



# Deliverable D2.5

Customized platform  
for Swedish Demo Case (First  
Version)



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Abstract of Deliverable	<p>Ground Truth 2.0 (GT2.0) aims to demonstrate that sustainable Citizen Observatories (COs) are possible. This is done using the innovative approach of combining the social dimensions of citizen observatories with enabling technologies, so that the implementation of the respective citizen observatories in six Demo Cases is tailored to their envisaged societal and economic benefits.</p> <p>This report presents the first version of the platform for the Swedish DC Citizen Observatory that was developed jointly with end users during co-design sessions.</p>

## Versions and Contribution History

Version	Date	Modified by	Modification details
v.01	25.01.18	Silvina Tejada Skoglund	Initial draft
v.02	26.01.18	Wim Clymans	Contributions & comments

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## List of abbreviations

CMS	Content Management System
CO	Citizen Observatory
DC	Demo Case
EW	Earthwatch Institute
FWW	FreshWater Watch
GT2.0	Ground truth 2.0
TTT	Train-the-trainer sessions
URTT	User Requirement Tracking Tool

## Executive Summary

Ground Truth 2.0 (GT2.0) aims to demonstrate that sustainable Citizen Observatories (CO) are possible. This is done using an innovative approach combining the social dimensions of citizen observers with enabling technologies so that the implementation of the respective citizen observatories is adapted to the social and economic benefits anticipated.

For each demonstration case, a technological architecture will be designed and set up.

**The Swedish Citizen Observatory** focus is on **water quality management in socio-economic systems** in the Mälarendalen region (includes Stockholm). The identified key challenge in this demo case, is the deteriorating water health due to current lifestyle choices and consumption patterns. It became clear during all sessions that, without a life-cycle perspective of what is going in and what is being taken out, we risk fixing one and starting many more problems. The citizen observatory, **and its platform**, have been baptised **VattenFokus** to emphasize its vision, and the urgency for the larger community to focus on water (sv. *Vatten*) issues and the role they can play.



# 1. Introduction

## 1.1 Background

The Ground Truth 2.0 project will deliver the demonstration and validation of six scaled-up citizen observatories in real, operational conditions, with four European and two African demonstration cases. It will demonstrate the technological feasibility, the sustained use and the societal and economic benefits of such citizen observatories. The ultimate objective is the global market uptake of the concept and enabling technologies.

One of the main objectives of WP2<sup>1</sup> is to enable adequate customization, deployment and upscaling of the required technical solutions in each demonstration case. Considering the different starting points and the differences in the cases' requirements, the aim is to set up a technological architecture in each case, taking into account both common modules as well as particular ones.

Within this frame, the Task T2.1, Technical design and integration of components per demonstration case, will settle the specific requirements of each demonstration case, based on the users' requirements made during the work carried out in Task T1.3, Functional design. The Task T2.1 is being developed with the purposes of: make the technical design of the Demo Case; develop standard integration between demonstration cases; and configure the technological platform in each demonstration case.

## 1.2 Purpose of the document

This document is one of the Task T2.1 outputs. It describes how, starting from the functional design of the Swedish Demo Case, going through the technical design and integration of IT components, the first version of the CO platform was developed.

## 1.3 Structure of the document

The present document is divided into 4 sections in order to give a comprehensive overview of the customized platforms of each Demo Case.

Section 1 presents an introduction to the document, giving details about the background, the purpose and the structure of the document.

Section 2 is a summary of the Functional Design for the platform. It describes the results of the planning carried out by the co-design group that participates in the DC. The co-design group, through co-design work sessions, defined and validated the Vision, Mission and Objectives of the Citizen Observatory, the customized Functional Design and the Technical Design.

Section 3 presents the platform architecture validated by the co-design groups of the DC, designed to satisfy the user requirements of the customized Functional Design, the selection of technological tools and the mock-up developed to obtain feedback from the co-design group.

Finally, Section 4 presents and describes the first version of the platform, created based on the customized Functional Design and the feedback from the co-design group.

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<sup>1</sup> Ground Truth 2.0 - Environmental knowledge discovery of human sensed data, D0.A extract FINAL for kick-off, 1.3.3. WT3 Work package descriptions

## 2. Summary of Functional Design for the platform of the Demo Case

During the co-design sessions, different activities were carried out to identify the challenge of the Demo Case Citizen Observatory and to define the Mission, Vision and Objectives. Then, the functional design for accomplishing these was developed.

### 2.1 Mission, Vision and Objectives of the Citizen Observatory.

The members of the co-design group defined first and validated later the Vision, Mission and Objectives of the Citizen Observatory. These are:

**Vision:** The Swedish Citizen Observatory envisions a society where government, business, citizens, researchers and civil society organisations collaborate to be active stewards of a sustainable environment.

**Mission:** For that, its mission is to support all stakeholders to collaborate in the governance and action of the aquatic ecosystems by collecting data, sharing knowledge, and making data accessible that complement established governmental initiatives.

**Objectives:** Five objectives were identified to make this vision and mission possible. These are:

1. To group the community by watershed and get citizen inputs (observations, data, from for instance Water Blitz) on the water health of Mälardalen Region and get these inputs verified by expert groups in 2017.
2. To include existing water data platforms in order to make those more visible and accessible and by so doing generating incentives to innovate with data in 2018.
3. To provide visualisation on the existing data platforms and the new data to make the gathered data more accessible in 2018
4. To initiate discussions / help finding a physical space for citizen to discuss, plan and engage in actions toward the open monitoring and stewardship of water quality and causes of stress visualized in the CO - in 2019.
5. Added objective: To raise awareness of water quality issues and how lifestyle choices impact upon the aquatic environment.

The vision, mission and objectives are summarised in Figure 1 below.



We ENVISION a society where government, business, citizens, researchers and civil society organisations collaborate to be active stewards of a sustainable environment.

The VISION of our citizen observatory is to support all stakeholders to collaborate in the governance and action of the aquatic ecosystems by collecting data, sharing knowledge, making data accessible that complements established governmental initiatives.

1. To group the community by watershed and get citizen inputs (observations, data, from for instance WaterBlitz) on the water health of the Mälardalen region and get verified these inputs by expert groups in 2017.

2. To include existing water data platforms in order to make those more visible and accessible and by so doing generating incentives to innovate with data in 2018

3. To provide visualization on the existing data platforms and the new data to make the gathered data more accessible in 2018

4. Helping to count on a physical space for citizen to discuss, plan and engage in actions toward the open monitoring and stewardship of water quality and causes of stress visualized in the CO- in 2019.

5. To raise awareness of water quality issues and how lifestyle choices impact upon the aquatic environment.

Figure 1 Vision, mission and objectives of the Swedish CO

## 2.2 Functional Design

In GT2.0, functional design is defined as a method to translate the stakeholders' requirements into design features (see D1.5 Functional design of the citizen observatories). A generic "Story Map"<sup>2</sup> was proposed to guide the development of a customized story map for each DC. It was also proposed that the user requirements are stored in a "User Requirement Tracking Tool" (URTT)<sup>3</sup> to allow for easy tracking of their status and to identify the corresponding layer in the platform architecture.

