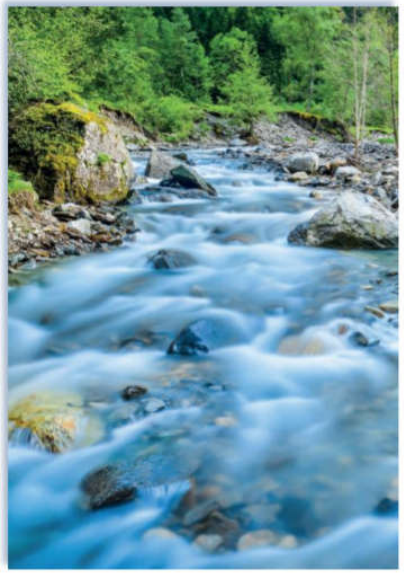
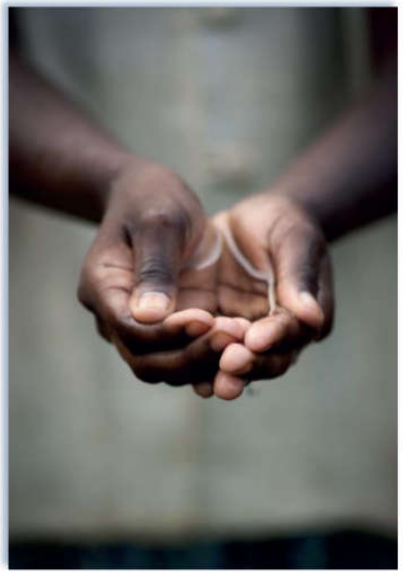
s::can
Intelligent. Optical. Online.






ADB e-Marketplace, March 18th, 2021: s::can virtual booth

Who is s::can?

s::can Messtechnik GmbH

- Founded in 1999, University Spin-Off from Univ. Boku Wien
- Owned by the US group Badger meters, Headquarters in Vienna, Austria
- 4 Subsidiaries in USA, Mexico, Spain, France, and Offices in India, China, Italy, and Portugal.
- 45 Sales partners globally
- We unite R&D, manufacturing, sales, and services
- 75 staff globally, 10 in R&D

University of Natural Resources and Life Science („Boku"), Vienna, Austria

Who is s::can

Intelligent

All s::can sensors are intelligent, they are digital and have the controller, the brain, built in. They check their health every second and can communicate with the operator.

Optical

If possible, we always use optical methods, since they are just better, more reliable, simpler and more accurate. If no optical method is suitable, we choose the next best alternative.

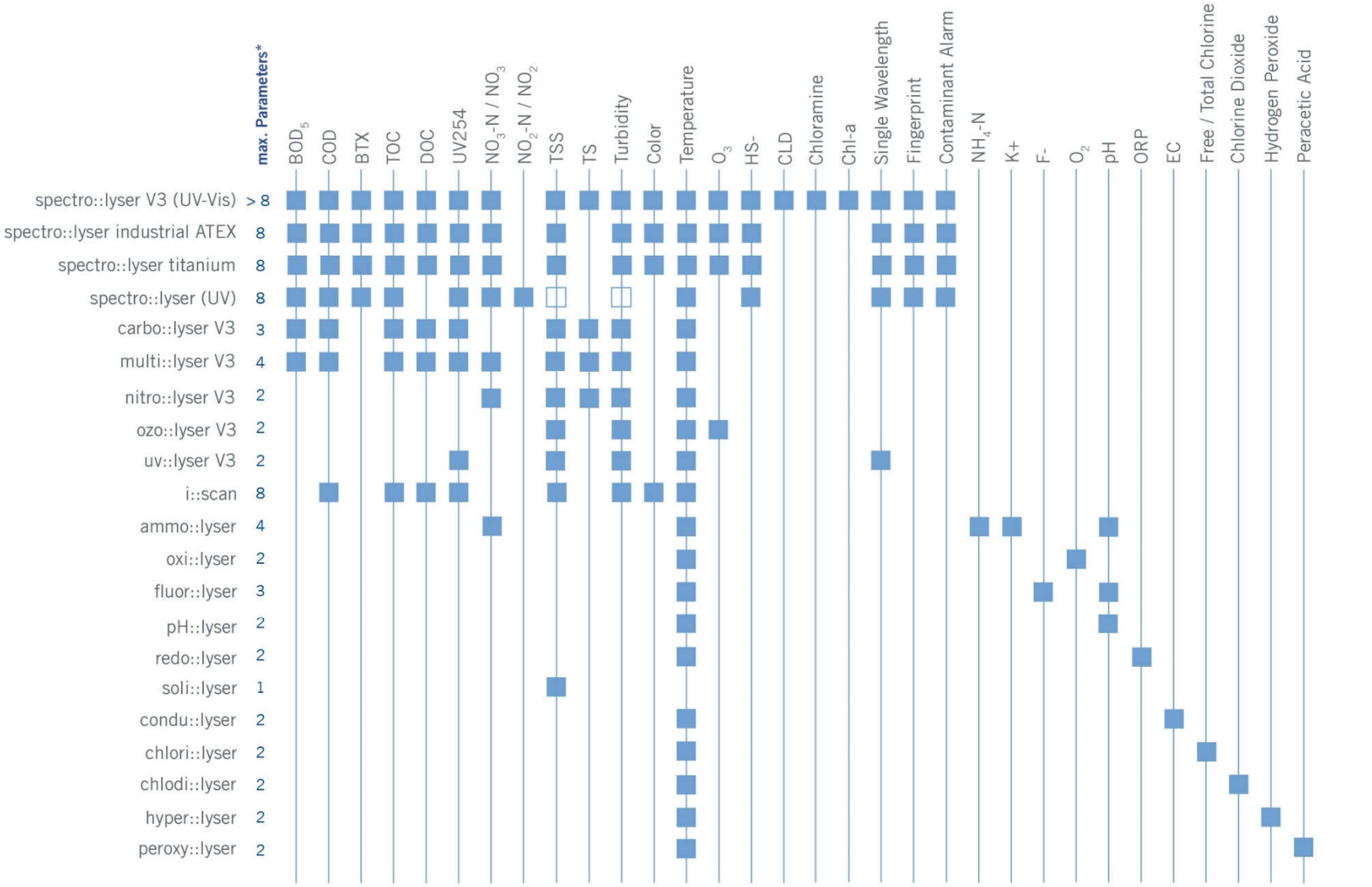
Online

We make nothing for laboratories, nothing that consumes reagents, nothing with moving parts. s::can is the only real „on-line“ company in the industry that offer an almost complete range of sensors and parameters, and nothing else.

Global Key Accounts

s::can the global technology provider

Parameter Overview



* The number of parameters is depending on the specific configuration of the monitoring system.

Product Range

Overview

Spectrometer Probes	Other Sensors	Terminals & Software	pipe::scan	Monitoring Stations	Accessories
					

light. speed ahead.

high performance online water quality monitoring

The new spectro::lyser V3

The next generation - from the market leader

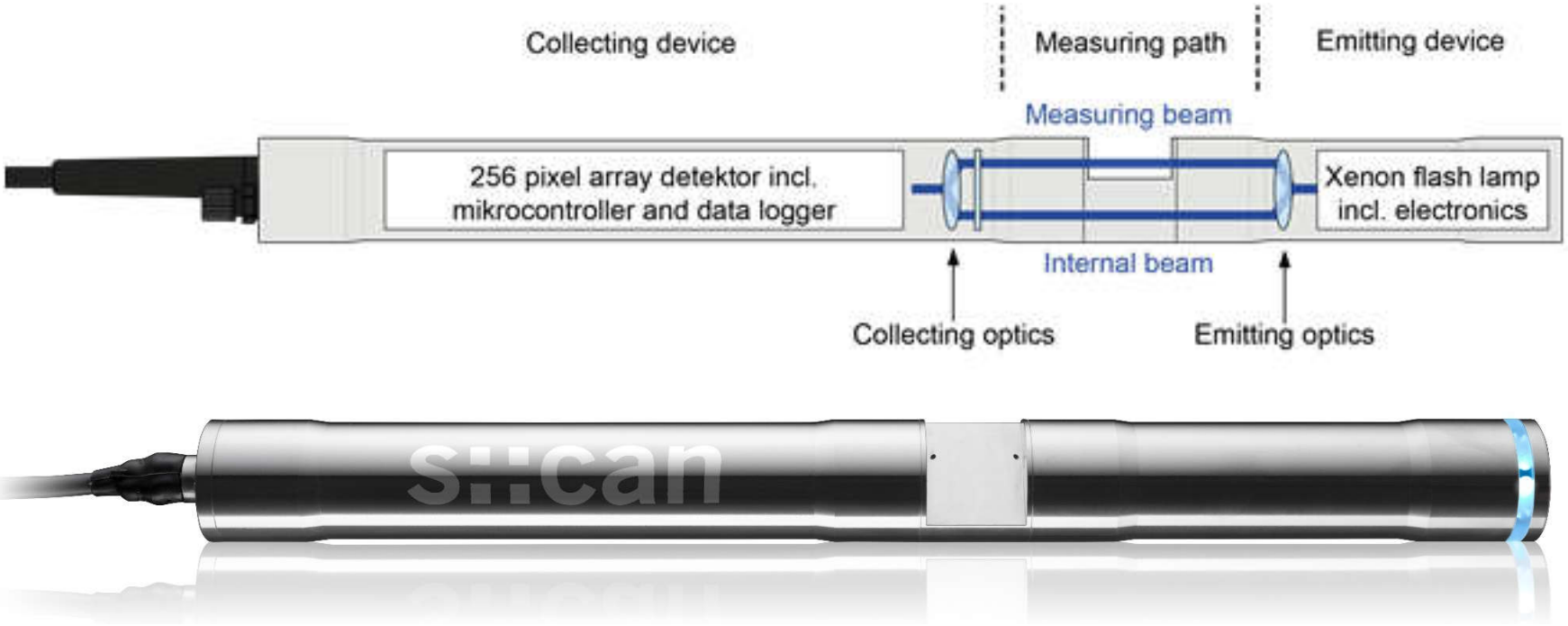
USPs

Innovative new features

- IoT enabled - web server on board, no additional software is needed to configure the probe
- Communicates directly with your mobile device WLAN - no terminal required
- Individual customization - choose exactly the parameters you want to measure
- Configuration freedom - unlimited number of parameters possible
- Capacity for logging data for many years - 8 GB onboard memory
- Improved optical performance - revolutionary precision
- Immediate event detection - fast measurement interval every 10 seconds, no delays
- Extremely power efficient - sleep mode for low energy consumption

Online Water Quality Monitoring & UV/Vis Spectrometry

Technology - How does it work?



