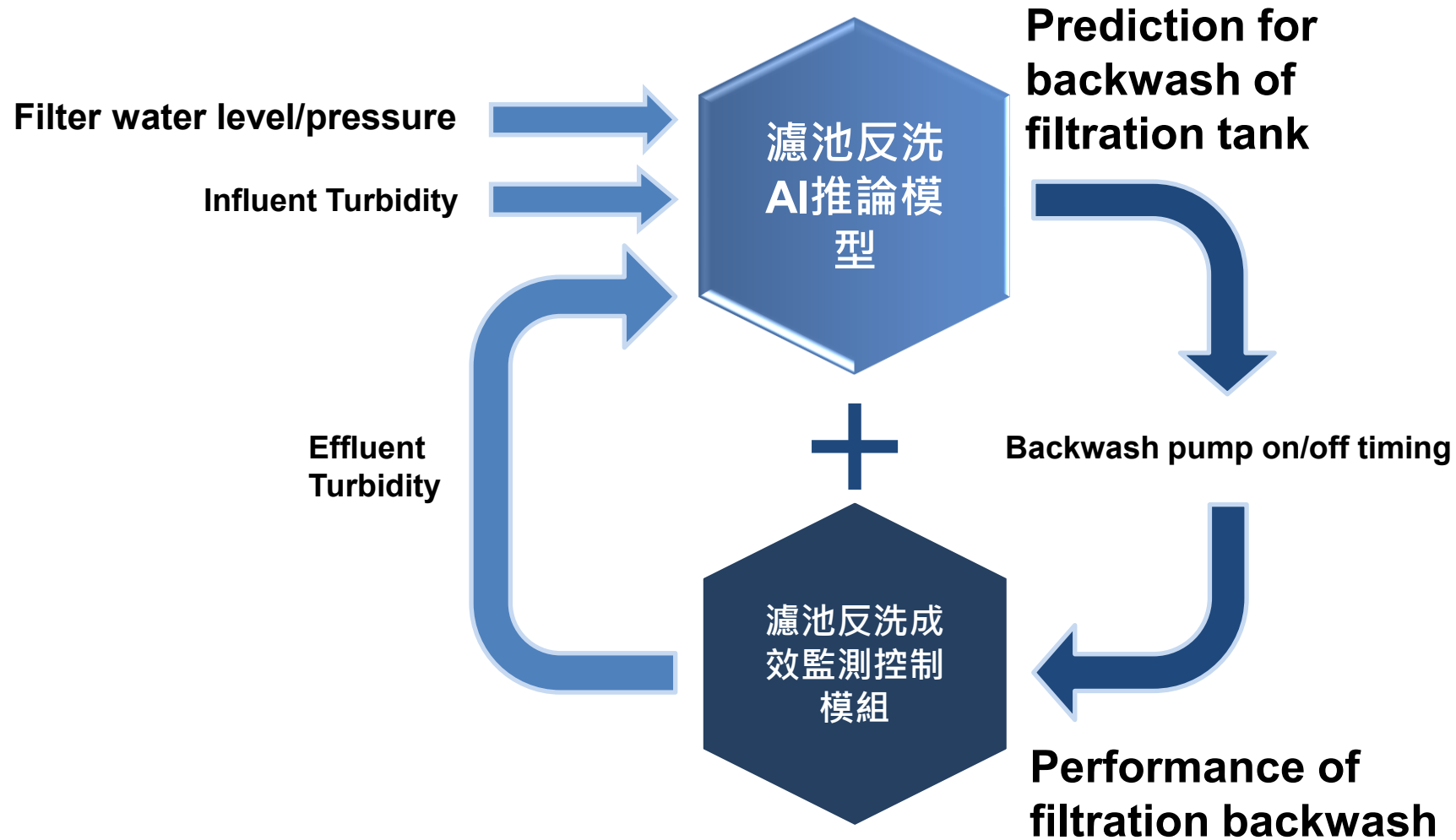
採樣自沉澱池進流水
Sampling From
Sedimentation Influent



