SWIM:AI

Early *w*arning system for pollution at river bathing sites

KWB

*W*ater quality can change rapidly in rivers, especially after heavy rainfall. Such events can lead to discharges of untreated *w*aste*w*ater, polluted storm*w*ater runoff, and runoff from fertilised fields, *w*hich negatively impact the *w*ater quality. Although these discharges are usually short, they endanger the health of s*w*immers or bathers. Such difficult-to-manage risks therefore discourage the *w*idespread use of rivers as bathing *w*ater sites.

The monthly microbiological monitoring required by la*w* is not sufficient for guaranteeing hygienic safety. Increasing the measuring frequency does not remedy the situation either: measurement results are only available 24 to 48 hours after a sample has been taken. This is too late to inform bathers of any pollution incidents. The result: adequate health protection, as required by the European Bathing *W*ater Directive, is not guaranteed.

S*W*IM:AI *w*as developed to tackle these specific challenges.

Our solution

SWIM:AI is an **early warning system** that provides **real-time assessment of bathing water quality** as an open source solution. Based on **machine learning** and **statistical modelling**, SWIM:AI predicts the hygienic load in specific sections of a river. SWIM:AI processes a range of local data such as precipitation, flow and temperature. The good thing about it: compared to time-consuming microbiological analyses, the aforementioned data are available quickly so that bathers can be warned in good time.

With SWIM:AI, the **hygiene quality of bathing waters** is documented on a **daily basis**. As a result, health authorities and bathers can be warned promptly about any pollution incidents and health risks.

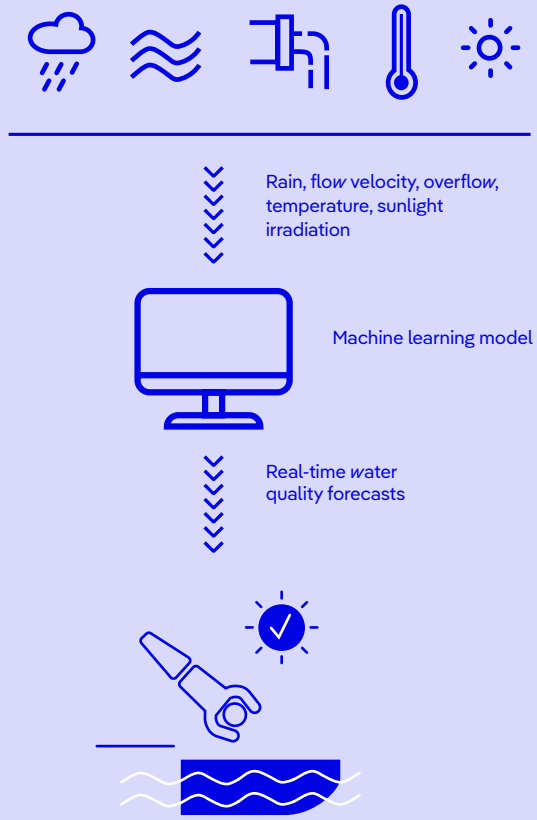
SWIM:AI

- provides **comprehensive predictions** of water quality at bathing sites on a daily basis, independently of the monthly microbiological analyses required by law,
- supports authorities in making **decisions on bathing permits** in urban areas by providing reliable forecasts and a robust set of data,
- improves the **long-term assessment** of bathing waters,
- ensures transparent and rapid **communication of bathing water quality to the wider population**
- enhance the **attractiveness of bathing sites for tourists** thanks to the options created for proactive promotion on municipal websites and tourism portals,
- supports the **requirements of the European Bathing Water Directive**,
- offers proactive **implementation of the expected tightening of EU** bathing water quality monitoring **directives**, which are likely to include the introduction of online early warning systems to complement traditional microbiological monitoring

Status quo

Challenges:
Too slow → decision made too late
Too sparse → sampling usually only every 4 weeks

SWIM:AI



Advantages:
Fast → timely, daily forecast
Freely available → open source

Our services

We can support you from the initial setup of the necessary dataset and data transfer protocols, and the collection and processing of water monitoring data right up to the full deployment and continuous operation of SWIM:AI as an early warning system for predicting water quality levels at your bathing water sites.