Spectrometry detects specific absorption signals caused by (groups of) substances

The perfect measuring range + accuracy for every application

- Reduced amount of optical path lengths
  - 3 fixed path lengths (no inserts)
    - wastewater sensor → 1 mm OPL
    - surface water sensor → 5 mm OPL
    - drinking water sensor → 35 mm OPL
  - Easy selection for customer

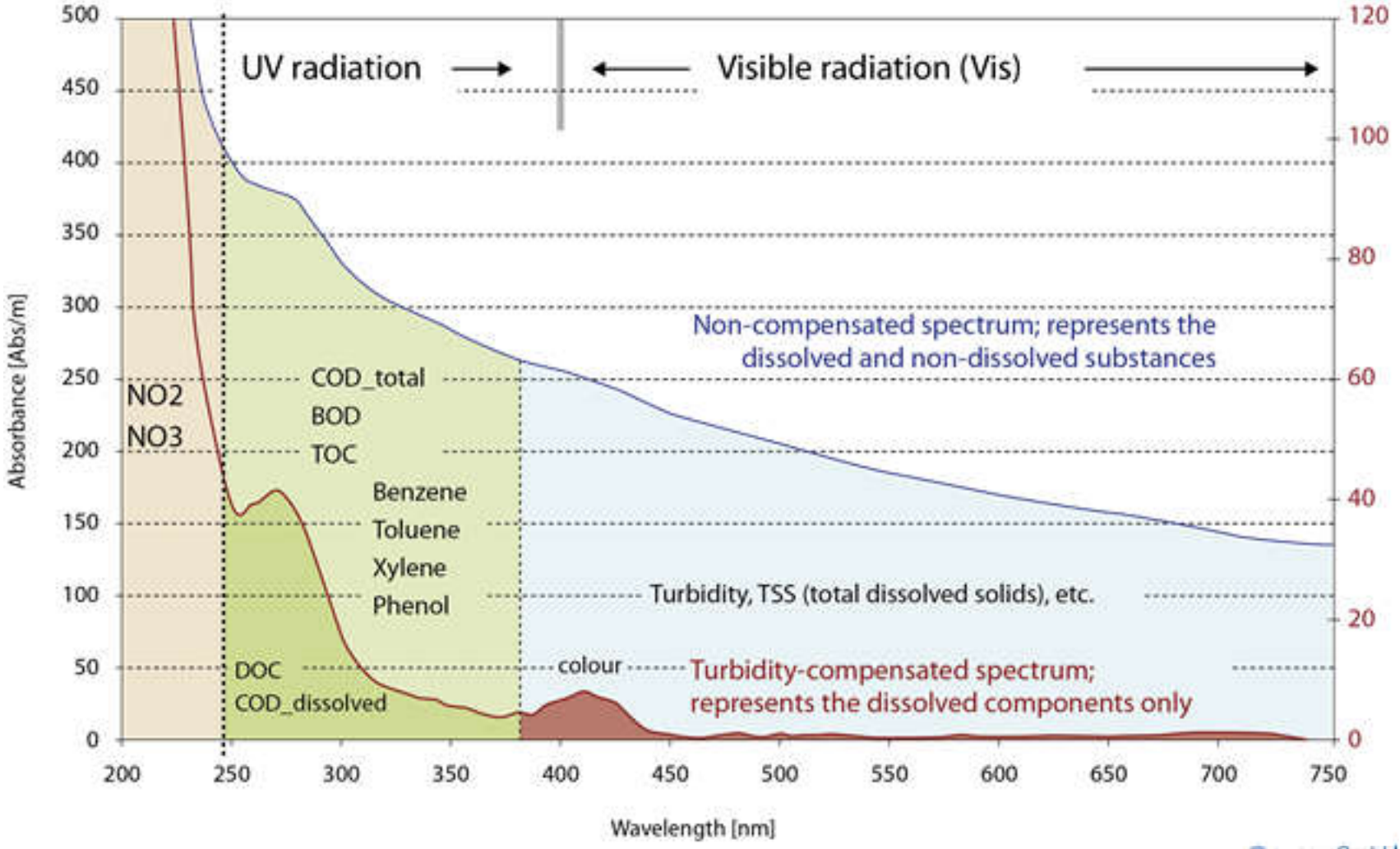
drinking water sensor: 35 mm

surface water sensor: 5 mm

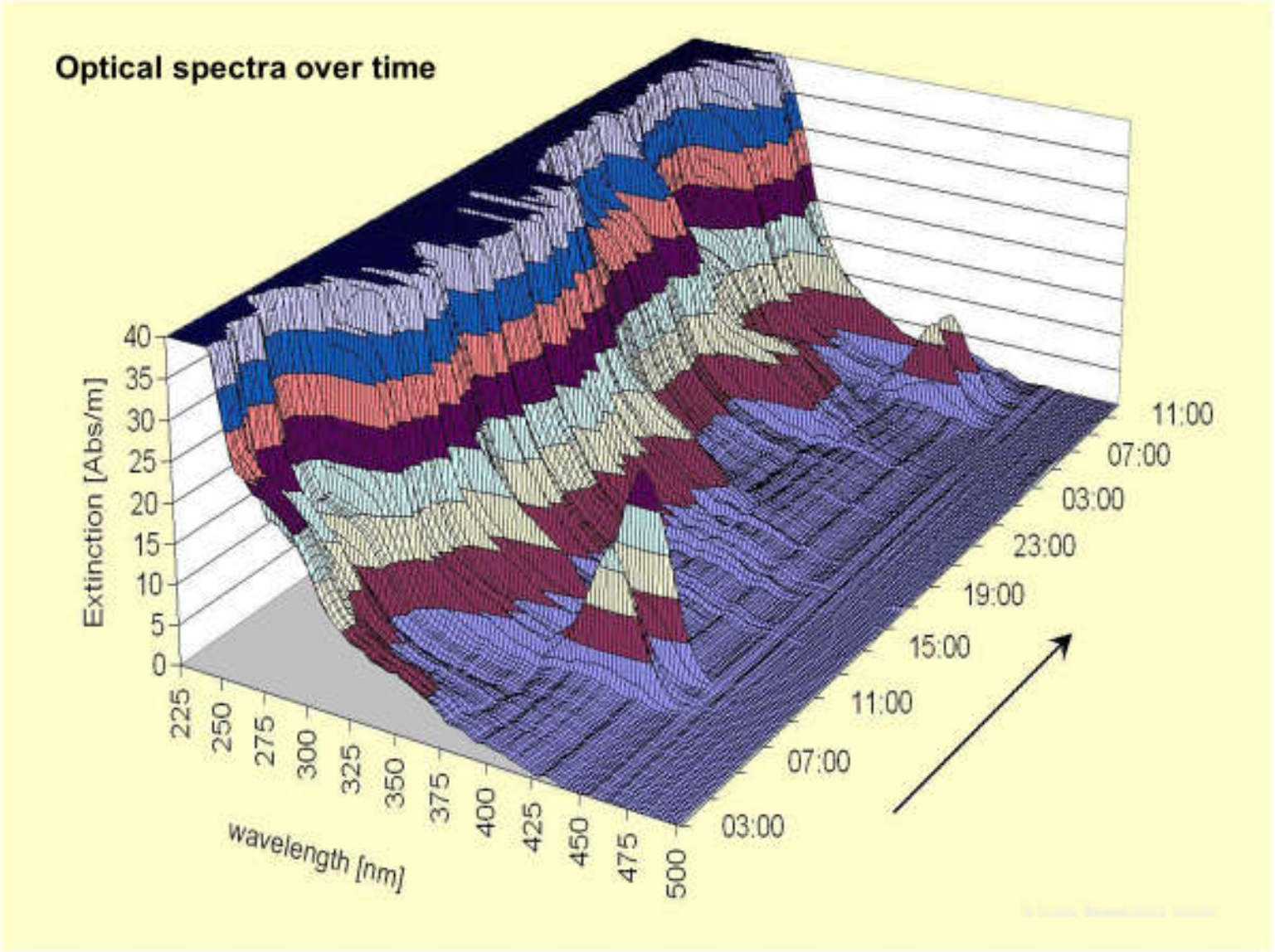
waste water sensor: 1 mm

Online Water Quality Monitoring & UV/Vis Spectrometry

The Measuring Principle – Fingerprint II

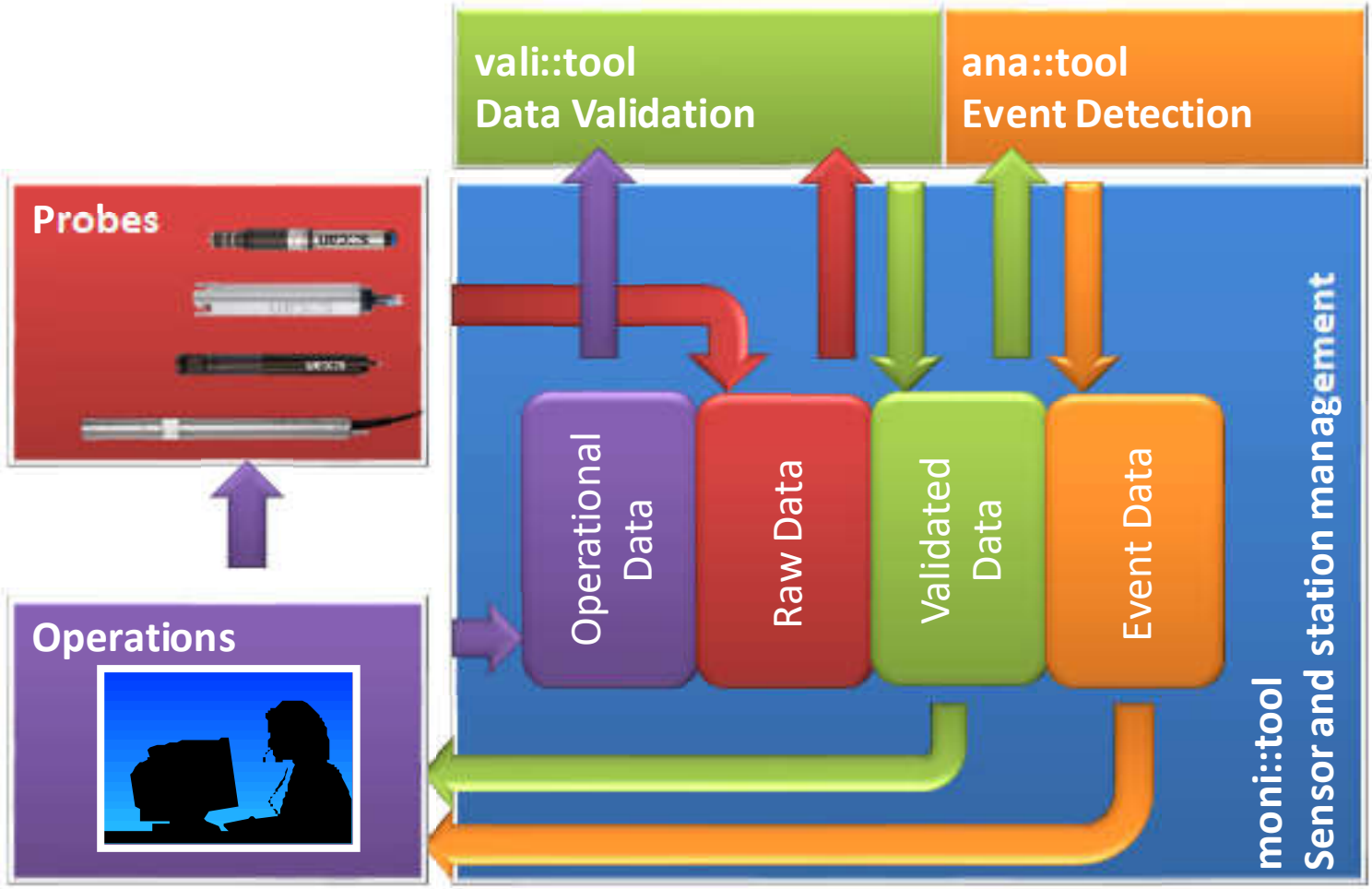


Spectral alarm



s::can Software

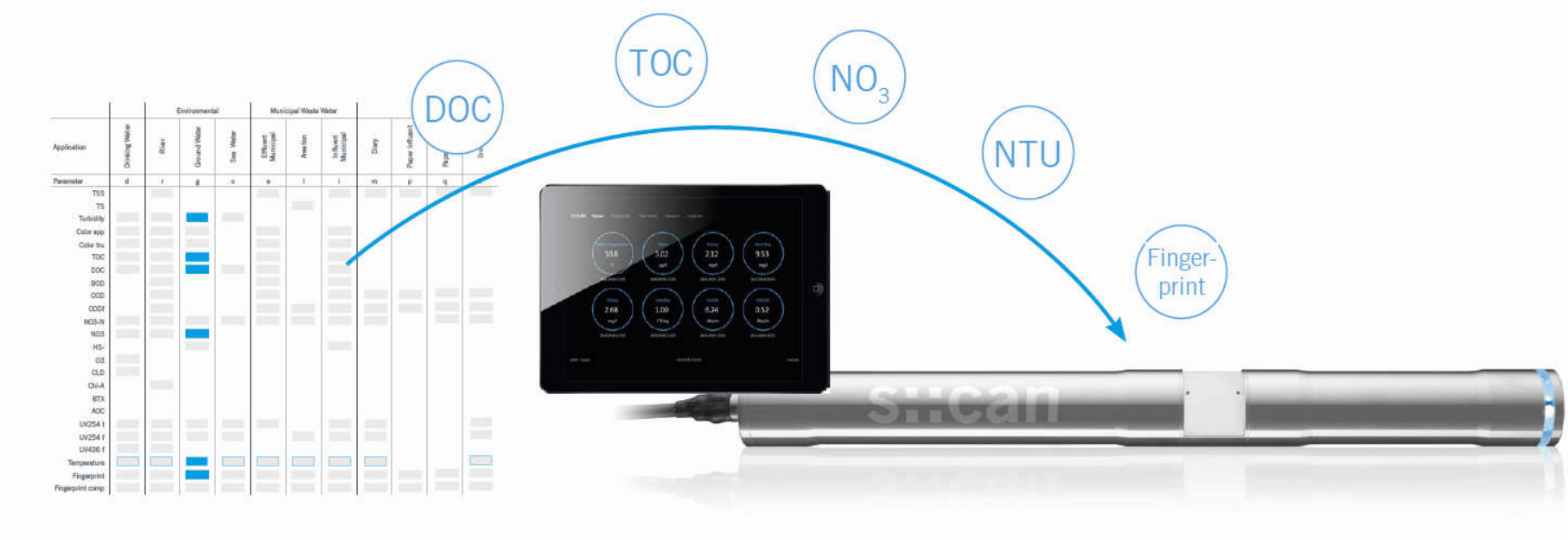
From Raw Data to Event Detection



Flexible parameter “apps”

Choose your parameters

Freely configure your spectro::lyser for your application. You only pay for the parameters you want to measure. Add new parameters any time.



Calibrations

“Local Calibration”

- If the pre-set calibration is not accurate, the “Local Calibration” is a necessary adaptation to local water composition
  - instrument can stay in the water
- High quality reference measurements are necessary, concerning:
  - sampling
  - storage
  - and laboratory analysis
- Procedure of 2-point-calibration: concentration trends are tracked for a few days; then, one sample is taken at low concentration, one sample at high concentration
  - simple input of lab values into s::can software
  - calibration automatically (standard) or manually (experts only)

Calibrations

"Advanced Calibration"

- For "difficult" water matrix
- When the composition of water is changing fast; industrial waste waters for which no "Global Calibration" is provided
- Individual service by s::can Vienna to adapt calibration to individual waters
- PCA and PLS tools are used
- Used in research projects by international research institutes in Austria, Germany, Switzerland, Italy, Australia, and other countries
- Used for big international companies
- Opens unlimited applications for process spectrometry

spectro::lyser – Cleaning

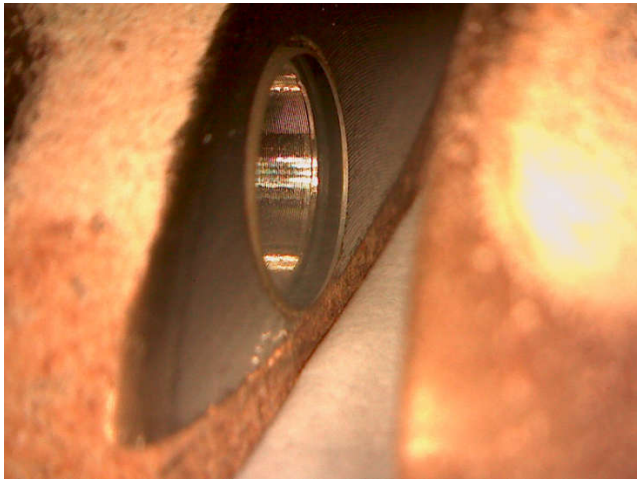
Autocleaning with compressed air

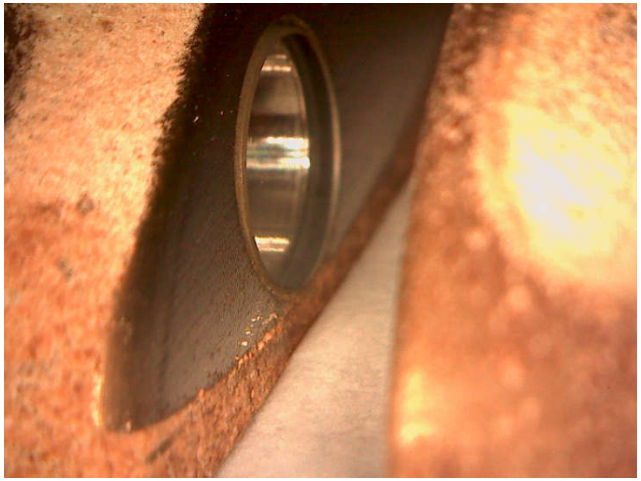