Departing from the generic Story Map as a reference point, the co-design group developed their own Story Map (Figure 2) from the perspective of the future users of the Citizen Observatory, citizens, scientists and policy makers. The customized and validated entries in the URTT form the basis for the deployment of the platform architecture of the Citizen Observatory.

The Swedish Citizen Observatory will support two lines of activity:

- Environmental Stewardship
- Cooperative Planning

<sup>2</sup> The generic Story Map is fully described in Ground Truth 2.0 "Deliverable D1.5, Functional design of the citizen observatories".



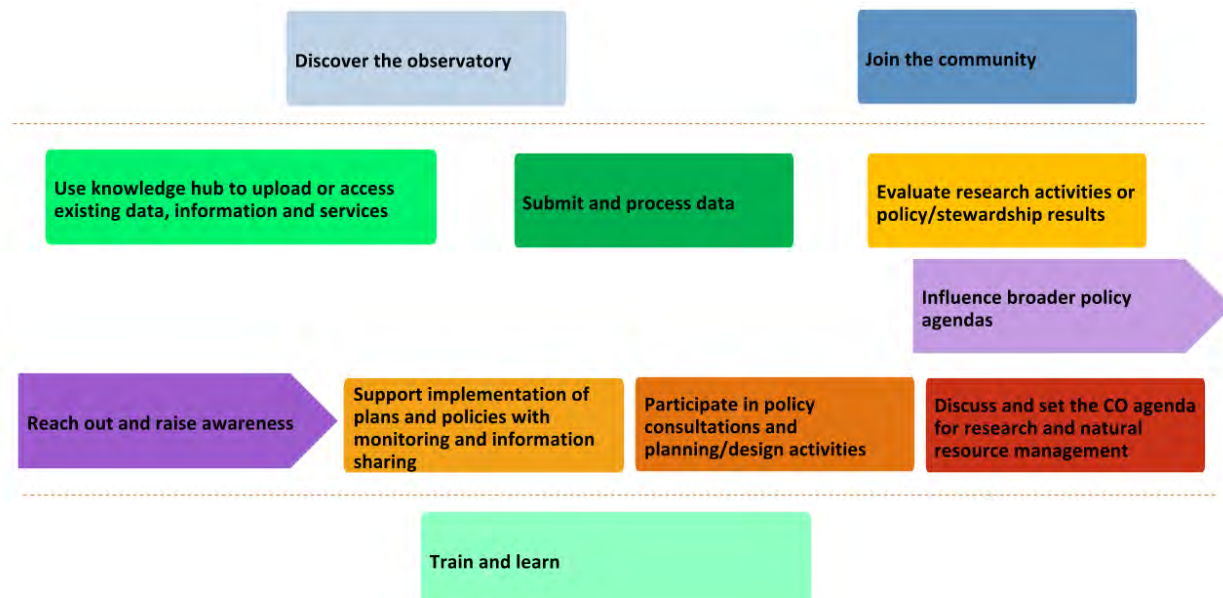


Figure 2 Story map Swedish demo case VattenFokus

We have identified the technical features that needs to support the story lines and URTT in a first step.

### ENVIRONMENTAL STEWARDSHIP (ES)

A **collaborative platform** for sharing and creating data on causes/drivers of stress for water health. To achieve environmental stewardship on water health, the **following functions** are included in the platform (*URTT is given between brackets, and corresponds with the final technical design – graph 'Technical integration of components'*):

1. **Repository** that offers visualization and eases access and sharing of new and existing data and information (*URTT: Use knowledge hub to upload or access existing data, information and services*).
2. **Data collection tool** (Web and app): Enable citizens to a) **submit and process data** for monitoring water quality, and b) **share their perceptions** to gain insights into water quality and water management (*URTT: Submit and process data*).
3. **Online and F2F evaluation: Facilitating joint discussion and analysis of results**, and review & feedback of campaigns (*URTT: Evaluate research activities or policy/stewardship results*).
4. **Promotion** all activities to a larger audience beyond the CO community to a) raise awareness on water health issues, b) attract interest in the CO and c) promote environmental friendly practices in the Mälaren area.

### COOPERATIVE PLANNING (CP)

Besides the platform, the observatory aims **to support the implementation of plans and policies** regarding water health issues through monitoring and information sharing. For this, citizens aim to gain a better understanding of current policies in order to influence policy making. Following **functions** are foreseen:

5. **Interactive policy page on website:** A) Facilitate **evaluation** current **regulations** and preparing **policy drafts** based on results of joint analysis (for policy stakeholders) – B) Citizen observatory a



first step towards **collaborative governance** in action (for citizens) (*URTT: Support implementation of plans and policies with monitoring and information sharing*).

6. **Online and F2F consultation:** Enable citizens **to understand and influence policy makers** about sustainable water management from a life cycle perspective (*URTT: Participate in policy consultations and planning/design activities*).
7. **Proposal and feedback form:** Allow CO community to help set the agenda/objectives of the CO (to be assessed) (*URTT: Discuss and set the CO agenda*)
8. **Promotion** to specifically non-participating decision makers (*URTT: Influence broader policy agendas*).

TRAIN and LEARN - CO needs to assist citizens to:

- interpret data (see EW guidelines and TTT sessions, Akvo to create easily interpretable reports and tools for data aggregation, in addition the platform requires pages describing basic methodology)
- train to and develop practices to achieve healthier water ecosystems (see webpage describing management but also life cycle perspective – only in later stages specific projects can be used to provide such training or even develop practices – e.g. Ecovillage)

In order to explain which technological tools were selected to meet the user requirements (included in WP1) in the first version of the VattenFokus platform, an overview of these tools and its specifications are added below in the following sub-sections.

## 2.2.1 Tools for the development of the platform

### WordPress: VattenFokus website

The web framework for this demo case's platform has been set up using WordPress, and uses a responsive web design.

WordPress is a CMS (Content Management System) focused on the creation of any type of webpage. Originally it reached a great level of popularity in the creation of blogs, to become one of the most user-friendly tools to create commercial web pages. It is developed in PHP for environments running MySQL and Apache, under the GPL licence and it is open source.

A series of WordPress plugins are used to lay-out web pages, to set-up contact forms, to include a calendar, to make backups, social sharing and feature the Twitter account on the main page. These support the defined user stories.

To operate, the WordPress site is hosted by Siteground (incl. excellent support, high speed and good security) which uses SingleHop as data centre. The site is technically administered by Akvo.

The home page of the website is shown in Figure 3.



Figure 3 Overview of the home page

## 2.2.2 Data Collection and data aggregation

This sub-section details how field observations and measurements are linked to online databases and feedback systems, including the specialized hardware and mobile devices used in the Swedish citizen observatory. The presented tools collect explicit (direct measurements) and implicit (tweets/news feed scraping) observations.

### FreshWater Watch: Web and Mobile Application

A key element of the Swedish observatory is to provide citizens with a tool to measure the water quality in their local water body to identify pollution sources, evaluate the impact of changes to local management practices, or simply evaluate the health of the water body in which they swim, kayak or fish. From a regulatory point, consistent monitoring of water quality adds to the existing network of monitoring stations in Sweden. From a scientific point of view the measurement set-up (parameters and sampling scheme) should be able to complement academic studies that try to fill knowledge gaps.

