

# A general SCADA Application for Water and Wastewater Treatment

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**The average Swede uses 140 liters of water every-day<sup>1</sup>. This combined with the usage in industry means that Swedish municipal water treatment plants produce approximately 900 billion liters of clean and safe drinking water every year. This does not include the fact that all water flowing to a treatment plant needs to be treated before being sent back out into the environment. These facts hint at what a huge scale these processes operate at. Furthermore, this needs to happen every hour of every day, 365 days a year. So how can these processes be monitored to ensure that everything works as intended and any problems are found and resolved as quickly as possible? With the help of a Supervisory Control And Data Acquisition (SCADA).**

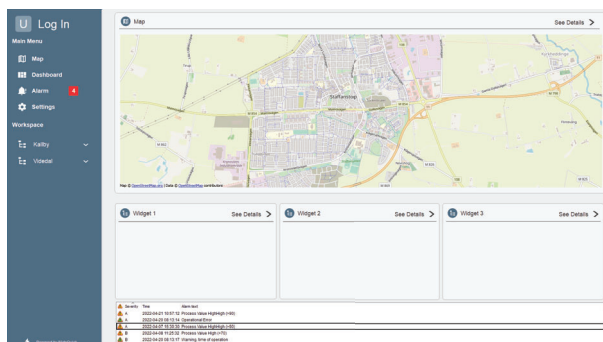


Figure 1: A visual representation of what a SCADA system can look like.

In simple terms a SCADA system is a computer software to supervise and manage a process. The software provides the user with real-time data and analytic tools to get an overview of a process to detect leaks, overflows and chemical imbalances as well as alerting operators of these unwanted behaviors in the process. It does this by collecting and storing process performance data such as flow rates, pH-levels, temperatures, oxygen concentrations and so on.

In this project the development of a general SCADA application for water and wastewater treatment was undertaken. In order to understand the needs of a

<sup>1</sup>Dricksvattenfakta, <https://www.svensktvatten.se/fakta-om-vatten/dricksvattenfakta/>, Accessed: 2022-05-12

SCADA system, interviews were conducted with people working in the water and wastewater industry. This was supplemented by the best practices from academics. The findings were compiled in to a list of requirements. The listed requirements were then used as a reference when creating a SCADA application. From the interviews it was understood that there are currently no strict standards in use in the water and wastewater industry concerning HMI (Human Machine Interface) and SCADA design.

An objective when creating the application was to design a SCADA solution that could quickly be commissioned with any water and wastewater treatment plant, regardless of the architecture of the process. A set of high performance HMI design principles were followed to ensure that the data gathered by the process becomes easy to overview and manage. In other words, transforming data into information.

To satisfy this objective a selection of main features were developed throughout the project. With smart objects, a navigation bar, an object library and object specific popups the end user of the application is granted with automatically generated graphical interfaces to assist with the control and supervision of the various processes throughout a treatment plant. Additionally, much of the configuration customers previously have had to deal with were automated allowing the system integrator to spend time of what really matters to them, the process.

Stemming from the fact that there are currently no standards in use in the industry concerning the design of SCADA applications, enabling maximum flexibility was essential. This includes the ability to change the color of pipes, designing custom objects as well as the ability to switch to a dark theme to reduce user fatigue in low-light environments.

The final application was demonstrated for people active in the water and wastewater industry and feedback was gathered. Using the feedback from these demonstrations an updated list of requirements was created to assist and give suggestions on further functionality to be added in the future.