Service option 1: Setup and support

We set up and maintain SWIM:AI for you as an early warning system for predicting water quality at bathing sites.
This includes:

- Validation of the water data provided
- Adaptation (training, testing) of the early warning system to local site conditions
- Setup and local configuration of the early warning system including automated and secure data transmission using open standards (FIWARE smart data models)
- Support and maintenance of the model used for predicting water quality at bathing water sites
- Provide forecasts via open and/or secured (REST API) interfaces for easy integration into existing information systems
- Optional: Display bathing water information including water quality forecasts in an app or as a browser-based solution

Service option 2: Consulting

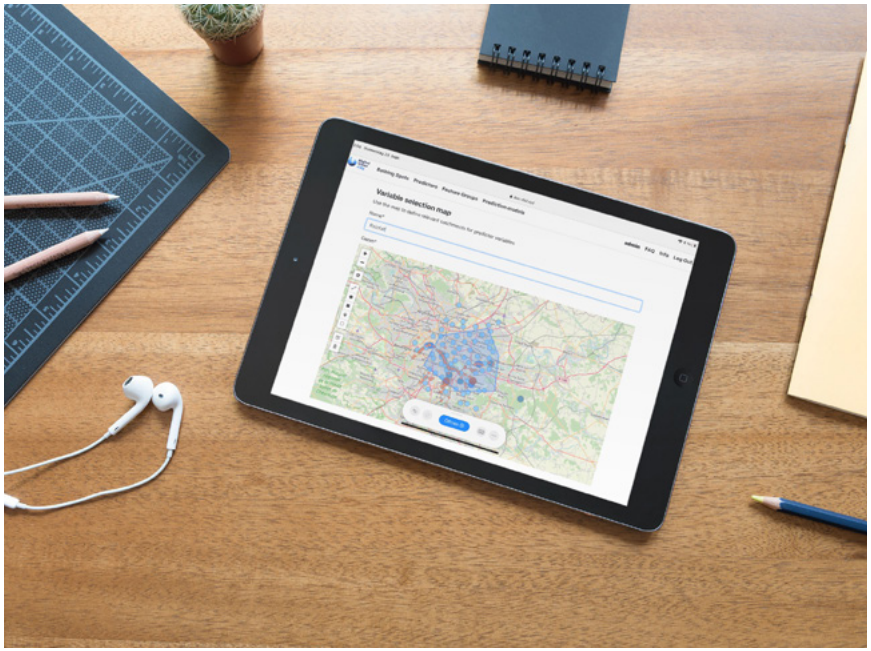
We can advise you on creating the necessary dataset for establishing an early warning system for bathing water quality.
This includes:

- Technical support of water monitoring during dry and rainy weather (sampling, laboratory analyses, online monitoring and documentation)
- Evaluation of monitoring data and support for reporting processes

A proven success

SWIM:AI was developed as part of a research project funded by the German Federal Ministry of Education and Research and has been deployed by the Berlin health authorities at selected bathing sites across the city since 2019. In summer 2019, the forecasting system was awarded the prestigious Berlin AQUA AWARD. As a result, SWIM:AI 2020 was expanded to additional bathing sites in Berlin. The Berlin health authorities are convinced of the reliability of the solution and its added value for ensuring hygienic water quality, and therefore plan to use SWIM:AI for the long term. Currently, the public is informed about the latest bathing water quality levels at selected bathing sites via the website www.badegewaesser-berlin.de.

Since 2020, the forecasting system has also been installed and further developed on the Seine River in Paris as part of the EU's digital-water. city project, led by the Kompetenzzentrum Wasser Berlin (KWB). It is being used to help secure water quality for the swimming competitions of the 2024 Olympic Games.



The SWIM:AI Interface

*W*ho *w*e are

KW*w*B is a non-profit research organisation specialising in applied research and innovation since 2001 and employing more than 35 people. *W*e proactively address the issues of the future related to climate change, *w*ater crises, digitisation, integrated energy and urbanisation by means of dedicated international research, practical solutions and innovative services.

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Kompetenzzentrum *W*asser Berlin gGmbH
Cicerostraße 24
10709 Berlin
www.kompetenz-*w*asser.de

Contact:
*W*olfgang Seis
*w*olfgang.seis@kompetenz-*w*asser.de
+49 (0) 30 - 53 653 - 807