The FreshWater Watch application allows citizens to measure and record the quality of water bodies, and has previously been successfully adapted and tailored to user requirements.

FreshWater Watch integrates a field kit (Figure 4) to conduct measurements with a web (Figure 5; using a datasheet, Figure 6b) and mobile (Figure 6a) application to record and submit data (incl. geolocation, picture of site, and environmental parameters).

#### Field kit (PackTest by Kyoritsu):

The Field kit includes methods for determining nutrient pollution (nitrate and phosphate), particulate (sediment) concentrations and algal blooms. A sample is taken manually (with the aid of sensors), and analysed in situ using testing kits (water quality) provided by the CO partners, or local leaders (engaged citizens/stakeholders). Samples are collected from water coming from lakes, groundwater, rivers, former wells, and other types of freshwater bodies.





Figure 4 FreshWater Watch kit that includes method for determining nutrient pollution (nitrate and phosphate), particulate (sediment) concentrations and algal blooms

**Web and mobile application:**

FreshWater Watch webpage uses Drupal as CMS (<https://www.drupal.org/>), which is an open source system to build and flexibly manage websites and databases. The collected data is stored centrally using Rackspace.

The mobile application is iOS and Android compatible. Via the phone app (or online using Google maps) the GPS and sample time info is collected (incorporated in the App). Besides the results of the field kit, citizen scientists collect information about the surroundings (land use/cover, water colour and the presence of litter, algae or other remarkable features) in a survey which are supported by pictures. In case of remote locations (no connection), data entry can be uploaded or edited using the online platform. Participants who are not technical skilled/versed can use hard copy datasheets to write down the data, and information can be entered at home (Figure 6b).

## COMMUNITY GROUP PAGE – Mälaren or Flen Eko Village

Vänligen välj en grupp nedan (alla uppgifter du laddar upp kopplas till den här gruppen)

Vakt:  
Flen Eco Village  
Se hemsida

Flen Vatten Blitz  
Se hemsida

### Mina nästa steg

**Ansvarsfriskrivning**  
Skriv under friskrivningen innan du börjar.

**Så här guidar du**  
Läs vår korta guide för att komma igång.

**Forskningsprovet**  
Titta på vår träningsvideo och gör forskningsprovet.

**Freshwater Quiz**  
Gör provet för att testa din kännedom om sötvatten.

**Vattenavtryckskalkylator 10 poäng**  
Beräkna ditt personliga vattenavtryck. Resultatet sparas under Mitt Innehåll.

**Gör en presentation**  
Håll ett tal för dina kollegor eller vänner och rapportera det här.

**Nivå: Nybörjare**  
200 Poäng till nästa nivå

**Engagemang**

Kommunikation  
Vetenskap  
Färdigheter

Figure 5 FreshWater Watch webpage where registered users can upload records, receive online training, participate in a quiz and update their user profile

SKAPA EN REGISTER

Allmän information

Provplats  
Orrhammaren

Geolokation (Latitud, Longitud)  
(51.777061864, -1.264698220)

Sluta

Prov datum/tid  
10. Nov 2017

Bild

Save Upload

FreshWaterWatch

FreshWater Watch Datablad

Namn \_\_\_\_\_ Datum \_\_\_\_\_ Tid \_\_\_\_\_

Provplats \_\_\_\_\_

Anteckna namnet på din vattensamling. Om den inte har ett namn än, ge den ett namn själv som du använder varje gång du återvänder.

Adress eller Latitud/Longitud \_\_\_\_\_

Ta ett foto

Försök att inkludera vattennivån, den omgivande vegetationen och eventuella föroreningar eller tecken på markanvändning. Om du tar en bild av en rörlig vattenkropp, se till att du ser uppströms så att man kan se vilken miljö det vattnet du testat kommer ifrån.

Figure 6 a) FreshWater Watch mobile application and b) Freshwater Watch datasheet to submit records to the VattenFokus general and specific community group database



## Akvo Lumen

Akvo Lumen™ is a new data transformation, analysis, and visualisation tool designed for and by international development professionals. It lets people unlock the stories in their data - even if they are not data specialists. It supports the VattenFokus platform as the data visualisation and aggregation tool. Akvo Lumen accesses the FWW database, and creates easy interpretable graphs and interactive maps showcasing the results of events or long-term measurement campaigns (Figure 7). Akvo Lumen is a flexible system that allows for the integration of a range of different datasets. The data flow between FWW, Akvo Lumen and the web platform will be optimized so data collected will be automatically updated on the result page.

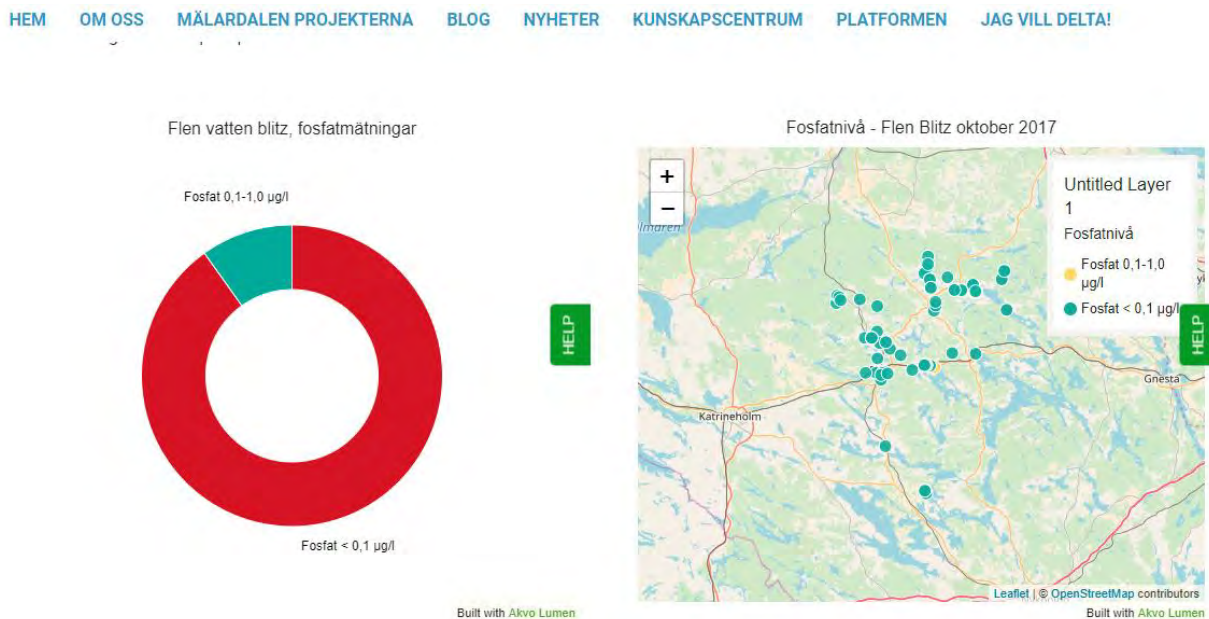


Figure 7 Result page on VattenFokus webpage of a single day water sampling event in Sweden (built with Akvo Lumen)

## Gavagai Monitor

Gavagai Monitor (Figure 8) collects all open online data. It not only reads all the information, but also creates executive summaries for you giving you instant insights in what is going on. A monitor has been initiated to track online media for water quality and related issues for Sweden and VattenFokus. Tracking is focusing on media writing in Swedish and located in the larger Stockholm area, including Twitter.