- High cleaning efficiency is crucial for reaching long maintenance periods
- Manual window cleaning is an exception
- Unmatched efficiency of cleaning mechanism
- No clogging, wearing, smearing, scratching or blocking

Examples of automatic
cleaning with pressurized air:

spectro::lyser – Cleaning

ruck::sack





The i::scan

What it is…

- compact and light
- precise and stable
- extremely robust
- … and very affordable!

... a novel, low cost, LED-based UV-spectrophotometer probe for multi-parameter, in-pipe, online water quality measurements...

The i::scan

Parameters and Features

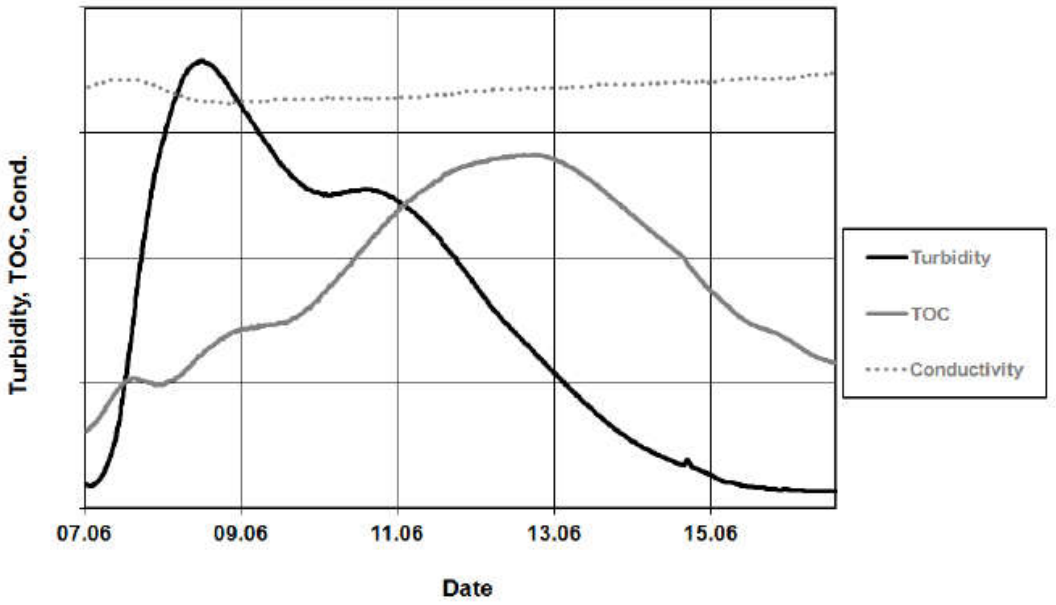
- Turbidity (NTU-EPA, FTU-ISO)
- Color
- UV254 / UVT
- Organic parameters (TOC, DOC, COD)
- and combinations

The pipe::scan

UVT
Conductivity
TOC
pH
Pressure
DOC
UV 254
Chlorine
Color
ORP
Temperatur
Turbidity

The pipe::scan

Organics and Turbidity Monitoring



- The diagram shows the relationship between Turbidity and TOC. Elevated Turbidity is followed by elevated TOC during this event.
- No significant change in conductivity was observed. A conductivity sensor alone would have missed the event.
- The combination of all parameters by an intelligent software provides highest possible detection rate at lowest false alarm risk.

The new pipe::scan

Benefits - Only the pipe::scan can:

- Accurate measurement in perfect agreement to standardized lab reference... not just ”trending”.
- Organics and Turbidity monitoring, see next slides.
- Totally flow-independent, even works under stagnating conditions.
- Hot-maintenance: without interrupting the flow/ pressure, and for each sensor individually.
- Full-scale event detection with real-time alarms within the drinking water distribution network.
- 6 months service time: Efficient, reliable stand-alone operation without maintenance.

The pipe::scan

Product overview

Enclosure
Additional security for sensors and operator.

i::scan
Multi-parameter spectrophotometer probe.

Parameters:
FTU/NTU, UV254, UVT, Color, TOC, DOC

Physical sensors
One chlori::lyser and two additional sensors (condu::lyser, pH::lyser or redo::lyser) can be installed.

Parameters:
Conductivity, Free Chlorine, pH, Redox and Temperature

Optional autobrush for i::scan
Provides automatic brush cleaning for the i::scan.