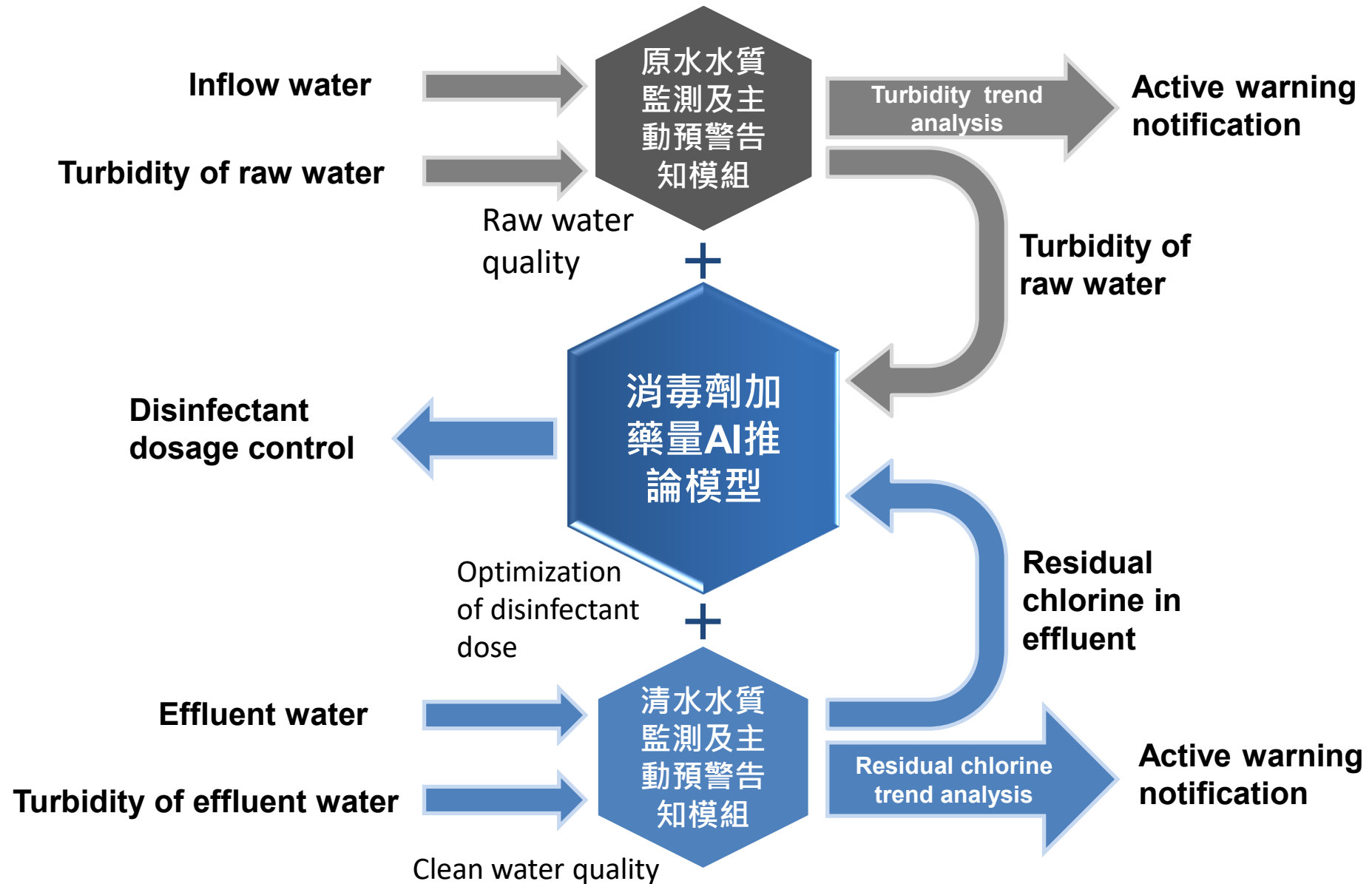
排放至沉澱池進流渠
Discharge to Inlet of
Sedimentation