This monitor is being integrated into the VattenFokus web platform. It offers dynamic content to the website and easy link to the on-going debate in Sweden related to water quality and life cycle issues. The specific tracker for each topic uses key words for filtering the wealth of online content.

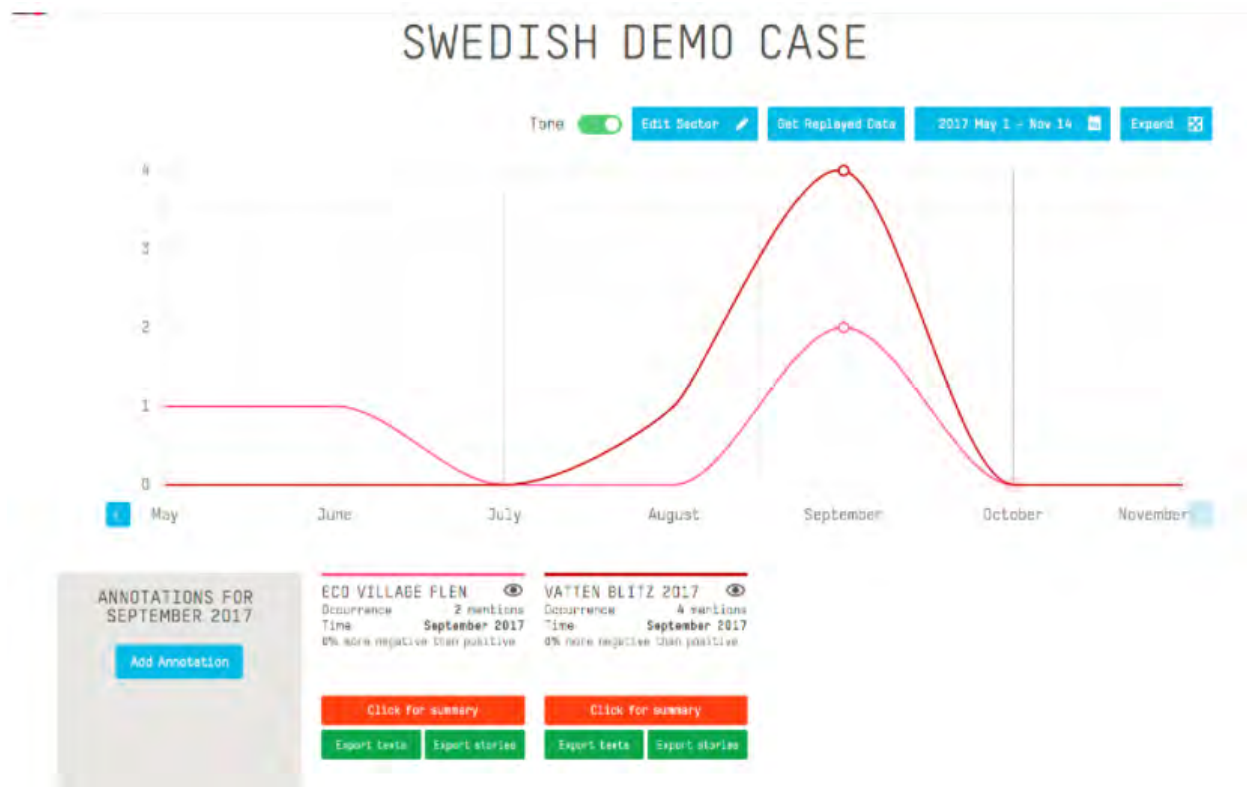


Figure 8 Gavagai monitor for VattenFokus, tracking and analysing water quality related issues in the Swedish context

### 2.2.3 Monitoring and assurance of the technical performance of the platform

For monitoring the website usage Google Analytics will be used. Technical performance of the FWW application will be monitored by the EW IT team using the Drupal performance & reporting modules. These allow for tracking error messages and server performance (speed). In addition, EW will use google analytics to monitor numbers of registered users, collected data points and levels of engagement (frequency of sampling) of VattenFokus members.

### 2.2.4 Standardization of data management

Data collection is to be done through FWW tools. FWW website, mobile app and platform allow for:

- standard water quality data collection
- management and integration of various specific participant groups within the CO

Users use the mobile app to upload information; they can alternatively use the FWW platform in case the observation site lacks connection to Internet. Collected data are further processed using scripts (non-automated) to filter, aggregate and average the raw data to a qualitative set of georeferenced data. The FWW database of CO data will serve as the main database for further links to Akvo and TYGRON tools. Once data is collected, it is fed into Akvo Lumen interface which provides reports (maps, graphs) to be uploaded on the VattenFokus website and FWW user interface. All reports will be published using our website as well as other options (GEOSS etc.).



## 2.2.5 Enhanced services

### **Tygron Engine**

Use of visualization and graphical modelling will be done through the Tygron Engine, which is a stand-alone tool for collaborative planning through serious gaming. The tool allows to build a 3D environment for the demo case, where users can take measures, see effects, interact with each other and learn from a serious game how different stakeholder's views impact the policy process.

The engine is based on online multi user technology. Multi user impact sessions allow users to interact with other individuals, whether in partnership, competition or rivalry and provide them with not only data but also social communication.

## 3. Platform technical design and integration of components of the Citizen Observatory

### 3.1 Platform architecture and selection of technological tools to use

This section explains the integration model: a description of how all the technical components are joined to address the functional needs. Thus, based on the user requirements collected in the functional design, and bearing in mind the different functionalities provided by each tool, the Demo Case has set up the list of tools and functionalities to be integrated or linked to the web platform. These will be represented from two different perspectives: the technical point of view (based on the technical architecture) and the navigation flow (based on the story lines).

#### **Platform architecture**

In Figure 9, the different components are interconnected and arranged over the technical global architecture. It highlights the role of the platform (section 2.2.1), various data collection and aggregation tools (section 2.2.2) and enhanced services (section 2.2.5). It needs to be pointed out that there is an overlap between FreshWater Watch (data validation and QA) and Akvo Lumen (aggregation and visualization) in terms of data processing. This is due to advanced integration of both tools. The enhanced services will only be fully implemented in the second phase of the citizen observatory.