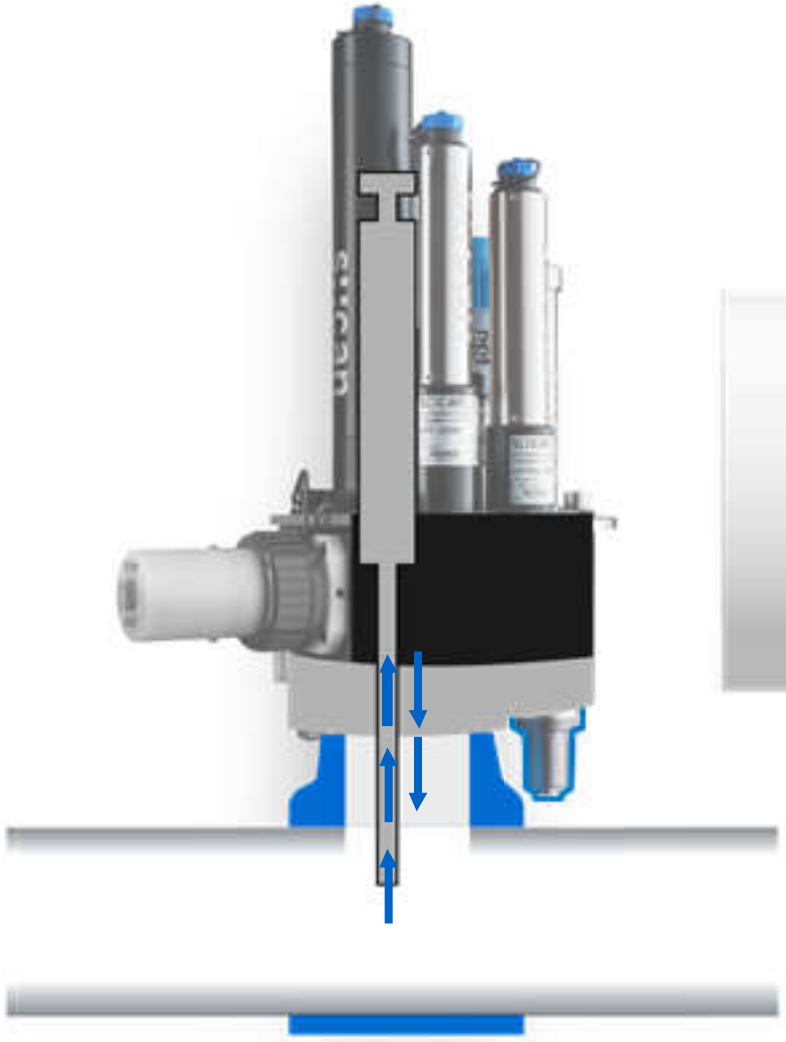
Base unit
Flow cell for up to 4 sensors with retractable insertion nozzle, filter, sample valve, automatic bleeder valve, pressure sensor and flow sensor (optional).

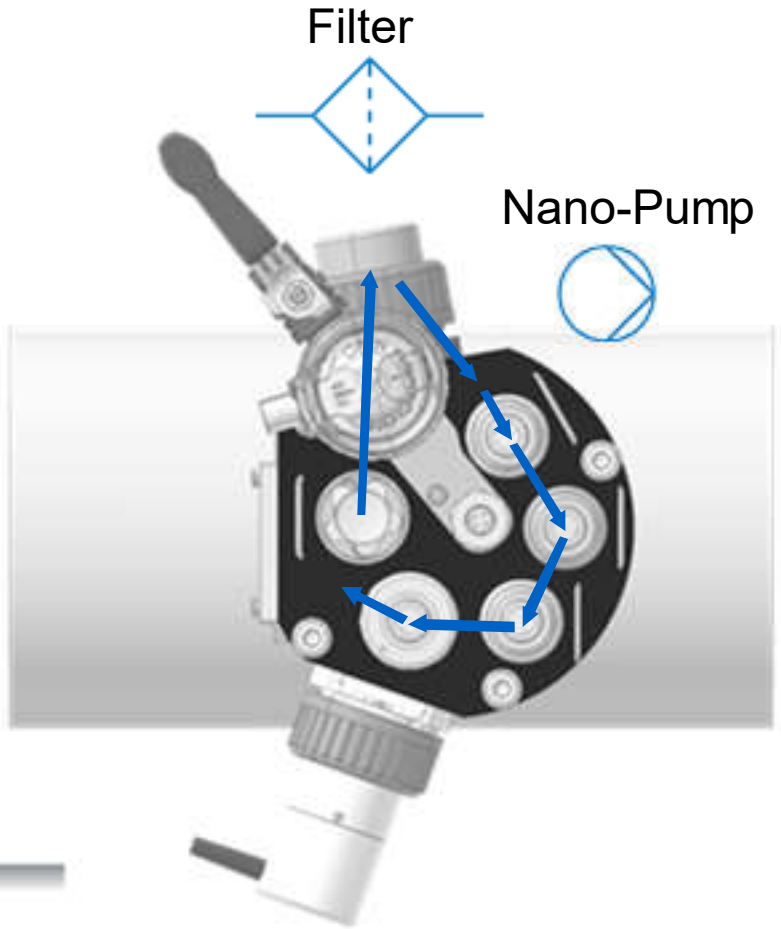
Pipe saddle
2" pipe saddle for hot tap installation.
Available for pipes from DN80 to DN600.

Nano-pump
For water flow even during periods of stagnation.

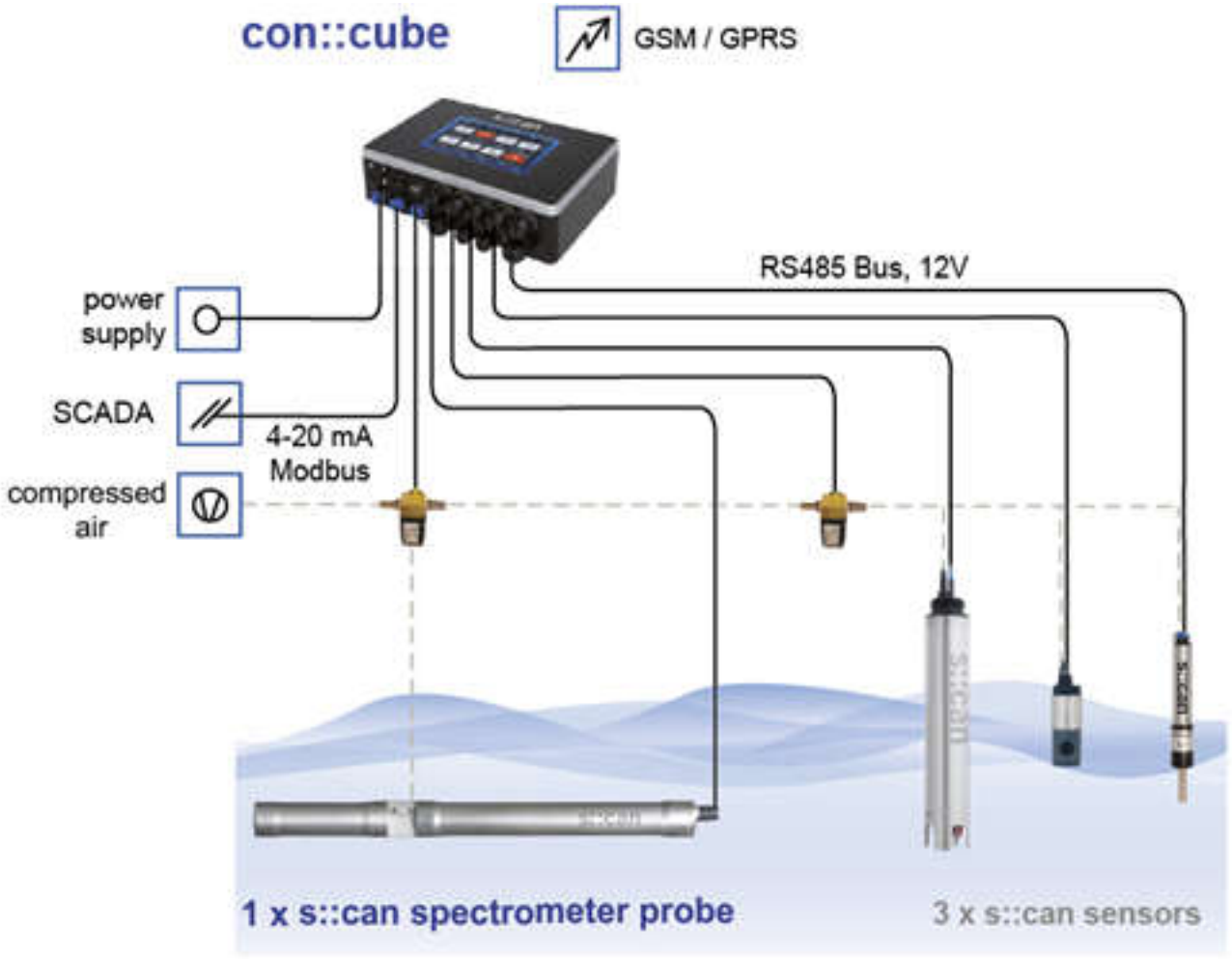
The pipe::scan

Functionality





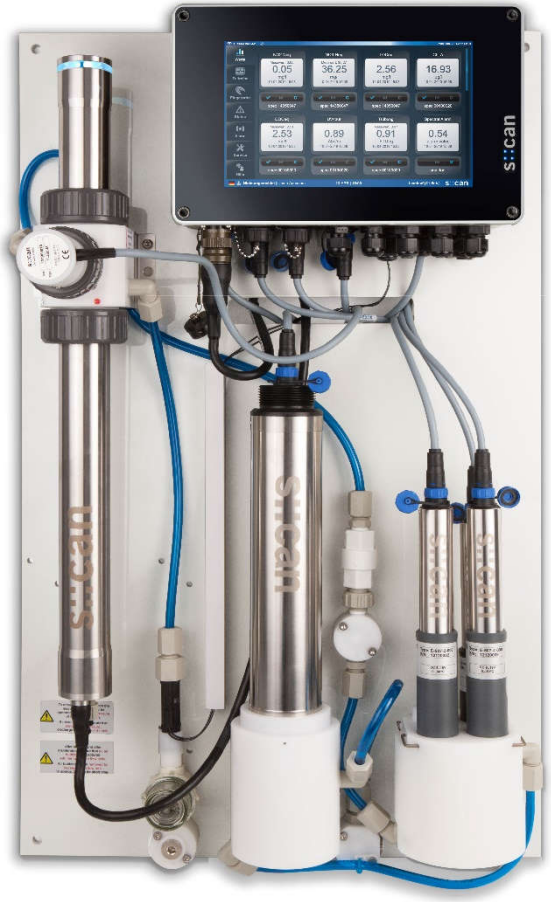
Complete s::can Water Quality Monitoring Station