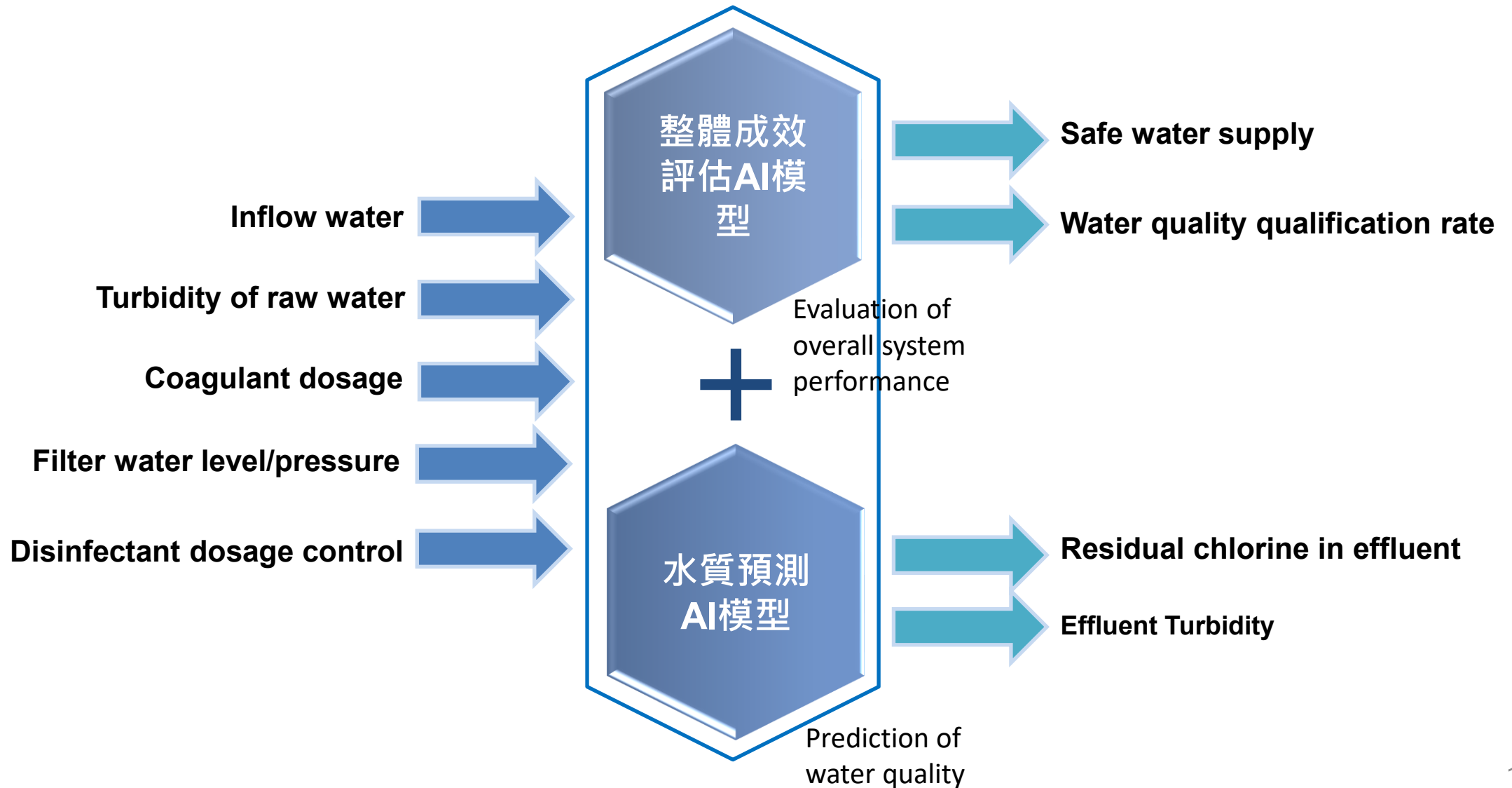
Filter backwash intelligent monitoring and control module