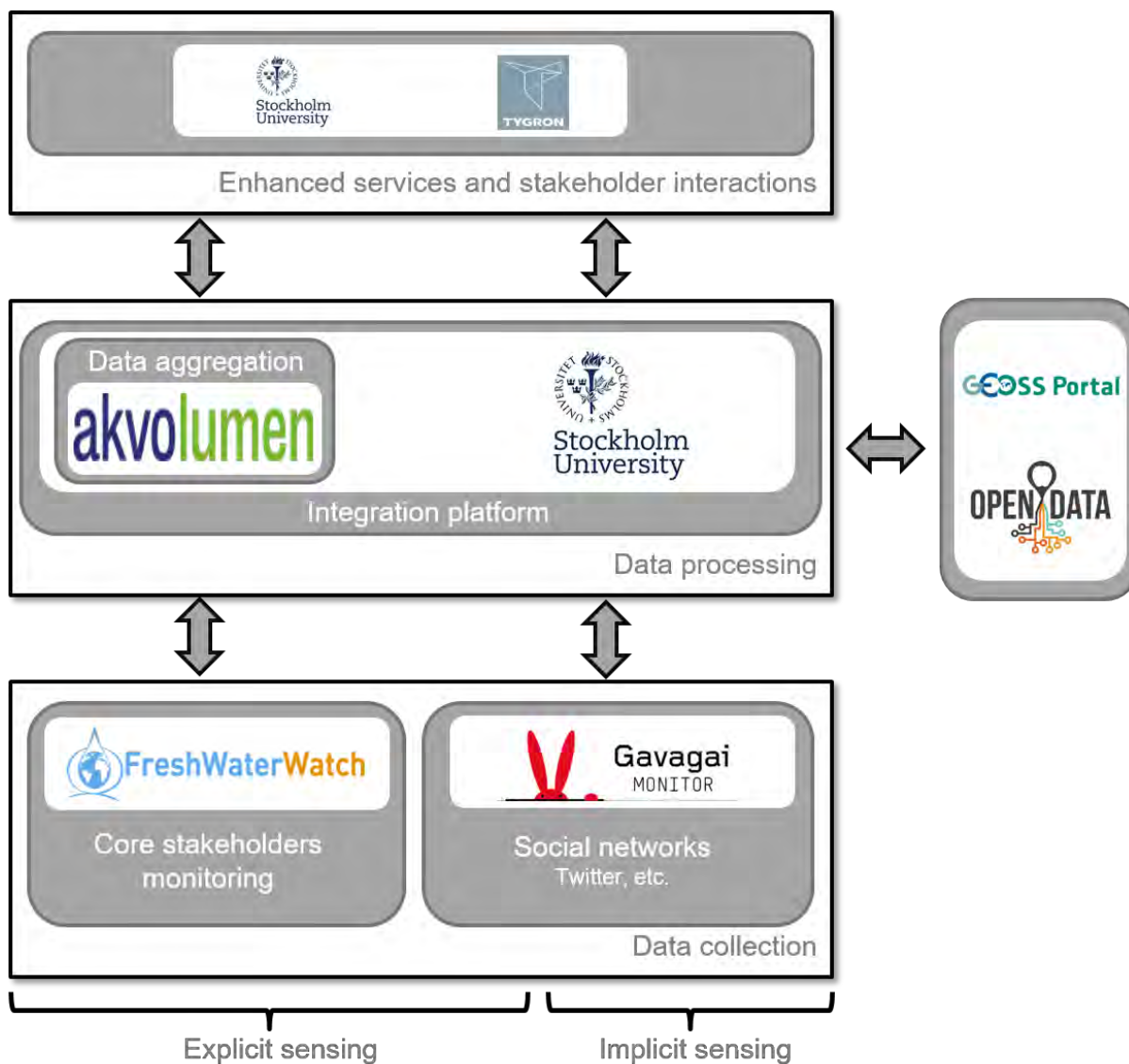


Figure 9 Architecture of the VattenFokus platform (initial version), where FreshWater Watch (data validation and QA) and Akvo (aggregation and visualization) overlap in terms of data processing

### Navigation flow

In the navigation flow, the different technical components are organized according to the story line defined in the case.



## Technical design of Vattenfokus citizen observatory

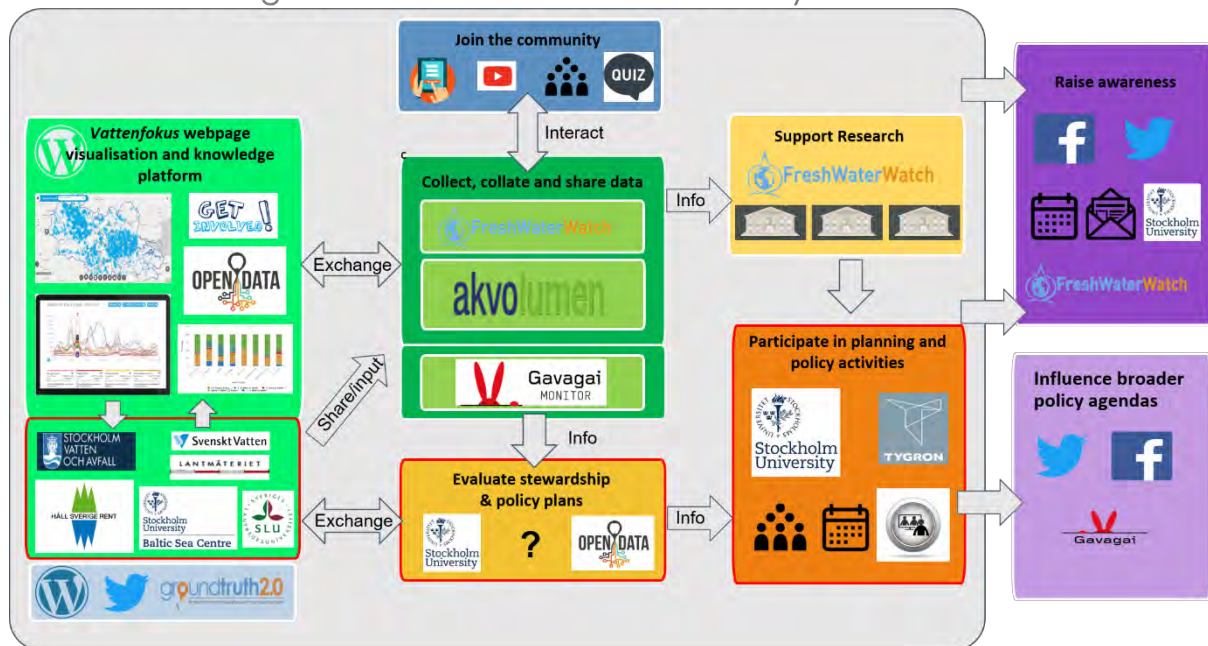


Figure 10 Technical design of the Swedish Demo Case platform showing the integration of the technical tools in the functional design, and how they support the identified story lines

We will run through the various compartments and highlight a) the technical features/requirements linked to the selected tool, b) connections with other compartments, and c) relationship to user stories (Figure 10).

### 1. VattenFokus webpage visualisation and knowledge platform (Figure 11)

The initial place of entry will be the CO website (**VattenFokus, WordPress**), which in essence is a visualisation and knowledge hub. The technical features and content of the website are in line with the requests from the user stories of our citizens, environmental experts, governmental employees, etc. A place to learn (e.g. citizens), create awareness (e.g. partner SLU, Stockholm's Vatten och Avfall, Svenskt Vatten and the communities involved in the CO) share and collect data (citizens from various communities). So, it is an entry point for both the Environmental Stewardship and Cooperative planning line.