- COD
- BOD
- TS
- NO3
- NO2
- NH4
- pH
- O2
- µS

s::can Product Line

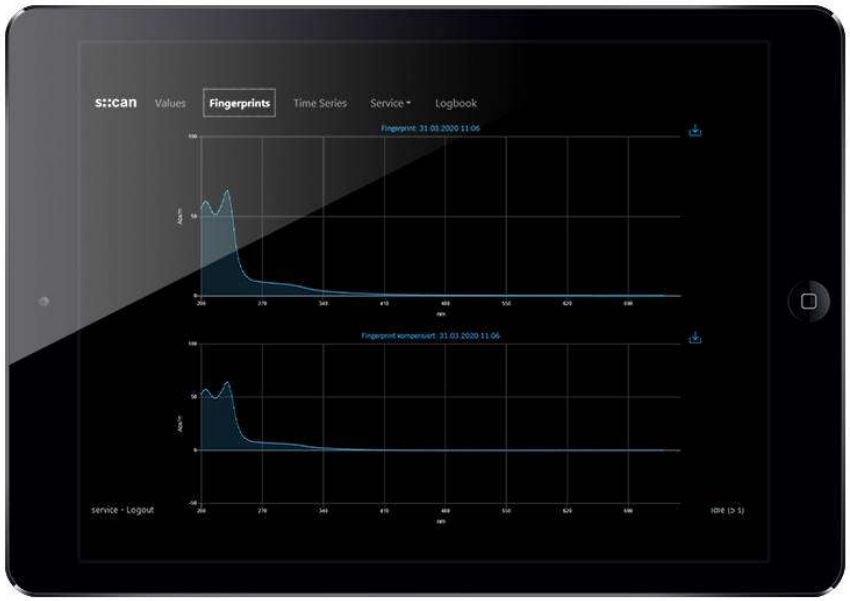
Monitoring Stations – micro::station and nano::station



s::can Software

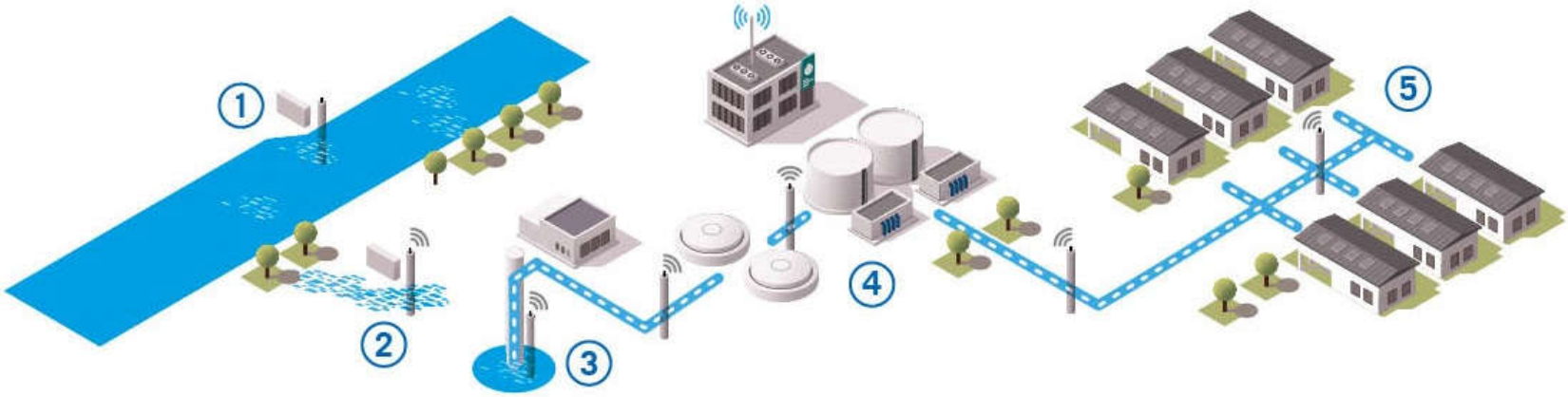
io::Tool - Wireless communication

- Intuitive web interface
- Data visualization
- Configuration of the spectro::lyser V3
- Unlimited number of parameters can be shown
- New ergonomic, functional design
- Usage of Web-Browser
- No need to install special Software
- Usable on PC, Smartphone, Tablet



Applications

Drinking Water



1 River & surface water monitoring

- Alarm systems
- Early warning system
- Turbidity
- UV254 (280, 436 etc.)
- TOC
- DOC
- NO3-N
- Hydrocarbons
- NH4-N
- pH
- EC
- ORP
- O2

2 Monitoring of bank filtration

- Filter efficiency
- Monitoring of turbidity incl. colloids
- Alarms at specific and nonspecific exceedance
- Turbidity
- TOC
- DOC
- NO3-N
- Hydrocarbons
- NH4-N
- pH
- EC
- O2

3 Ground water monitoring

- General suitability for drinking water
- Turbidity
- Alarms
- TOC
- DOC
- NO3-N
- Hydrocarbons
- NH4-N
- H2S
- pH
- EC
- O2
- BTX
- NO2-N
- ORP

4 Monitoring, operation and control of the treatment plant

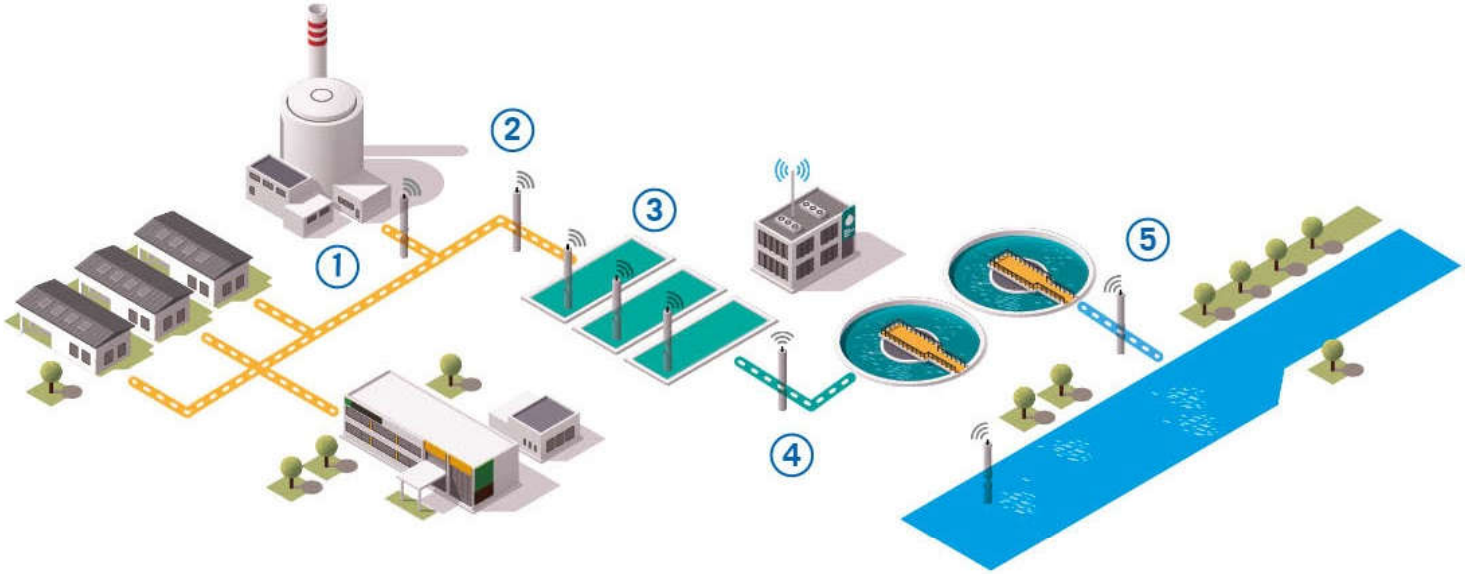
- Turbidity
- TOC
- DOC
- Ozone
- Change of OC at Oxidation
- Oxidation-products
- Filter efficiency
- Flocculants / turb. / OC
- NO3-N
- Various single substances
- Spectral tracing
- NH4-N
- F-
- Free Chlorine
- pH
- ORP

5 Monitoring of distribution network

- TOC
- DOC
- NO3
- Turbidity
- Hygienical risk
- Single substance alarm
- UV254
- Free Chlorine
- O2

Applications

Municipal Waste Water



1 Monitoring of municipal and industrial waste water:

- Compliance with emission regulation limits
- Determination of process stability
- Determination of problems within/during the process
- Real time dosing
- Determination of product losses
- Effluent monitoring
- TSS
- COD
- NO3
- NH4
- pH
- EC
- ORP

2 Sewer Monitoring:

- Determination of waste water composition
- Identification of industrial dischargers
- TSS
- COD
- BOD
- NO3
- H2S
- Alarm
- NH4
- pH
- EC
- ORP
- O2

3 Monitoring of WWTP influent:

- Quantification of load and nutrients
- Judgement of consequences due to indirect dischargers
- Reaction to loadpeaks
- Real time dosing
- TSS
- COD
- BOD
- NO3
- H2S
- Alarm
- NH4
- pH
- EC
- ORP
- O2

4 Optimisation of aeration:

- Cost savings due to process optimisation
- Nitrification- and denitrification control in real time
- Reduction of operational costs
- TSS
- NO3
- NO2
- NH4
- TS
- O2
- ORP
- pH

5 Monitoring of WWTP effluent:

- Determination of efficiency
- Control of cleaning process
- Compliance with emission regulation limits
- TSS
- COD
- BOD
- NO3
- NO2
- NH4

Applications

Environmental Monitoring

1 River monitoring network

- For regulatory purposes
- TSS/Turbidity
- COD
- BOD
- Color
- NO3
- NO2
- NH4
- pH
- EC
- ORP
- O2
- BTX

2 Monitoring of bank filtration

- For regulatory purposes
- Reporting and documentation
- Well Protection
- Spectral Alarm
- TSS/Turbidity
- NO3
- NO2
- NH4
- pH
- EC
- ORP
- BTX

3 Spring monitoring

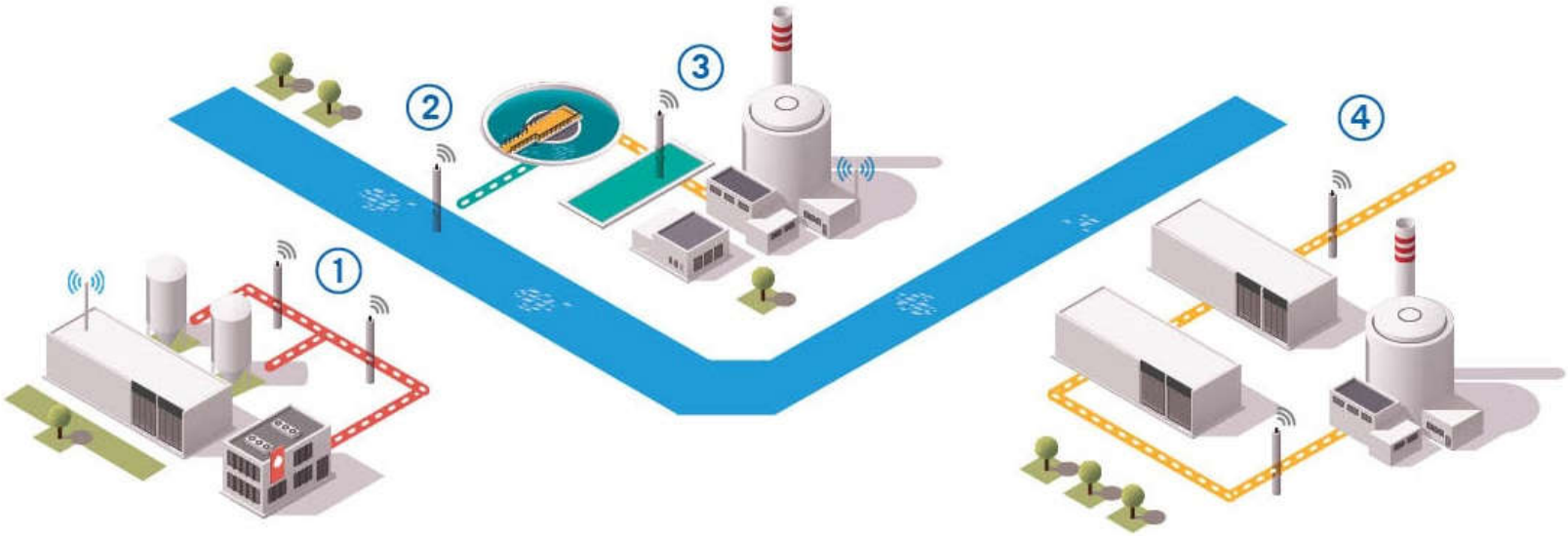
- For regulatory purposes
- Reporting and documentation
- Well Protection
- Spectral Alarm
- TSS/Turbidity
- NO3
- NO2
- NH4
- pH
- EC
- ORP
- BTX

