Water Safety Planning: tools for development and implementation

7 April 2022 | 10:30 GMT
iwa-network.org/webinars
The IWA WSP Specialist Group aims to disseminate practical knowledge in WSP implementation to the key stakeholders involved in delivering safe drinking water, including water suppliers, regulatory authorities, catchment management authorities, health organizations and the international water community at large.

Join the IWA WSP SG on IWA Connect!

https://iwa-connect.org/group/water-safety-planning/timeline?searchFor=all
CONFERENCE ANNOUNCEMENT AND CALL FOR PAPER

WATER SAFETY CONFERENCE 2022

22 – 24 June 2022

Narvik, Norway

Bring together leading international experts, share the state-of-the-art research, and contribute knowledge to the key stakeholders
□ This webinar will be recorded and made available “on-demand” on the IWA website, with presentation slides, and other information.

□ The speakers are responsible for securing copyright permissions for any work that they will present of which they are not the legal copyright holder.

□ The opinions, hypothesis, conclusions or recommendations contained in the presentations and other materials are the sole responsibility of the speaker(s) and do not necessarily reflect IWA opinion.
WEBINAR INFORMATION

▪ ‘Chat’ box: please use this for general requests and for interactive activities.

▪ ‘Q&A’ box: please use this to send questions to the panelists. (We will answer these during the discussions)

Please Note: Attendees’ microphones are muted. We cannot respond to ‘Raise Hand’.
AGENDA

- Welcome, introduction, housekeeping rules  
  *Philip de Souza*

- Overview of typical water safety planning requirements and typical approaches/tools utilised  
  *Rui Sancho*

- TRiM®online – Webservice for Technical Risk Management  
  *Martin Offermann*

- A Novel Management And Monitoring Tool For Seamless Water Safety Plan Implementation  
  *Agung Putra Kusuma*

- Water Safety Planning: Integrated Risk and Incident System  
  *Matthew Higginbotham*

- Water Safety Planning Tools: High Tech or Low Tech  
  *Asoka Jayaratne*

- Poll and Q&A Panel Discussion

- Final remarks and conclusion  
  *Philip de Souza*
MODERATORS & PANELISTS

Philip de Souza
Emanti Management, South Africa

Martin Offermann
IWW Zentrum Wasser, Germany

Matthew Higginbotham
Melbourne Water, Australia

Rui Sancho
IWA WSP SG Chair, Portugal

Agung Kusuma
Malang City, Indonesia

Asoka Jayaratne
Yarra Valley Water, Australia
LEARNING OBJECTIVES

1. Learn about best practices utilities are applying to manage development and implementation of Water Safety Plans.

2. Identify needs and requirements for successfully implementing a digital tool to manage water safety planning activities.

3. Draw from the experiences presented to assist to choose the appropriate tool to local settings for the development and implementation of robust and resilient water safety planning that enable utilities to rapidly respond to hazards and risks.
SHARE YOUR THOUGHTS ON SOCIAL MEDIA

Tag @IWAHQ on social media and tell us:

Why WSP is important?

How does it affect your life?

What is the main contribution to the SDG6 and the 2030 Agenda?

Don’t forget to include the hashtags #IWA & #WSP.
TRiM® online – Webservice for Technical Risk Management

MARTIN OFFERMANN
IWW WATER CENTRE, GERMANY
INTRODUCTION

▪ About IWW
  – Research, consulting and training centre for drinking water, bathing water, process water, industrial water and waste water
  – Part of DVGW - German Technical and Scientific Association for Gas and Water
  – Over 140 scientists, engineers, economists and technicians
  – 6 software developers

▪ About TRiM®online
  – Commercial webservice (SaaS) for German water (and gas) suppliers
  – Started with a R&D project co-financed by innogy SE and in cooperation with four German water suppliers
  – Output of the project was the development of a self-check for small and medium sized water suppliers for the implementation of a technical risk management
WSP IN GERMANY