Figure 11 VattenFokus webpage visualisation and knowledge platform

The main structural elements of the webpage (designed by **Akvo**) are accessible for registered and non-registered users:

- About Us (Description CO, Project description citizen science projects, pledges and description of partners, Contact)
- VattenFokus Projects (Description of existing community group)
- **Newsfeed** (information provided partners, and collected by Gavagai), Gavagai monitor to track sentiment to water health and **calendar** of events to showcase CO (example announcement Blitz) and recruit for on-and offline planning discussions, and **blogs** provided by participants.
- *Knowledge hub* page:
  - Information on water quality parameters
  - Causes and drivers of stresses for water health, and the role/opportunities of personal decisions to reduce one’s impact in a Swedish context (under development)
  - Results: Showcasing an overall data map of the citizen science data and external data (provided by **Akvo Lumen**)
- Description of the platforms and technical tools used within the CO
- Get Involved! (Through CONTACT FORMS that end up with administrator/responsible)
  - Share data or information
  - Participate in monitoring campaign
  - Set-up a community/research project
  - Participate in planning group

*Connections between the core-stakeholders* (e.g. Läntmateriet, Svenskt Vatten, etc.) are indicative of basic information about the partners, links to important scientific and policy documents, and integration of data (second stage) etc.



*Connections with other compartments:*

a) VattenFokus platform -> collect and share data through:

\*GET INVOLVED as citizen scientist (Remark: Data will be returned to the VattenFokus platform.)

\*GET INVOLVED send/share data to platform by core and new stakeholders

b) VattenFokus platform -> Evaluate stewardship and policy plans: The core-stakeholders and Stockholm University combine efforts to look for opportunities to evaluate stewardship programs (impact on how resources are used) and policy plans. Such evaluation is supported by the openly available data from the Collect, collate and share data platform.

## 2. Join the community (Figure 12)

For those users who want to participate as a data collector there is the option to register and join the community as a) citizen scientist, b) local administrator, c) project coordinator, d) core stakeholders (scientists, water authorities, politicians). The **FWW platform** allows for all types of interactions/memberships/engagement, and the CO needs all types of engaged citizens to establish a sustainable CO.

The connection is obviously with the “collect and share data” compartment. In return, a community group is established that allows for interactions with fellow participants (blog posts and forum). Training is provided through videos, quiz and train-the-trainer level, and gamification is present within the platform. Critical is the direct feedback on the water quality of the taken sample (see next compartment). Again, this fits the purpose of users to become part of a community, and to be able to learn while collecting valuable data.



Figure 12 Join the community

## 3. Collect, collate and share data (Figure 13)

This includes the **data collection tool**, which is the **Freshwater Watch** (Web and app tool; explicit), and **Gavagai monitor tool** (implicit):

- Enable citizens to **submit and process data** for monitoring water quality (mobile application and
- **Share their perceptions** to gain insights into water quality and water management

And supported by the data aggregation platform **Akvo Lumen**. Data will be uploaded by participants of the CO to FWW and aggregated in Akvo Lumen. Further data can be loaded into Akvo Lumen from other data sources and shared on the VattenFokus website.

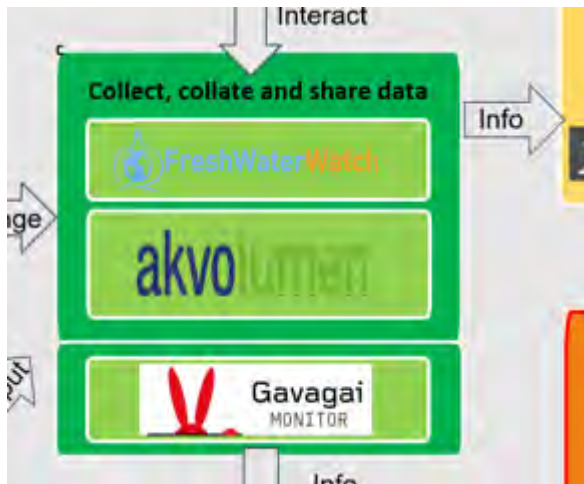


Figure 13 Collect, collate and share data

The data collection and sharing tools lay at the heart of the user story requirements. Two links have been described earlier: 1) with the knowledge hub and 2) with the joined-up community.

Thirdly, depending on the set-up groups and user communities it will support research either by:

- providing open data that can be used in scientific studies on water quality and related issues in the Mälardalen area.
- a possibility to set-up a citizen science project with the CO (see GET INVOLVED options) that supports new research (e.g. a project that includes additional parameters, and which can recruit through the Citizen Observatory network).

Similarly, the fourth connection is the information that is gathered by citizen scientists with the use of the platform, and disseminated through Akvo Lumen on the VattenFokus platform. This information can be used to evaluate stewardship and policy plans by third parties. An example, based on the stakeholder interactions, would be a local politician that together with a water management company has implemented a water management strategy, and wants to evaluate its effectiveness by using the citizen science data collected within the CO, because it exceeds the traditional statutory monitoring organised by the Swedish environmental agency.

#### 4. Support Research (Figure 14)

There are no technical features except providing the opportunity to set-up a research project (dynamic) through the Freshwater Watch app that answers a specific question in collaboration with stakeholders (e.g. young academics who want to involve citizens; or environmental agencies with a strong research focus). Of course they always have the ability to use the open data, and profit from Akvo Lumen aggregation efforts. It links with the user stories that want to benefit from alternative data sources.





Figure 14 Support research

It also links with participating in planning and policy activities as it provides the scientific background required to design planning efforts, and will allow researchers to sit around the table (on and offline) with policy-makers. There is also a possibility to together with other engaged stakeholders and SU further develop the citizen observatory and set the agenda (REMARK: a URTT not taken up in the final technical design).

#### 5. Evaluate stewardship and policy plans (Figure 15)

There are no explicit technical features included to support this step but we expect the VattenFokus calendar, blog and Knowledge hub (WordPress) to share resources to fulfil minimum requirements. Other opportunities will be developed through intense collaboration between the various stakeholders within the CO, and this with the support of SU as a mediator (e.g. check opportunities). *Example: Allow CO participants to provide feedback on policy plans by creating a feedback scheme, and share it through the CO website.*

On the short-term: They are provided with the options to use the citizen science data collected, and even set-up specific programs (with FWW – see set-up groups within observatory)/reporting tool (with Akvo Lumen – see possibility to tailor reporting to user requests) to evaluate outcomes of engaging the public in managing water, or policy plans. There is a linkage with the users request to ‘facilitate the collection of data within water management by citizens, so that it can actually be used by authorities and policy makers and in the end create better water quality’.



Figure 15 Evaluate stewardship and policy plans

The evaluation feeds into a broader possibility to organise participatory events for citizens and users where they can interact (see compartment number six) – this will be further developed in the next version of the platform.

#### 6. Participate in planning and policy activities.

There are two ways that such opportunities are provided:

- Intensive scenario building sessions with policy-makers and using the **Tygron engine** (long-term)
- Rolling calendar that advertises on and offline sessions to discuss in local and regional planning activities.

This opens opportunities for both citizens and our more engaged stakeholders to not only interact with each other but also set the CO agenda. This support the various user stories that either wanted to understand (see also Knowledge hub) and influence policy, but also share their knowledge with policy makers. And vice versa to create awareness among citizens about policy plans/activities.

1 to 6 form together the technical platform from which the outcomes are to:

### 7. Raise awareness (Figure 16)

The CO aim is to raise awareness about the **deteriorating water health** due to current **lifestyle choices and consumption patterns**, and about the ways government, business, citizen, researchers and civil society organisations can collaborate to be **active stewards** of a sustainable environment.