4 Lake monitoring

- For regulatory purposes
- Chlorophyl
- TSS/Turbidity
- COD
- BOD
- Color
- NO3
- NO2
- NH4
- pH
- EC
- ORP
- O2
- BTX

Applications

Industrial Monitoring



1 Process monitoring & control

- Determination of process stability
- Determination of problems within/ during the process
- Real time dosing
- Determination of product losses
- Irregularity alarms
- TSS
- COD
- NO3
- NH4
- pH
- EC
- ORP
- Spectral Alarm

2 Industrial waste water effluent & Compliance monitoring

- Compliance with emission regulation limits
- Control of cleaning process
- Effluent monitoring
- TSS
- COD
- BOD
- NO3
- NO2
- NH4

3 Industrial waste water influent

- Quantification of load and nutrients
- Reaction to loadpeaks
- Real time dosing
- TSS
- COD
- BOD
- NO3
- H2S
- Spectral Alarm
- NH4
- pH
- EC
- ORP
- O2

4 Detection of product loss & toxic / hydrocarbon spills

- Determination of product losses
- Irregularity alarms
- TSS
- COD
- Color
- pH
- EC
- ORP
- BTX
- Spectral Alarm

Farys|TMVW, Belgium

Monitoring Belgian drinking water quality from source to tap

- Challenge
  - Supplying drinking water to the coast area which is produced in the central part of the country. Water is transported in pipes over more than 100 km
  - Contaminations in the groundwater are often detected too late and are potentially reaching the end consumer
  - Limited maintenance, in places where less space is available, an in-pipe solution was required
- s::can‘s solutions
  - micro::station and the pipe::scan measure multiple parameters simultaneously and require little maintenance
- Benefits
  - The event detection system sends an alarm when an abnormal change occurs
  - The online measurements are useful to steer chlorine dosage and to mitigate the formation of disinfection by-products

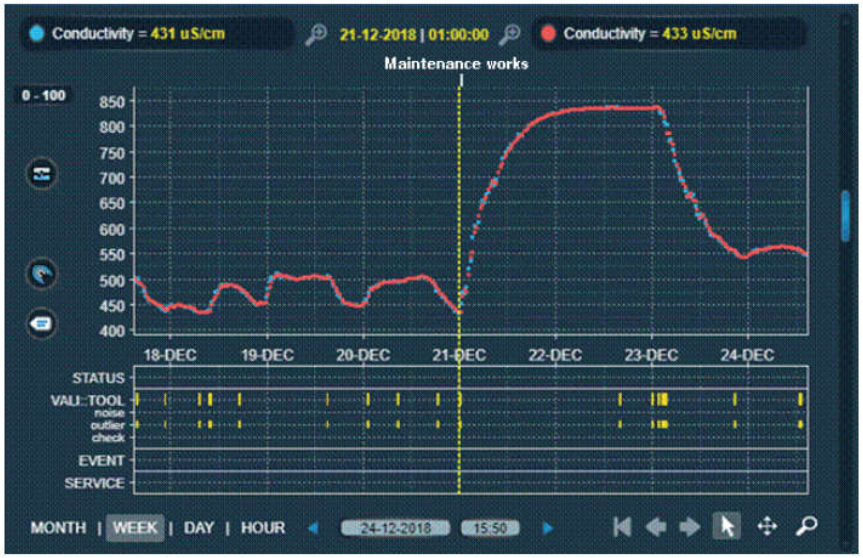
“When an abnormal change occurs, the s::can event detection system sends an alarm to warn the operators.“

Prof. Dr. Bart De Gusseme, Project leader Production and Transport, Farys|TMVW

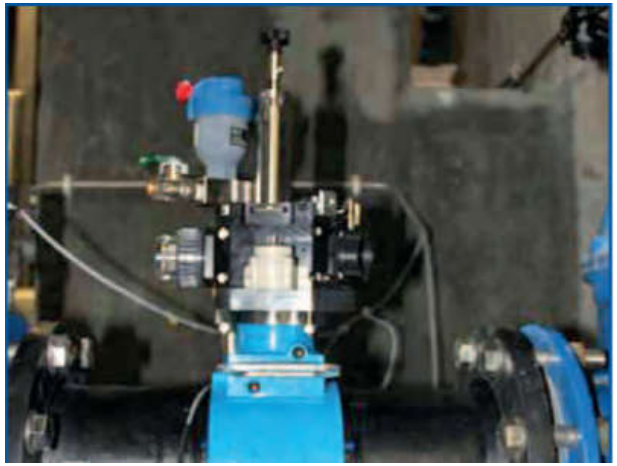
Farys|TMVW, Belgium

Monitoring Belgian drinking water quality from source to tap

- Parameters
  - Free Chlorine
  - Turbidity
  - UV254
  - TOC
  - DOC
  - Color
  - Nitrate
  - Temperature
  - pH
  - Conductivity
  - Pressure
- Products
  - pipe::scan
  - micro::station
  - con::cube



In the event of maintenance works, a reservoir was filled from an alternative production plant. This led to a clearly visible change in the conductivity.



JR-AquaConSol, Austria

Nitrate alarm: continuous groundwater measurement

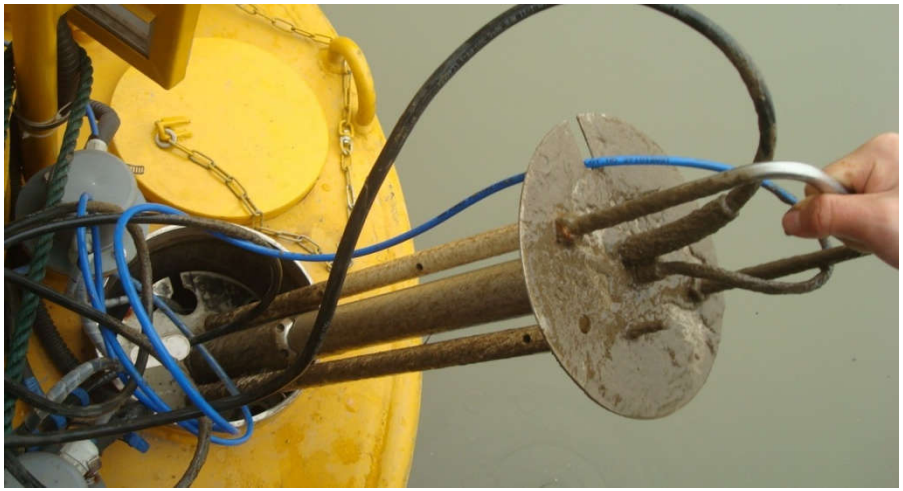
- Challenge
  - Massive overfertilization of the fields has endangered groundwater
  - Contaminations in the groundwater are often detected too late and are potentially reaching the end consumer.
- s::can‘s solutions
  - A monitoring program was installed to analyze groundwater for drinking water production
  - The systems combine optical maintenance-free online-sensors with sporadic sampling systems
- Benefits
  - The s::can system are long-lasting, have low power consumption and need very little maintenance →perfect for stationary, decentralized, battery-operated installations
  - Countermeasures can be taken immediately as soon as contamination events occur

“Online monitoring technology is an essential improvement in quality assurance for drinking water suppliers.“

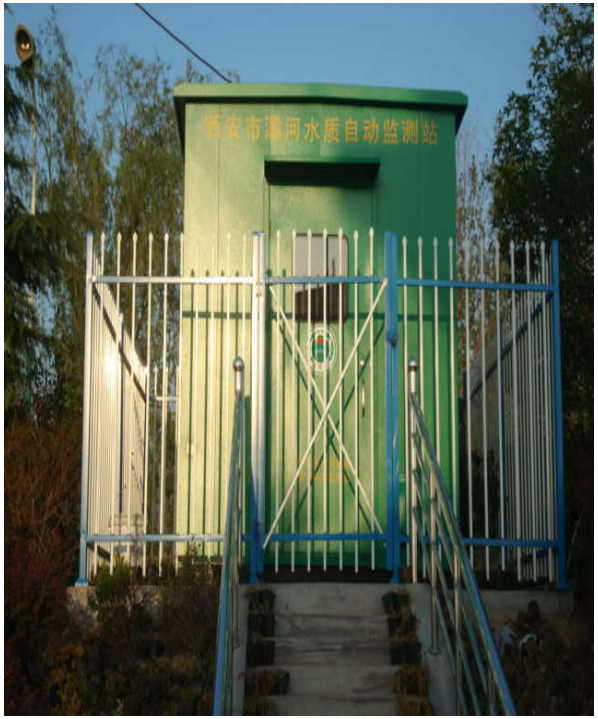
Johann Frank, Ph.D., CEO JR-AquaConSol

s::can buoy installation- Nanjing city EPA, China

COD, BOD, TOC, NO3, NTU, NH4, ph, Do, conductivity, Temperature,



s::can river WQ monitoring station – Xi‘an EPA



- River monitoring throughout Xian city
- Turbidity, COD, TOC, NO3,NH4, pH,DO, EC

Case Study:

River Monitoring Singapore

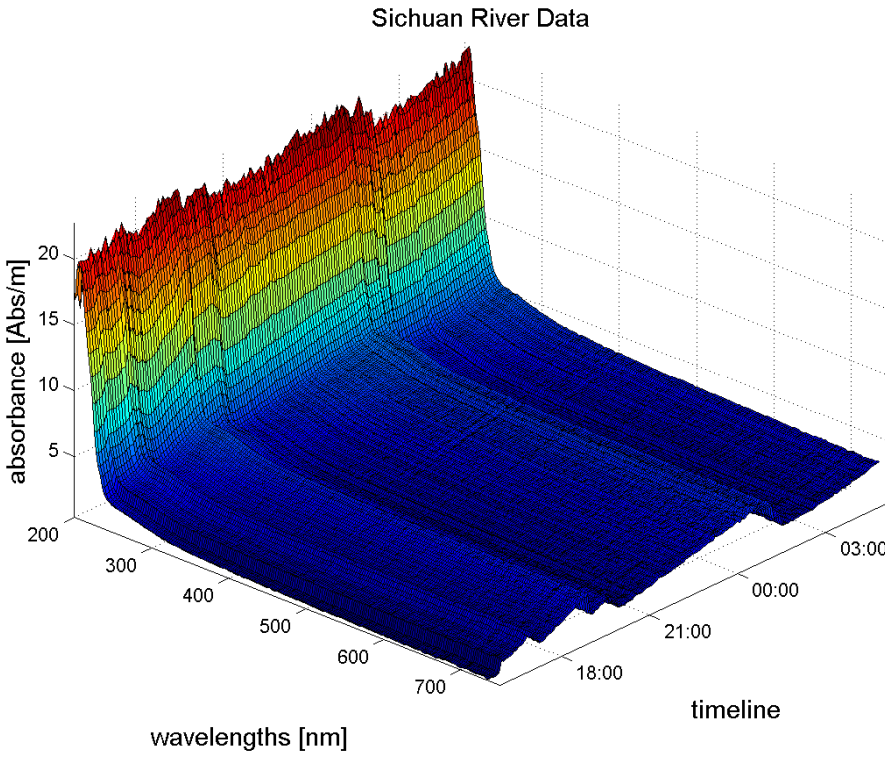
Rochor Channel Monitoring, RTU with solar power and GPRS data upload to online PUB website