WSP in Germany:
- Water Safety Planning aka Technical Risk Management in Germany
- Deals with risks related to water safety and security (quality and quantity)
- Part of the technical standard of DVGW since 2008, DIN EN standard since 2013
- Will become mandatory as part of the implementation of the EU Drinking Water Directive

Challenges:
- Heterogeneous structure of water suppliers; many very small water suppliers; multi-utilities supplying several sectors, as gas, electricity, …
- Limited human, financial and technical resources
- Limited methodological knowledge
- Up to now, risk management is not mandatory

Structure of the German water supply in 2010

Quelle: Statistisches Bundesamt, Fachserie 19, Reihe 2.1, Heft 2013, erschienen 08/2013
RISK MANAGEMENT APPROACH

1. Where can something happen?
2. What can happen and how?
3. What are the associated risks?
4. How can the risks be better managed?
5. How do you determine whether the measures are effective?
6. Is the risk management well documented?
7. Has anything changed?

DIN EN 15975-2

Source: DIN EN 15975-2:2013
DRINKING WATER SUPPLY SYSTEM DESCRIPTION

- Supply chain from source to tap:
  - organization & management
  - water catchment
  - water extraction
  - water treatment & desinfection
  - water pumping & storage
  - Water transport & distribution

- User has to add different assessment objects of the supply system, e.g.
  - boreholes,
  - storage tanks,
  - pumping stations,
  - mains
  - ...
HAZARD ANALYSIS

- Hazard analysis based on prepared lists
- Lists with hazardous events, which address effects on safety and security
- Hazards in form of qualitative (biological, chemical, physical) and quantitative (continuity, volume, pressure) impairments
- Numbers:
  - 6 processes
  - 17 types of infrastructure elements
  - 273 hazardous events (categories: planning, construction, operation, maintenance)
  - 568 measures of risk control
**RISK ASSESSMENT**

- **Hazards and hazardous events** are assessed with regard to their risks for each supply element using a **3x3 risk matrix**
- Assessment taking into account **existing measures** (for control or mitigation) which have been compiled on the **basis of the DVGW standards** and **further regulations**
- Possibility of using suggested definitions or supplier-specific **definitions** for the **likelihood and severity**

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**dangerous event**

<table>
<thead>
<tr>
<th>Inspection/Maintenance</th>
<th>Well contamination and/or failure due to improper inspection/maintenance.</th>
</tr>
</thead>
</table>

**Relation:**
- DVGW W 125:2004-04
- DVGW W 291:2000-03
- DVGW W 1001:2020-11
- DVGW Water Information No. 51:1997-09

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**Selection of evaluation objects**

| Select/deselect all | Fountain 122 | Fountain row 101 |

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**Selection of existing measures**

- Inspection and maintenance plan
- Cleaning and disinfection of devices that come into contact with water or exclusive use in components that come into contact with drinking water
- Use of clean rubber boots and clothing
- Provision of necessary consumables and spare parts
- Use of suitable/disinfected protective clothing (when working in water-bearing parts)
- Regular evaluation of the results and derivation of necessary actions

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Automatic translation with Google Translate
If the identified risk is too high, further measures can be defined with corresponding deadlines and responsibilities.

It is possible to change the status of measures from “to do” to “done”.

All tables can be filtered and exported in the filtered view.
VERIFICATION, DOCUMENTATION, REVIEW

- **Documentation** in form of **tables and dashboard**
- **Update** of the lists of hazardous events and measures of risk control **twice a year by IWW** (especially in the case of changes in the regulations)
- Risk management is to be **used continuously** via TRiM®online. It is possible to compare different years within with regards to a review.
CONTACT DETAILS

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- IWW Zentrum Wasser
- Moritzstr. 26
- 45476 Mülheim an der Ruhr
- Germany

Contact us:
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- e-mail: info@iww-online.de

Martin Offermann
- e-mail: m.offermann@iww-online.de
A Novel Management And Monitoring Tool For Seamless Water Safety Plan Implementation

AGUNG PUTRA KUSUMA
TUGU TIRTA WATER WORKS, INDONESIA
Every era has its technology, and each has its own advantages, it's just humans whether they want to change or not.