Disinfectant dosing intelligent control module



Comprehensive performance evaluation and water quality prediction AI model



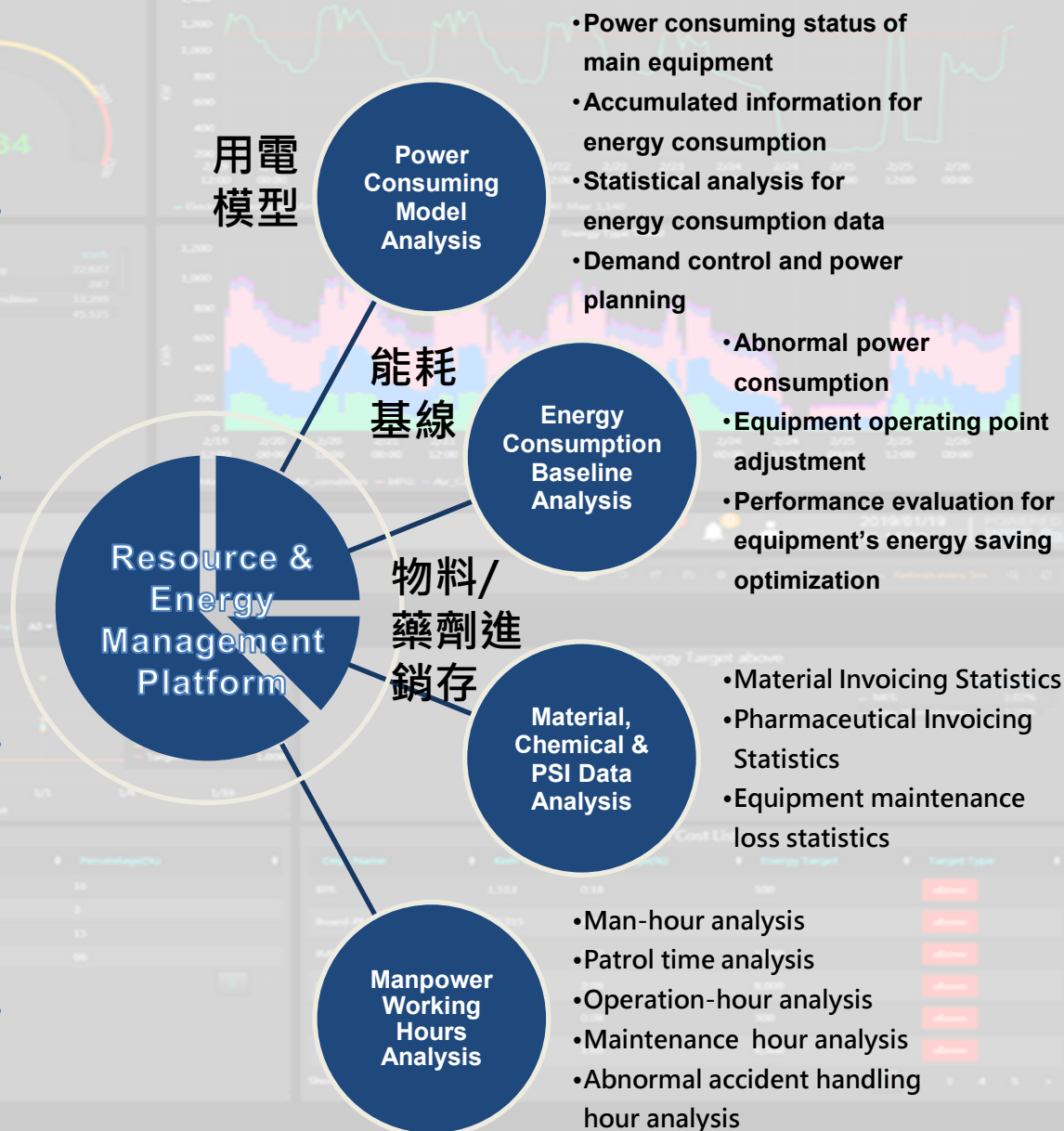
Energy & Cost Saving

Electric energy monitoring data for main energy-consuming power equipment

Operation optimization program power equipment power monitoring data

Management data for material, chemical, consumables and PSI (purchase, sales and inventory)

Registration information for operation record and working hours



- ❖ Energy overview
- ❖ Energy performance index
- ❖ Energy KPI Management Plan
- ❖ Energy demand forecast
- ❖ Real-time power consumption information
- ❖ Power consumption statistics for the first 6 months
- ❖ Electricity statistics
- ❖ Energy consumption trend analysis
- ❖ Historical data query