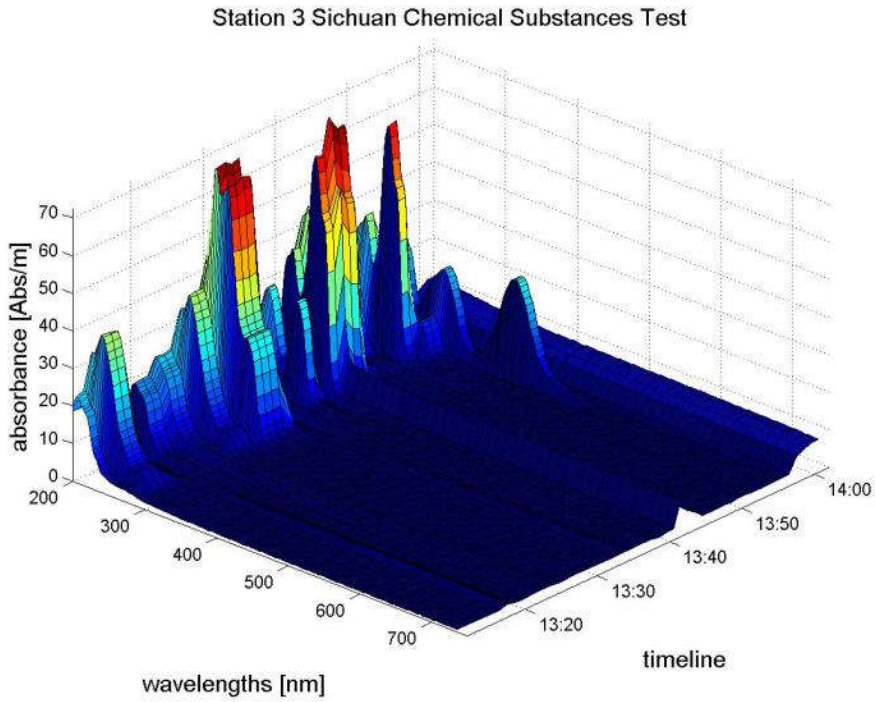
Case Study:

River Monitoring Malaysia

Case Study:

River Monitoring Sichuan EPA



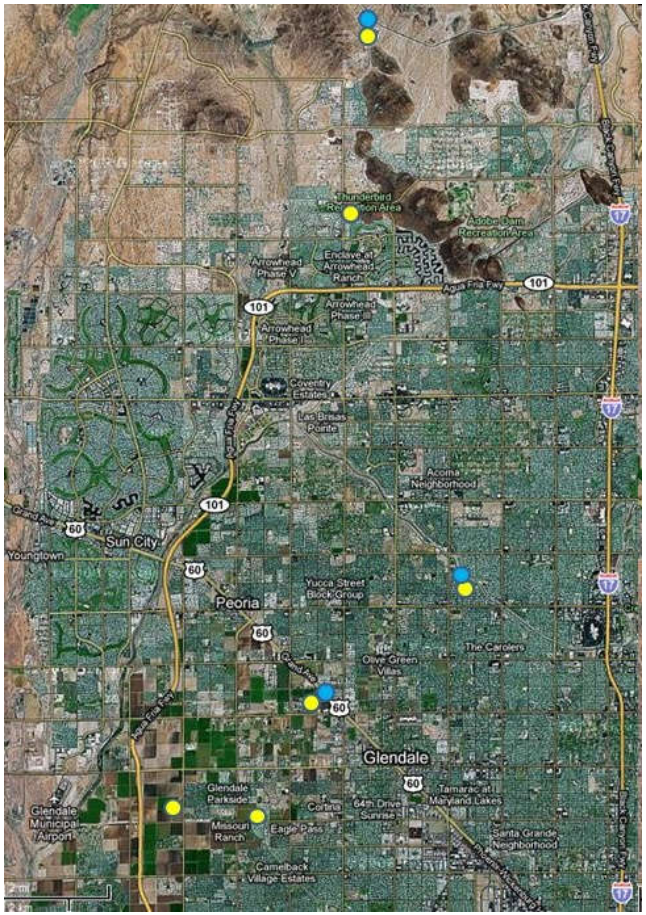


spectral alarms for unknown contaminants (e.g. Hydrocarbons, BTX, ..)

OEM: Grundfos by s::can

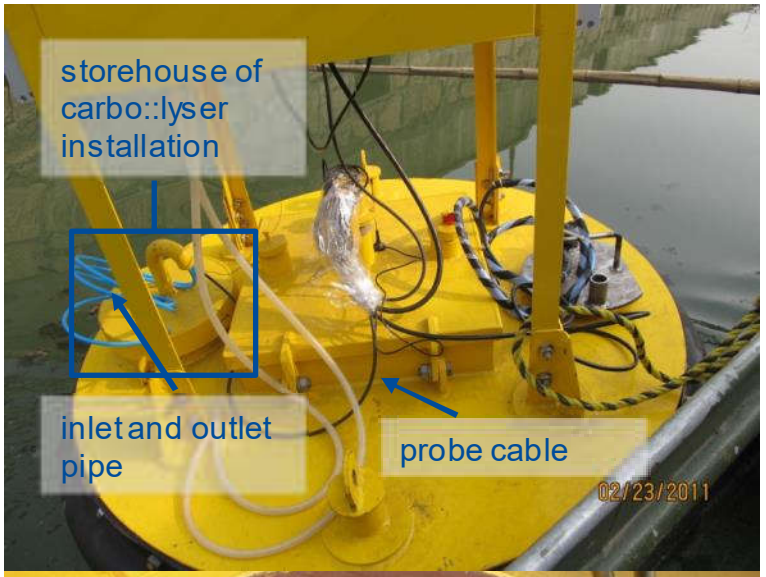
DID - Disinfection Control

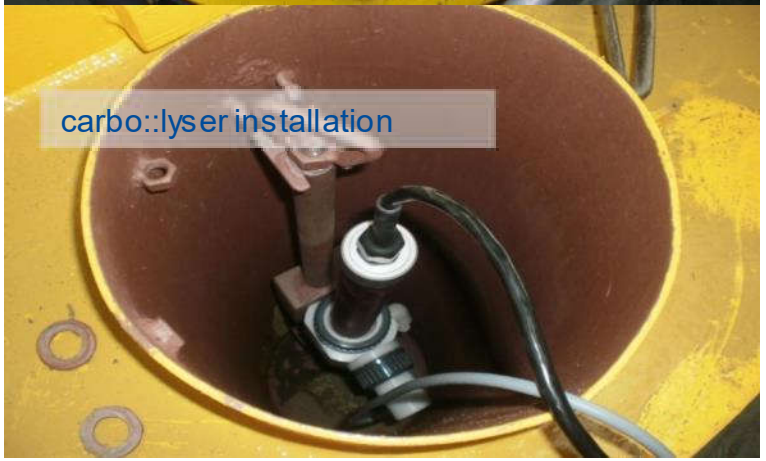
USA – Drinking Water Security (Glendale, AZ)



- All stations fully integrated into a central data base
- Achieved together with CH2M-Hill, the leading US consultant for Water Security projects and systems.
- CH2MHill and s::can are the leading team in all US WSI projects.
- The first reference of a well working Homeland Security project in the USA.

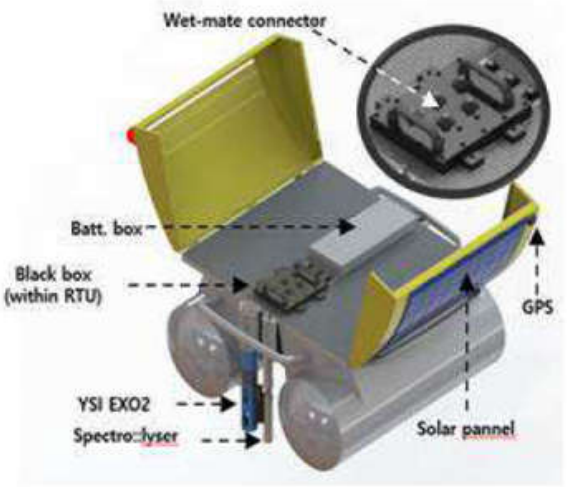
Lake and Reservoir Monitoring China



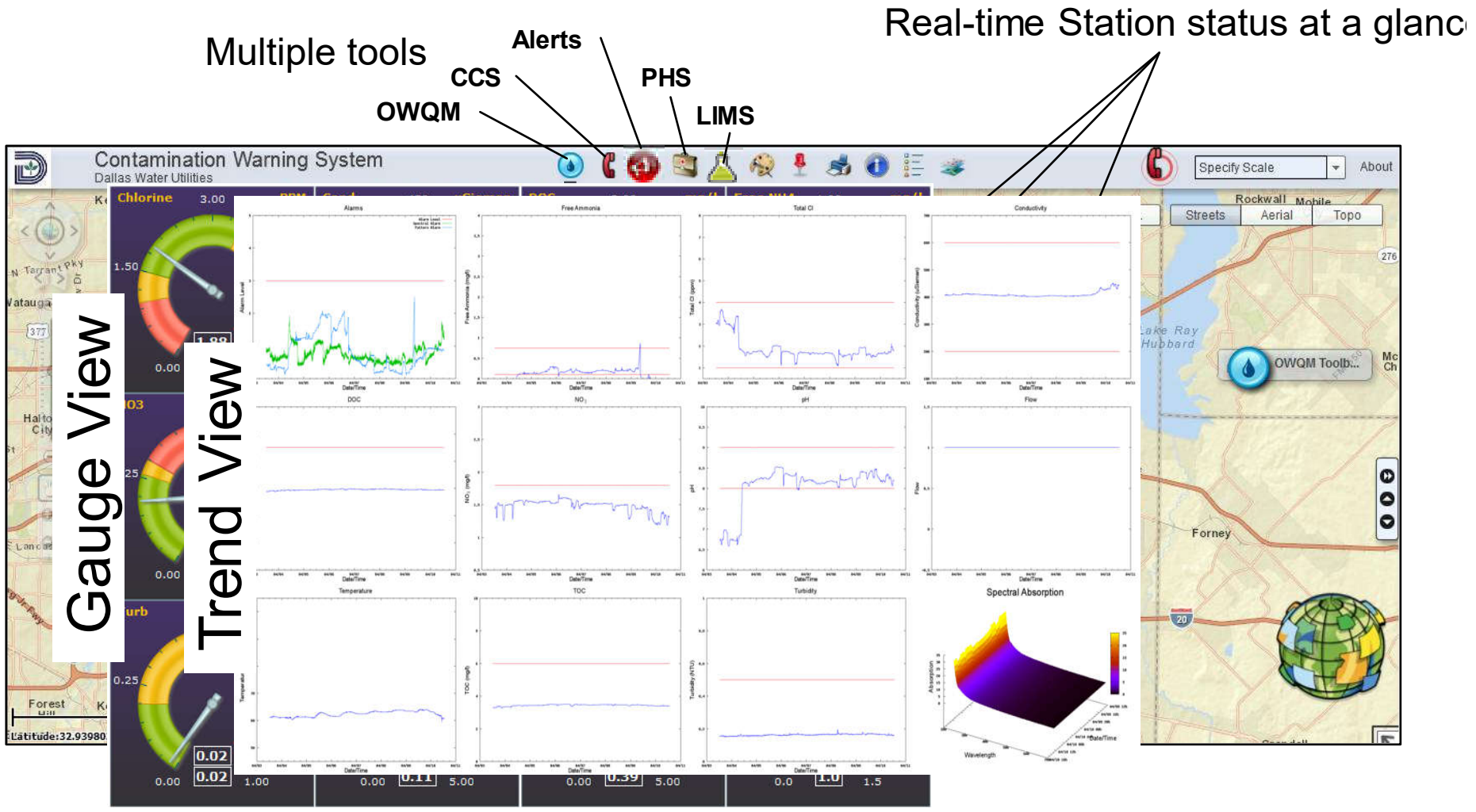


Lake and Reservoir Monitoring South Korea

120 monitoring points across Korea



The Dallas / USA contamination prevention solution*



*using sensors and stations from s::can

Aquafin, Belgium

Efficient control of de-/nitrification in their WWTPs

- At the end of 2019, 84% of all domestic waste water in Flanders was connected to one of Aquafin's more than 320 waste water treatment plants.