- Agung Putra Kusuma
THE BIG WHY?

Why are people still using the traditional system:
- People are used to using it
- Lack of desire to learn
- Add another workload for him

Why are people still not using the modern system:
- The system is too complicated
- The system is not yet integrated to his current work
THE BIG WHY?

EXCEL SPREADSHEET
we always use it in every documentation

GOOGLE SPREADSHEET
document collaboration
THE BIG WHY?

We Need a Solution!

create a tool that is easy to use and can be integrated with the existing system!
Enable real-time implementation and management of the WSP in accordance with the National WSP Manual.
WATER SAFETY INTEGRATED SYSTEM (WISE)
WATER SAFETY INTEGRATED SYSTEM (WISE)
WATER SAFETY INTEGRATED SYSTEM (WISE)
The PDAM Malang City SPAM supply chain is a water supply chain that is depicted in a flow chart that depicts SPAM in full from the point of collection at the source to the customer’s water faucet. In the SPAM supply chain, PDAM Malang City receives supplies from 11 sources of raw water. This flow chart is described starting from the Catchment Area to the point of use at the consumer. The detailed description of each supply is clarified in a single line.
### Module 3

<table>
<thead>
<tr>
<th>Hazardous Event</th>
<th>Hazardous</th>
<th>Likelihood</th>
<th>Consequence</th>
<th>Risk Score</th>
<th>Score Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>MICROBIOLOGICAL CONTAMINATION DUE TO LACK OF SECURITY AT RESERVOIR LOCATIONS</td>
<td>MICROBIOLOGY</td>
<td>3. Maybe</td>
<td>5. Extreme</td>
<td>15</td>
<td>TALL</td>
</tr>
<tr>
<td>THE EMERGENCE OF MICROORGANISMS BECAUSE CHLORINATION STOPS DUE TO LEAKAGE OF CHLOR GAS</td>
<td>MICROBIOLOGY</td>
<td>2. Small chance</td>
<td>5. Extreme</td>
<td>10</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>PHYSICAL CONTAMINATION DUE TO SOLAR OVERLOAD IN WENDIT 3 GENSET 3 FUEL TANK</td>
<td>PHYSICS</td>
<td>5. Almost certainly</td>
<td>3. Moderate</td>
<td>15</td>
<td>TALL</td>
</tr>
<tr>
<td>MICROBIOLOGICAL CONTAMINATION AT SOURCE WENDIT, DRILL WELL DUE TO SABOTAGE DUE TO THE SAFETY FENCE CAN BE CLIMBED BY RESIDENTS</td>
<td>MICROBIOLOGY</td>
<td>4. Most Likely</td>
<td>5. Extreme</td>
<td>20</td>
<td>EXTREME</td>
</tr>
<tr>
<td>MICRO-ORGANISMS CONTAMINATION DUE TO THE ENTRY OF ANIMAL WATER INTO THE RESERVOIR DUE TO THE ROOF OF THE RESERVOIR LEAKING DURING RAIN</td>
<td>MICROBIOLOGY</td>
<td>2. Small chance</td>
<td>5. Extreme</td>
<td>10</td>
<td>MEDIUM</td>
</tr>
</tbody>
</table>
WATER SAFETY INTEGRATED SYSTEM (WISE)
WATER SAFETY INTEGRATED SYSTEM (WISE)

The image shows a section of a page from a document or presentation, which includes a table titled "RPAM Module." The table contains information about different modules and their associated activities, responsible persons, costs, start dates, expected end dates, and statuses. Notably, it mentions that the system is "Integrated with budgeting system."
Integrated with work order and asset management system for everyday monitoring operational
WATER SAFETY INTEGRATED SYSTEM (WISE)

Integrated with ISO 9001 system
WATER SAFETY INTEGRATED SYSTEM (WISE)

Mobile App Integrated to Work Order and Asset Management System
BEFORE & AFTER USING ONLINE APPS

• It’s Hard for me to using it
• Oh my god, it’s another job for me
• There is a new employee coming, I have to explain this document to him
• What must I do for this job? Where is the document?
• Where is the new version of the document, its on my laptop?