The visibility of CO will be promoted by using existing social media channels, advertising the existence of the platform on various events, by promotion in newspapers and other media streams. This will be supported by the **Gavagai monitor** to pinpoint sensitive moments to reach out to non-participating decision-makers.

The content provided by partners for the website needs to consolidate the impact of the awareness raising. Participation in achieving this aim by engaged volunteers and stakeholder will be supported through the online calendar for the promotion of events, and share the outcomes of for example their management practices in newsletters and blogs (e.g. Eco-village; Blitz reports). This was after the collection of data user priority number 1, and therefore it is supported by the whole CO rather than an entrance levels as reflected in the Functional Design.



Figure 16 Raise awareness

### 8. Influence broader policy agenda (Figure 17)

A specific part of the raise awareness is to advertise the outcomes in social and other media streams to influence broader policy agenda. By timing the release of data reports, and making advertisement for them, with sensitive moments (e.g. announcement of new water management plans). This will again be supported by **Gavagai**.



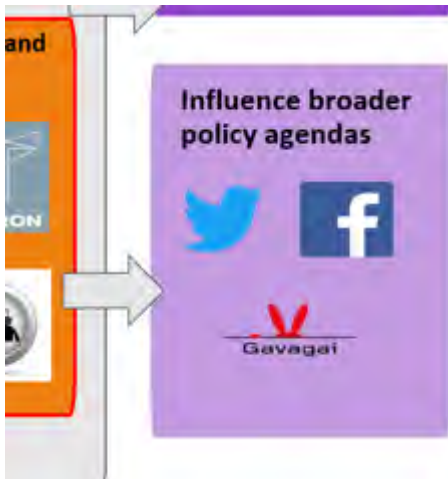


Figure 17 Influence broader policy agendas

### 3.2 Mock-up and feedback

This section summarises the mock-up session set-up and details the feedback obtained during the mock-up session, including the main tasks for the development of the first version of the platform.

#### Set-up Mock Up session

During the Mock-up session the concept of the CO platform (webpage) with the integration of Akvo Lumen visualisation tools, and the Gavagai monitor was introduced and discussed in a plenary session with all CO co-design group members present, followed by a break-up in groups visiting two stations. One station allowed the participants to test the various technical features of the FreshWater Watch tool selected for data collection and submission: including registration, uploading records, data querying, feedback, setting up user profiles, following training. A second station introduced the power of the Tygron Engine by exploring management and policy scenarios 3D simulations related to water issues. Each station collected the tool specific feedback from all participants. The sessions ended with a general discussion, and feedback session on the VattenFokus project.

#### Feedback obtained during the mock-up session:

The main feedbacks received during the prototypes evaluation period with the co-design groups, and responses by the DC team are summarized as follows:

- The structure and proposed content on the website was received well by the co-design group. The geographical focus of the platform (Mälardalen) was considered to be too limited, as their might be an interest across Sweden. The technical tools used, and design has been structured to allow scaling-up of the platform.
- Users' technical abilities, knowledge and competence in water related issues (e.g. limnologist) and therefore requested consideration/increased attention in terms of developing accessible technical tools (registration, alternative to mobile application, language) but also web design (intuitive). A range of alternative recording tools have been developed, and interactions with the FWW tool / platform are simplified (in structure and language) to accommodate a divers user community. Likewise, the navigation flow of the webpage has been adapted.



- The 3D engine by Tygron was received as an interesting enhanced service with the CO, but a clear integration pathway requested by the co-design group. In a next phase, a series of workshop and pilot session using VattenFokus data will be held to explore integration pathways and set-up interactive sessions.
- A name was lacking at the start of the session – VattenFokus was selected by the co-design group.

The next table (Table 1) lists the tasks to be done, the tools that will be used for the development of the task and who will be the responsible for it.

Table 1 Necessary tasks to develop the first version of the CO from the mock-up

Task	Tools	Responsible
Coordination, redaction and revision of content (texts and figures/ language) of VattenFokus website pages. Validation of contents with stakeholders.	WordPress	SU
Website development (technical aspects)	WordPress	Akvo
FWW app updates (language and simplification registration and user interface, respond to bugs)	FWW tool	EarthWatch
Tygron integration in CO	Tygron Engine	Tygron and Stockholm University (SU)
Improve linkage between FWW database, and Akvo Lumen visualization tool, and vice versa.	Akvo Lumen - FWW	EarthWatch & Akvo
Design and integration of data visualization tools, on VattenFokus website	WordPress - Akvo Lumen	Akvo
Link-up of Gavagai Monitor and FWW log in to VattenFokus website	WordPress - Gavagai	Akvo – SU - Gavagai
Server services (data storage in EarthWatch)	EW Server	EarthWatch
Design of CO logo. Design of web style page for VattenFokus. Validation of both designs with stakeholders.	WordPress	SU - Akvo - Gavagai



## 4 Presentation and description of contents of the Citizen Observatory platform (First version)

The first version of the VattenFokus platform is still under development, and will be launched on the worldwide web together with the launch of the citizen observatory in the Winter of 2018: <http://vattenfokus.akvotest.org>

All information on the website will be available in Swedish. An overview of the different pages on the platform was in section 3.1. The logo of the citizen observatory is styled similar to GT2.0's logo and used on all pages (Figure 18).



Figure 18 VattenFokus logo

Following from left to right, we can see the 'menu' of functionalities that are available in the first version of the platform. The following screen shots yield an overview of the pages:

**About us:** Short introduction to all partners, the GT project, the CO's mission, vision and objectives, and a contact form (Figure 19).



Figure 19 About us section

**Mälardalen project:** Description of WaterBlitz activities and community groups (Figure 20).



Figure 20 Mälardalen project section

**Blog:** Shows blogs written about the CO (Figure 21).



Figure 21 Blog section

**News & Calendar:** Presentation of upcoming activities and other communications (Figure 22).



Figure 22 News and Calendar section

**Knowledge hub:** The section includes baseline information about water quality indicators and its parameters (including water quality, chemical, ecological, optical, hydrological). In addition, it presents reports about results, causes and drivers of water pollution (Figure 23).



The Ground Truth 2.0 project has received funding from the European Union's Horizon 2020 Research and Innovation Program under grant agreement No. 689744. [www.gt20.eu](http://www.gt20.eu)



Figure 23 Knowledge hub section

**Platform:** The section presents the different tools used for the purposes of the citizen observatory (Figure 24).



Figure 24 Platform section

**I want to be a part of:** Allows the registration of new users. The form collects the person’s name, email and preferences so that the CO’s administrators contact him/her. The data is stored in our database run by the [Akvo Foundation](#), as well as emailed to the responsible person at [EGovLab](#). The form data may also be shared with [FreshWaterWatch](#) only if required to provide a service to you (register new users).