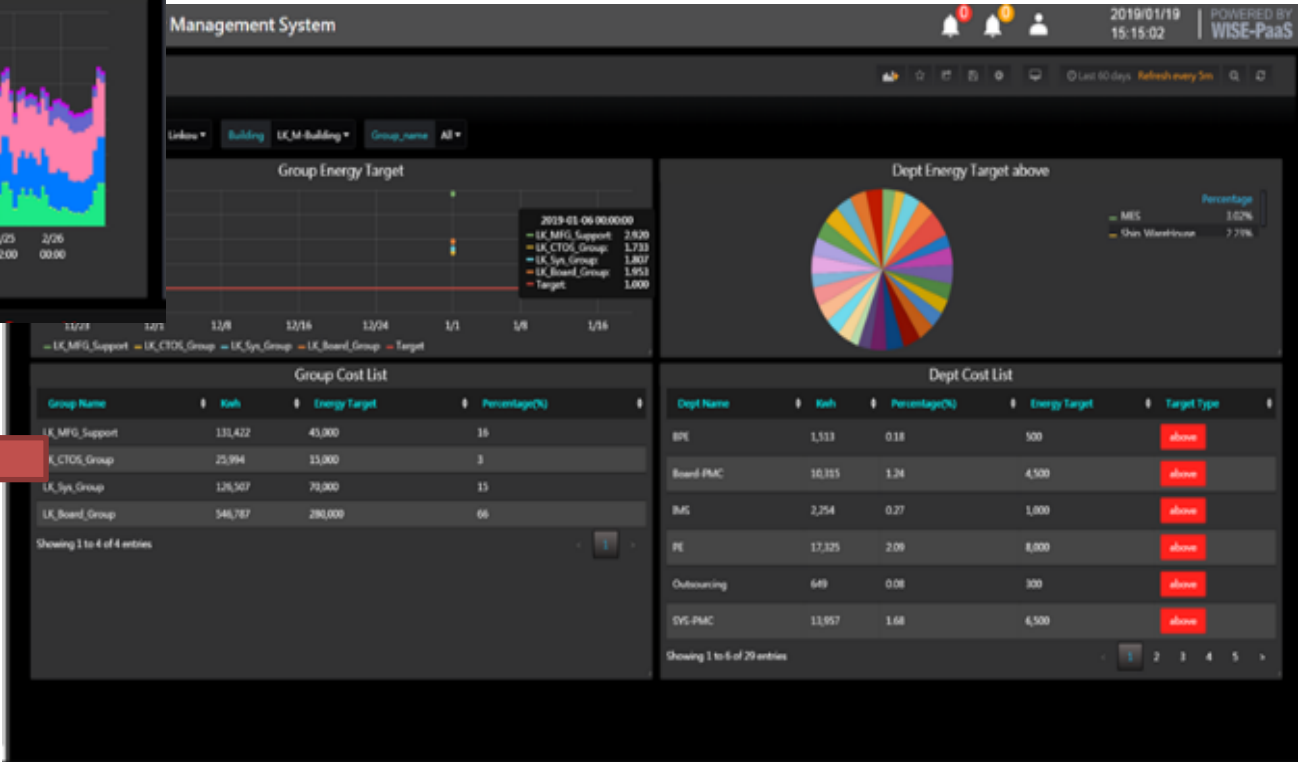
- ❖ Material consumption cost analysis
- ❖ Chemical consumption cost analysis
- ❖ Cost analysis of equipment maintenance loss
- ❖ Operation and maintenance labor cost analysis
 - ❖ Patrol site manpower
 - ❖ Inspection manpower
 - ❖ Operation manpower
 - ❖ Maintenance manpower
 - ❖ Abnormal accident handling manpower

Energy Management Platform



For example, through the "Energy Consumption Overview", you can monitor the accumulative power consumption of each district, and know which unit, equipment or area the power consumption comes from, and find out the unreasonable energy consumption after comparing the differences between the districts; For high power consumption equipment (such as blowers), the power consumption profile can be monitored.

Through the "Energy KPI Management", the total power consumption can be allocated to each unit, so as to formulate energy-saving KPIs, and review the rationality of power consumption with the energy-consumption responsibility system. Consolidation and analysis of energy-related data, so as to know processing efficiency from changes in energy consumption.



Thanks for Your Listening!