• Wow, my work is done faster
• Nice! It’s easy for me to monitoring “the job”
• Hello, all explanation for this document is on the app, just access and learn from that..
• Ah, this app can be accessed everywhere, with just a simple click
• Yup, this app is the new version of document, and the history of that document
KEY FACTOR OF SUCCESS

- Top Level Management Commitment
  - Regulation
  - Lead By Example
- Company Culture
- Continuous Training and Education
- Continuous Improvement with the App
- Pandemic ??
Author notification - Water Safety Conference 2022

Thomas Pettersson <Thomas.Pettersson@chalmers.se>
to me, Kizito, Rui

Dear Agung Kusuma,

Thank you very much for submitting your abstract: “A Novel Management And Monitoring Tool For Seamless Water Safety Plan Implementation” to the IWA-WHO Water Safety Conference in Narvik 2022. Your abstract has been reviewed by three independent reviewers who have evaluated your work based on clarity, structure and relevance for the selected theme session.

After weighing together the reviewers' scores, we are pleased to announce that your abstract has been accepted for a platform presentation. This means you will have a 20 min time slot in the conference programme, with 15 min presentation and 5 min for questions.

First, we would like to ask you to confirm that you have received this email and that you agree to present your work at the conference.

Before adding you and your presentation into the conference programme, you must make a full conference registration. Please register on the conference website – www.watersafety2022.org/registration/ – on 15 April 2022 at the latest. Please note that the early registration expires on April 1, 2022.

We will send out more detailed information after the conference registration is completed.

On behalf of the program committee, we look forward to meeting you at the conference in Narvik in June 2022.
THANK YOU
Water Safety Planning: Integrated Risk and Incident System

MATTHEW HIGGINBOTHAM
DRINKING WATER QUALITY MANAGEMENT SYSTEMS LEAD

Melbourne Water
Enhancing Life and Liveability

inspiring change
OVERVIEW

- Water Supply in Melbourne
- Regulatory context and WSP Implementation
- IRIS Demo
- Pros, Cons and key considerations
Melbourne Water and Yarra Valley Water are located in the Australian state of Victoria.
WATER SUPPLY IN MELBOURNE

- State Government owned water utilities in Melbourne
- Water, Sewerage and Recycled Water Services
WATER SUPPLY IN MELBOURNE

- Half of our drinking water is supplied from protected catchments with chlorine only disinfection. The other half is split between desalinated water and conventionally treated water.

- 16 primary treatment plants that range in scale from 0.5KLD UV/Chlorine plant to a 600MLD conventional treatment plant.

- MW and the RWCs were early adopters of HACCP for drinking water quality management.

- Our Drinking Water Quality Risk Management plan (water safety plan), quality risk register and HACCP plans manage water quality risks across the system.
DRINKING WATER REGULATIONS IN AUSTRALIA

Australia’s National guidance document

Drinking water legislation in Victoria ➔ WSP Mandatory

Authorised Version No. 015
Safe Drinking Water Act 2003
No. 46 of 2003
Authorised Version incorporating amendments as at 31 December 2019

