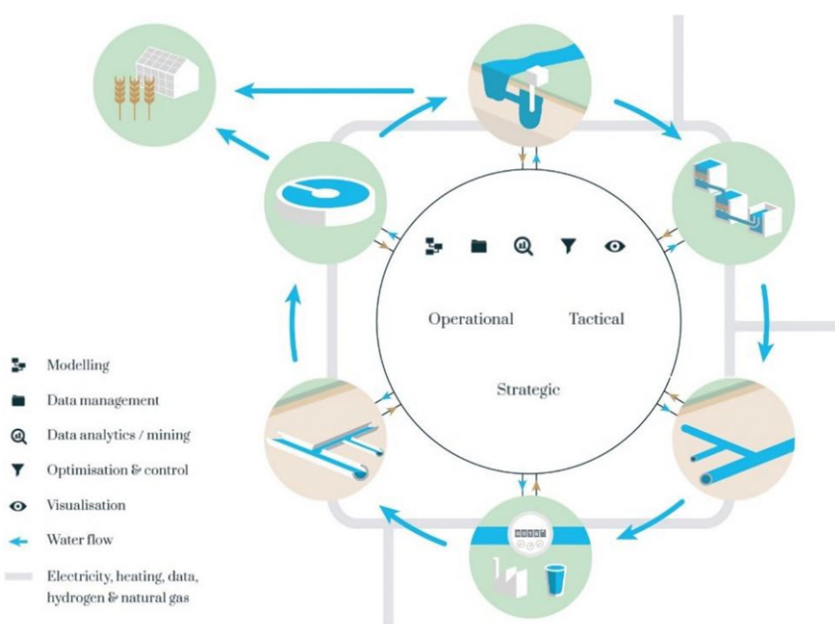


BTO Executive Summary

New vision provides framework to shape further development of hydroinformatics and smart water management

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With the advancing digitisation and interconnectedness of society at all levels, the handling of increasing quantities of data and the valorisation of information is becoming more and more important. Hydroinformatics and smart water management can contribute to making the water sector more future-proof. A vision has been developed of the digital water sector of the future, founded on an analysis of the current state-of-play and on technological trends. This vision identifies opportunities and risks, and is intended as a framework for further thinking and discussion, and to help define the agenda for research, development and implementation.



Schematic representation of the vision developed of the role of hydroinformatics (HI) and smart water management (SWM) in the water sector, which has several dimensions: the seven domains within the water sector (from source to wastewater treatment, and water use for food, energy and industry); five components of hydroinformatics and smart water management (modelling, data management, data analytics/mining, optimisation & control, and visualisation); and three levels at which they are deployed (operational, tactical and strategic).

Interest: addressing future challenges

With the advancing digitisation and interconnectedness of society at all levels, the handling of data and the valorisation of information is becoming increasingly important. It is expected that in the water sector, as in other industrial sectors, the use of data and the further digitisation will help the sector become future-proof and confront challenges, such as climate change, population growth, urbanisation and migration, chemicals of emerging concern in water, and ageing infrastructure. The handling of data and the valorisation of the information extracted, digital optimisation and control of systems, model-based decision-making and scenario generation have

already become indispensable in the water sector. The required information science, data science and digital technology are relatively recent additions to water sector operational management. Together, they constitute the new fields of hydroinformatics (HI) and smart water management (SWM): truly interdisciplinary fields, which integrate knowledge and methods from every water-related domain where data are collected and processed. The reliance of the Dutch and Flemish water utilities on HI and SWM is growing rapidly, while the fields themselves are still developing. To properly shape this development, a vision is needed to provide a framework for further collaborative thinking and discussion, and to help define the agenda for research, development and implementation.

Approach: current state in the water sector, technology and trends collected as basis for vision in 2030

For the development of this vision, the researchers combined their knowledge of HI and SWM with an overview of technological trends, and of questions and issues arising in the water sector. They sketched the current state-of-play in the fields of HI and SWM at KWR, in the Netherlands generally, and worldwide. On this basis, they formulated a vision of the role of HI and SWM in the water sector, particularly the Dutch and Flemish water sector, over the medium term (2030).

Result: opportunities for the water utilities

The vision developed identifies the opportunities open to the water sector to use HI and SWM, and the risks this will enable them to address. The vision described below is not set in stone, but offers a probable picture of future developments. Currently, information about the condition of (buried) assets and the quality of the water is only available for a small number of specific locations and points in time. An ideal environment would make available all the information required to make decisions, with full knowledge of the facts, about current and future issues, and to make predictions about the future condition and functioning of the system. In a future with advanced information services, qualitatively better decisions will be taken at operational, tactical and strategic levels, because HI

and SWM will eliminate many of the unknown parameters that might influence the outcome of a decision. This will result in better concept choices, better system designs and better operational management – ‘better’ here means: more effective, more efficient, more reliable or less costly. The stakeholders in the water cycle will therefore be better equipped to confront future challenges.

Implementation: defining the agenda for research, development and implementation

The vision can serve as a conceptual framework and a basis for discussion to help define the agenda for HI- and SWM-oriented research and development. The ultimate measure of the success of HI and SWM – namely, our ability to transpose scientific and information theory developments into practice for the benefit of the water sector and society in general – will be determined by the strength of four pillars:

1. a safe, integrated data infrastructure, connected to sensors and actuators, a solution for data management, and the availability of (software) tools or embedded software, including long-term support;
2. deployment of data scientists and hydroinformatics specialists, and support for knowledge transfer within and between water utilities and water organisations;
3. support for HI research and development, particularly where IT developments have not yet been converted into solutions for the water sector;
4. the conviction that smart water systems are capable of confronting the challenges of today and tomorrow.

Report

This research is described in the report *Hydroinformatics and Smart Water Management - Current State and Opportunities for the BTO Utilities* (BTO 2019.045).