- Challenge
  - To run there WWTPs as efficient as possible
  - Keep maintenance for analyzers to an absolute minimum, as all WWTPs are unmanned
- s::can's solutions
  - nitro::lysers with compressed air cleaning showed best results in competitive trials
  - Almost 100 economic nitro::lyser/con::lyte systems have been installed so far at Aquafin
- Benefits
  - Saving costs and time, easy installation
  - Measuring NO3-N to control aeration tanks
  - Reduction of operating costs
  - Ultra low maintenance

Colorado Springs Utilities, USA

Effectively controls aeration blowers in its WWTP with s::can

- Challenge
  - Dynamic installation was needed because of movement of the sensors between two separate basins for maintenance purposes
  - High costs and time consuming installation

- s::can‘s solutions
  - Dynamic solution to keep the costs and maintenance low
  - RS458 Modbus radios were used to transmit data to the con::cube in real time, therefore no need for installing new conduit under each basin cover

- Benefits
  - Saving costs and time at the installation
  - Measuring parameter while controlling aeration blowers
  - Reduction of operating costs
  - Easy adaptable system / movable stations

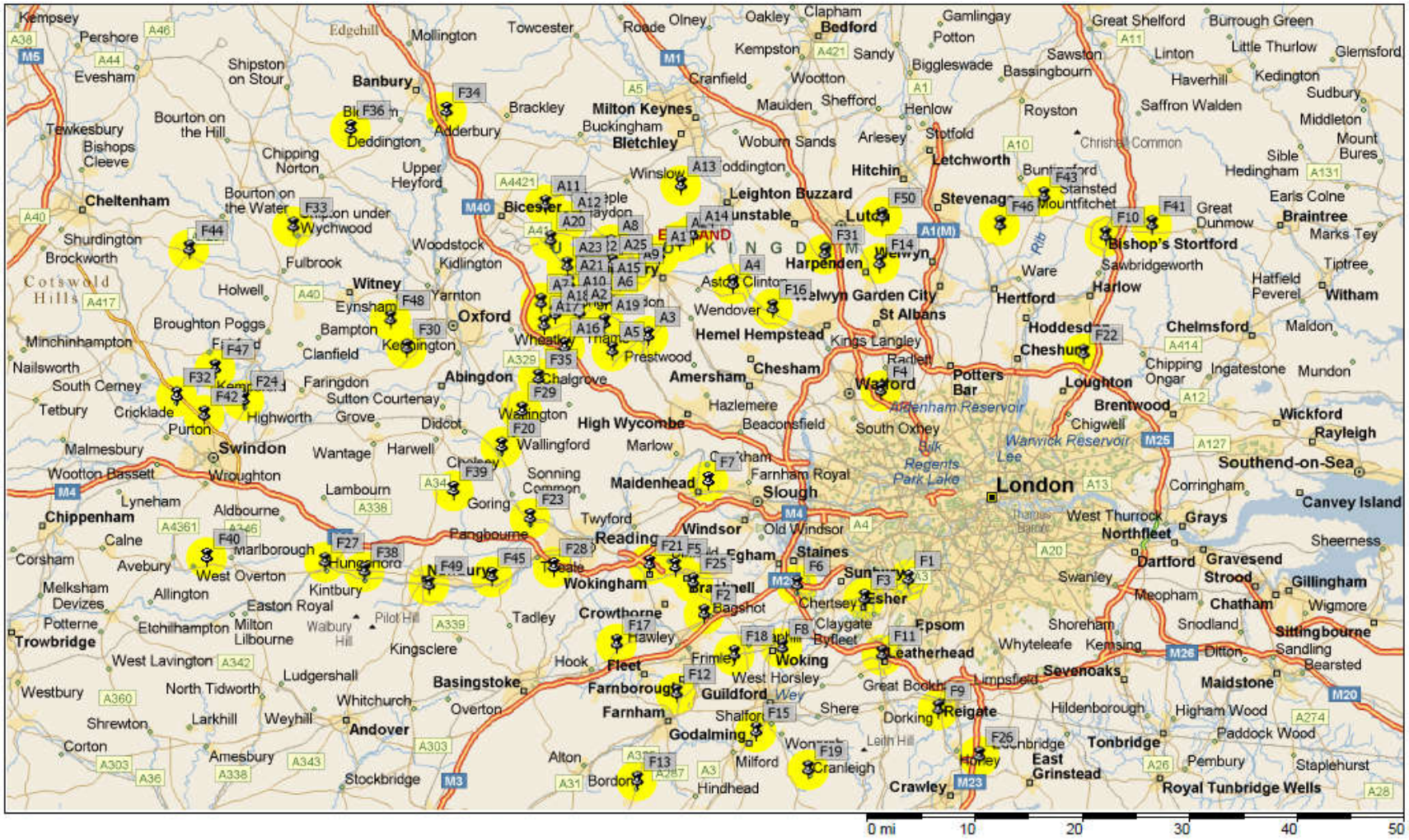
“s::can’s solution gives us a tool to efficiently control our aeration system, reducing energy and lowering our daily operating costs.“

Shaun Thompson
Treatment Operator A, Colorado Springs Utilities

UK - Waste Water

Waste Water Treatment Plant Monitoring

Thames Area, UK



Industrial Effluents Monitoring

The India Perspective

- Very strong and consquential initiative by Indian government, further intensified under Premier Modi
- To find the industrial polluters and stop their bad behaviour = obey the law

Strategy for Implementation of OCEMS (ONLINE CONTINOUS EFFLUENT MONITORING SYSTEM)

1) from **2015**: ca. 3.500 industries from 17 categories of **Highly Polluting Industries** (HPIs), selected by CPCB in 1991
2) from **2015**: GPIs = **Grossly Polluting Industries at the Ganga river and tributaries, and all with direct emission into rivers**
3) from **2015**: ca. 200 **CETPs - Common Effluent Treatment Plants**
4) from **2016**: **ZLD - Zero Liquid Discharge Industries** - install flowmeter and web camera, but no analysers
5) from **2017**: up to 10.000 Individual **RED LIST** small and medium size industries

Industrial Effluents Monitoring

India Categorization

STATUS OF 17 CATEGORIES OF INDUSTRIES (CATEGORY WISE)		
Sl.No.	Sector	Number
1	Aluminium	10
2	Cement	320
3	Chlor Alkali	29
4	Copper	6
5	Distillery	319
6	Dye & DI	137
7	Fertilizers	98
8	Iron & Steel	249
9	Oil Refinery	24
10	Pesticide	93
11	Petrochemical	40
12	Pharmaceutical	662
13	Power Plant	315
14	Pulp & Paper	242
15	Sugar	602
16	Tannery	107
17	Zinc	7
	Total	3260

Industrial Effluents Monitoring

Parameters for online monitoring as per Guidelines

Annexure-1

Sl No	Category	Effluent Parameters	Emission Parameters
1.	Aluminium	pH, BOD, COD, TSS, Flow	PM, Fluoride
2.	Cement	-	PM,NOx,SO_2
3.	Distillery	pH, BOD,COD,TSS, Flow	PM
4.	Dye and dye intermediate	pH, BOD,COD, TSS, Cr, Flow	-
5.	Chlor Alkali	pH, TSS, Flow	Cl_2,HCl
6.	Fertilizers	pH, flow, Ammonical Nitrogen, Fluoride	PM, Fluoride, Ammonia
7.	Iron & steel	pH, Phenol, cyanide, flow	PM,SO_2
8.	Oil refinery	pH, BOD,COD,TSS, flow	PM,CO,NOx,SO_2
9.	Petrochemical	pH, BOD,COD,TSS, flow	PM,CO,NOx,SO_2,
10.	Pesticides	pH, BOD, COD, TSS, Cr, As , flow	-
11.	Pharmaceuticals	pH, BOD, COD, TSS ,Cr ,As, flow	-
12.	Power Plants	pH, TSS, Temperature	PM,NOx,SO_2
13.	Pulp & paper	pH, BOD, COD, TSS ,AOx, flow	-
14.	Sugar	pH, BOD,COD,TSS, flow	-
15.	Tannery	pH, BOD, COD, TSS, Cr, flow	-
16.	Zinc	pH, TSS, flow	PM SO_2
17.	Copper	pH, TSS, flow	PM SO_2
18.	Textile(GPI)	pH, COD, TSS, flow	-
19.	Diary(GPI)	pH, BOD,COD,TSS, flow	
20.	Slaughter House	pH, BOD,COD,TSS, flow	

Industrial Water Re-use - Example

“ZLD - Zero Liquid Discharge” in India papermill

…under difficult conditions

- Waste water treatment and 85% recovery into the process
- Residual waste water under continuous monitoring
- Basis: Innovative, maintenance free online monitoring
- Future approach for thousands of Indian industries “ZLD - Zero Liquid Discharge”

Paper Mill, India

Raising the water recycling rate to 90%

- Video: https://www.s-can.at/applications/videos-scan-stories#paper_mill_in

Monitoring sea water quality in China

Detecting industrial spills with spectro::lyser titanium pro

- Challenge
  - Because of increased sewage discharge the water quality of Xiangshan Harbor is getting worse and red tide occurs frequently
  - The harsh marine environment requires instrumentation that survives the saltwater and high concentration of Cl
  - Due to the remote installation on buoys an automatic cleaning system was needed
- s::can's solutions
  - Two buoys were equipped with spectro::lyser titanium pro with durable titanium housing to prevent corrosion caused by saltwater
  - To keep the optical windows automatically clean, a ruck::sack was installed
- Benefits
  - Real-time monitoring of a remote offshore area
  - Data for the environmental monitoring network and finding solutions to fight the pollution of the seawater

"The spectro::lyser titanium pro provides us with the necessary data for scientific research and gives us evidence for offshore area eutrophication and red tide."

Professor Yongjian Xu,
Ningbo University

The CPCB – Ganges, India

Monitoring the Ganges River

- The remote stations are field operational and tolerant to extreme environmental conditions in India, in high or low temperatures, high humidity coastal conditions and high temperature desert conditions

Monitoring stations in Kannauj, Wazirabad and Patna

The CPCB – Ganges, India

Monitoring the Ganges River

- Remote water monitoring station in Allahabad
- Monitored parameters: TSS, COD, BOD, EC, pH, Temp, NH4, DO, Chloride, NO3-N

Atoyac River, Mexico

River Monitoring

- Video: https://www.s-can.at/applications/videos-scan-stories#atoyac_mx

Alseseca River, Mexico

River Monitoring

- Video: https://www.s-can.at/applications/videos-scan-stories#alseseca_mx

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