TABLE OF PROVISIONS

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<td>2</td>
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<td>3 Definitions</td>
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<td>7 Water suppliers must prepare, implement and review risk management plans</td>
<td>6</td>
</tr>
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<td>8 Water storage managers must prepare, implement and review risk management plans</td>
<td>6</td>
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<tr>
<td>9 Risk management plans</td>
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<td>13 Approval of risk management plan auditors</td>
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<td>14 Only approved auditors may conduct audits</td>
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<td>17 Drinking water must comply with quality standards</td>
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<td>18 Notification required if non-complying water supplied</td>
<td>12</td>
</tr>
<tr>
<td>19 Variations of schematic standards</td>
<td>13</td>
</tr>
<tr>
<td>20 Exemption from water quality standards</td>
<td>14</td>
</tr>
</tbody>
</table>
Components of the Drinking Water Quality Management System

- Microsoft office combined with version control/archiving software
- Combined Assurance, Compliance, Risk, Events and Action tracking software. We will look at this today

Enterprise Asset Management software

Lab monitoring and process control software
IRIS

- One location to track events, risks, assurance, compliance and improvement actions
PROS

- Linking events, risks, assurance, compliance and improvement actions in one place helps integrate the system and track all the moving parts.
- The ability to search by location or risk type gives a good picture of enterprise risk.
- Clear accountabilities and visibility of those responsible for risks and controls, great breadth and depth of reports.
- Supports standardisation across departments.
- Periodised activities and automated reminders are very useful.
CONS

- It’s an external software package we license to use. Can be expensive/difficult to modify and there are ongoing costs in licensing and dedicated internal support roles, a lot of work is required up front to set the system up followed by regular maintenance.

- Can be double handling where systems don’t interface well, e.g. with Maximo and still relies on maintaining Word manuals and supporting documentation.

- If risks and controls aren’t set up early there can be lots of duplication/issues with categorisation

- The complexity can deter some users.
KEY CONSIDERATIONS

- Most important thing is to get started. Melbourne Water has been working on this for over 20 years, it is continuously improved.

- Build a solid foundation and think about the whole system early. Consider all aspects of running it not just the implementation, consider compatibility with other digital systems (e.g. maintenance software) and if possible use the same back end database (e.g. SQL).

- When transitioning from excel/paper based systems to a software package do the upfront work to clean up/categorise your data before entering it.

- Engage widely during design and roll out, help the people you're asking to use the system solve problems so they're incentivised to use it.
Water Safety Planning: tools for development and implementation

ASOKA JAYARATNE
WATER QUALITY SPECIALIST

Yarra Valley Water

inspiring change
OVERVIEW

- Co-WSP Management – MW/YVW
- Yarra Valley Water WSP Implementation
- Paper / digital version - pros and cons
- What matters – software vs paper/digital
- Next phase of WSP management
HEAVILY REGULATED

Water Industry Act 1994

Safe Drinking Water Act 2003

Safe Drinking Water Regulations 2005 (DHS)


ADWG 2004 “Framework”

Water Quality Standards

Management System
- Emergency management
- Community involvement & awareness
- Research and Development

HACCP Plan (1999)
WHOLESALE/RETAILER INTERFACE
WSP INTEGRATION

CATCHMENT

TREATMENT

TRANSFER

DISTRIBUTION

RETICULATION

CUSTOMER

Bulk Water Supply Agreement
Legally Binding

MW - WSP

YVW - WSP
COMPLEX NETWORK – MULTIPLE SOURCES
Components of the Drinking Water Quality Management System

- Enterprise Asset Management software
- Microsoft Office SharePoint
- Enterprise Asset Management software

- Drinking Water Risk Management Plan (Inflo)
- Drinking Water Quality Risk Register (IRIS)
- HACCP Plans, SOPs, Forms, Checklists (Inflo)
- Drinking Water Monitoring Program (EnviroSys, SCADA)
- Emergency Response, Contingency Plans, Gene (Maximo)
### ALL IN A WORD DOCUMENT

**YARRA VALLEY FUTURE WATER**

**DRINKING WATER HACCP PLAN VERSION 36**

**MARCH 2022**

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#### Likelihood vs Severity

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Once every five years or less</td>
<td>1 = No impact or not detectable</td>
</tr>
<tr>
<td>2 = Once per year</td>
<td>2 = Impact on potential customer complaints</td>
</tr>
<tr>
<td>3 = Once per month</td>
<td>3 = Impact on customer charter compliance</td>
</tr>
<tr>
<td>4 = Once per week</td>
<td>4 = Impact on Licence/Statement of Obligation compliance</td>
</tr>
<tr>
<td>5 = Once per day or more</td>
<td>5 = Impact on public health</td>
</tr>
</tbody>
</table>

**Total Assessed Risk** = Likelihood x Severity  
**Total Assessed Risk ≥ 0** = Significant Risk = Critical Control Point

*Note – Hazardous events related to "Total Assessed Risk" less than 6 where loss of control can pose a significant risk to public health will be considered for a CCP by the HACCP Team.*

The CCPs are then determined based on decision trees in the *Codex Alimentarius Guidelines* and Appendix I, Section AI of the *ACWG*.

---

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Potential Hazard</th>
<th>Responsible Team for Control</th>
<th>Cause (Hazardous Event)</th>
<th>Control Measure</th>
<th>Residual Risk</th>
<th>Validation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chemical Contamination</td>
<td>SCADA Alarms, Contractor Access to SCADA,</td>
<td>2</td>
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<td>Contamination Prevention Procedures,</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Chemical Contamination</td>
<td>Contract specification 1</td>
<td>5</td>
<td>5 Not significant</td>
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<tr>
<td></td>
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<td>WOPS</td>
<td>Sport Disinfection procedures in the</td>
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<td>Operations Reference Manual</td>
<td>1</td>
<td>5</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>No residual chlorination, injection</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>into or points at storage tanks</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Contract specification for spot dosing</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>of tanks</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

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**IMPACTS**

**WOPS**

- Recussass contamination from spot dosing from liquid to contact within rawwater during spot dosing  
- Chemical contamination from over treating

**DWP**

- Short term contract – Project to check on constructed drawings of all sites to be completed in February 2017  
- Chlorinator contract

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PROS

- Simple and easy to manage all in one place.
- Managed by one WSP Team Leader from 1999 to date.
- Checks and balances to ensure currency and implementation
  - Rolling review
  - Teams and working groups
  - Internal and external audits
  - Senior management review
  - Awareness from the Board to the field crews
CONS

- Reliance of few individual experts
- Efficient tracking of changes → document, risk assessment, audits, audit actions…
- Dependent on human interventions
NEXT PHASE – SOFTWARE BASED MANAGEMENT

- ISO 9001
- ISO 14001
- TRADE WASTE ISO22000
- OHS
- SEWERAGE SYSTEM
- RECYCLED WATER
- MANAGEMENT TOOL (SOFTWARE BASED)
- WSP
KEY MESSAGES

- What works for you → local context
- Know what you are doing → transparent
- No one answer → software vs paper based
- Most important aspect → Implementation or Operationalisation
- Learn from experiences of others
- Try before you buy
Poll & Q&A Discussion

MODERATOR: RUI SANCHO
POLL

Poll: Which tools do you use for water safety planning activities?

Participate in the poll and share your answer with us!
UPCOMING WEBINARS

Stay tuned for our next webinars:

Quantifying, Modelling and Mitigating Process Emissions

Process Emissions - Masterclass 1

WEBINAR

12 April 2022 | 10:00 BST

https://iwa-network.org/learn/process-emissions-masterclass-1/
IWA World Water Congress & Exhibition

COPENHAGEN
DENMARK
11 - 15 SEPTEMBER
2022

Super Early Bird rates available until 15 May

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#WorldWaterCongress

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IWA brings professionals from many disciplines together to accelerate the science, innovation and practice that can make a difference in addressing water challenges.

Use code WEB22RECRUIT for a 20% discount off new membership.

Join before 31 December 2022 at: www.iwa-connect.org