**Footer:** Overview of demo case partners, funding from EU H2020, project coordinator (Figure 25).



Figure 25 Footer

**Integral view of VattenFokus (Figure 26).**

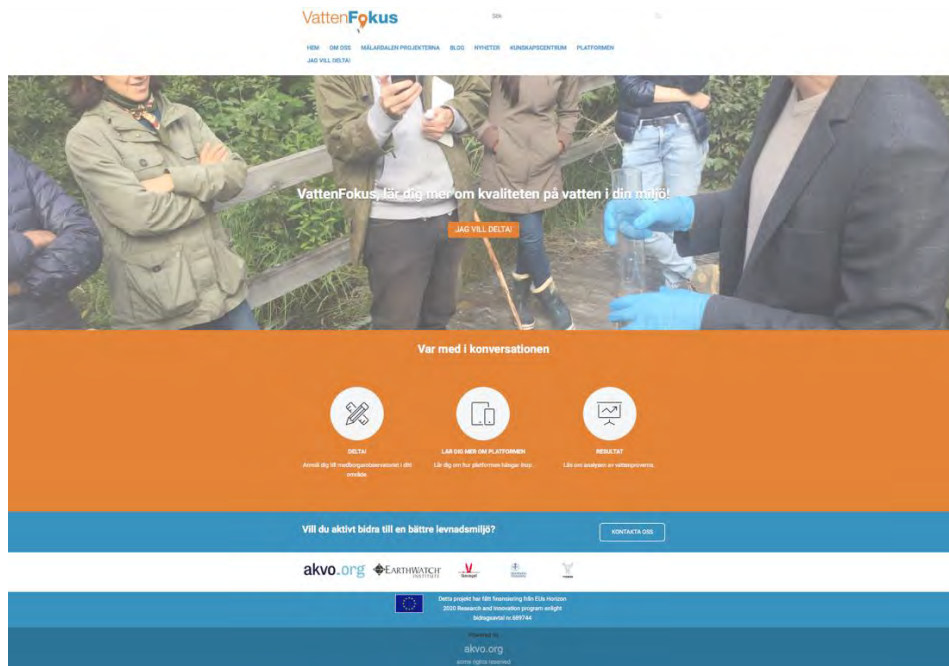


Figure 26 Integral view of VattenFokus

The following table (Table 2) provides an overview of the development of the technical platform, and how the Functional Design is linked with the development of the first version of the platform.

Table 2 Platform implementation (first version)

FIRST VERSION PLATFORM IMPLEMENTATION					
HEADLINES	SUBHEADLINES	YES/NO	WHY NOT?	TOOL	WHERE? / HOW? DETAILS
<b>DISCOVER THE OBSERVATORY</b>	Read portal/info pages	YES		Website + WordPress	<a href="https://vattenfokus.akvotest.org">https://vattenfokus.akvotest.org</a>
	Watch videos	NO	Final platform		
	Play games/do quizzes	YES		FWW platform	Community group page (registered user)
	Access public data/materials	NO	Final platform		
	Take guided tours	NO	Final platform		



FIRST VERSION PLATFORM IMPLEMENTATION					
HEADLINES	SUBHEADLINES	YES/NO	WHY NOT?	TOOL	WHERE? / HOW? DETAILS
<b>JOIN THE COMMUNITY</b>	Register account/agree terms	YES		Website Contact Form + Log in FWW	<a href="https://vattenfokus.akvotest.org/kontakt/">https://vattenfokus.akvotest.org/kontakt/</a> + API to login webpage
	Provide information required for user assessment/verification	YES		Website Contact Form	<a href="https://vattenfokus.akvotest.org/kontakt/">https://vattenfokus.akvotest.org/kontakt/</a>
	Create profile & link to other users	YES		FWW Profile page community group page	
	Choose notifications channels	NO	NA		
<b>SUBMIT AND PROCESS DATA</b>	Submit open observations for exploration and discovery	YES		FWW platform	FWW Mobile app + Web
	Send notifications to “go and observe”	NO	Final platform		
	Submit observations according to research protocols and instructions	YES		FWW platform	FWW Mobile app + Web
	Add tags and meta-data	NO	NA		
	Provide comments on observations	YES		FWW platform	FWW Mobile app + Web
	Integrate external data sets	NO	Final platform		

FIRST VERSION PLATFORM IMPLEMENTATION					
HEADLINES	SUBHEADLINES	YES/NO	WHY NOT?	TOOL	WHERE? / HOW? DETAILS
	Validate/process scientifically	YES		Akvo Lumen	
<b>EVALUATE RESEARCH ACTIVITIES OR POLICY/ STEWARDS HP RESULTS</b>	Rate and review activities	NO	NA		
	Launch or respond to surveys	NO	NA		
	Post or review results data	YES		Website Blog + FWW Webpage (community group)	<a href="http://vattenfokus.akvotest.org/blog/">http://vattenfokus.akvotest.org/blog/</a>
	Discuss results	YES		Website Blog + FWW Webpage (community group)	<a href="http://vattenfokus.akvotest.org/blog/">http://vattenfokus.akvotest.org/blog/</a>
<b>TRAIN AND LEARN</b>	View instruction videos	YES		Learning material FWW profile (embedded YouTube) - registered users	Profile page FWW & Mobile application
	Access/download manuals and field guides	YES		Learning material FWW profile (embedded YouTube) - registered users	Profile page FWW & Mobile application



FIRST VERSION PLATFORM IMPLEMENTATION					
HEADLINES	SUBHEADLINES	YES/NO	WHY NOT?	TOOL	WHERE? / HOW? DETAILS
	Test knowledge	YES		Learning material FWW profile (embedded YouTube) - registered users	Profile page FWW
	Create and get feedback on test submissions	YES (Get NOT create)		FWW profile dynamic responses on data submission based on local values	FWW Mobile app + Web
	Develop personal competencies	NO	NA		
<b>USE KNOWLEDGE HUB TO UPLOAD OR ACCESS EXISTING DATA, INFORMATION AND SERVICES</b>	Search/Browse observatory data	YES (only when registered)		FWW platform group page	FWW Web
	Browse observatory database	YES		FWW platform group page	FWW Web
	View maps and visualizations	YES		Akvo Lumen	<a href="http://vattenfokus.akvotest.org/flen-vattenblitz-resultat/#">http://vattenfokus.akvotest.org/flen-vattenblitz-resultat/#</a>
	Upload existing data and information	NO	NA		
	Use CO knowledge hub	YES		Website + WordPress	<a href="http://vattenfokus.akvotest.org/flen-vattenblitz-resultat/#">http://vattenfokus.akvotest.org/flen-vattenblitz-resultat/#</a>
	Use enhanced services	NO	Final platform		



FIRST VERSION PLATFORM IMPLEMENTATION					
HEADLINES	SUBHEADLINES	YES/NO	WHY NOT?	TOOL	WHERE? / HOW? DETAILS
<b>INFLUENCE BROADER POLICY AGENDAS</b>	Participating decision makers				
<b>REACH OUT AND RAISE AWARENE SS</b>	Share contents on social media	YES		Twitter	WordPress (plugin)
	Create, send or read newsletters	NO	Technical and financial constraints		
	Download information/promotion materials	NO	Not available yet.		
	Launch or take part in online campaigns	NO	NA		
	Find/join/promote offline activities	YES		Calendar WordPress	<a href="http://vattenfokus.akvotest.org/flen-vattenblitz-resultat/#">http://vattenfokus.akvotest.org/flen-vattenblitz-resultat/#</a>
<b>DISCUSS AND SET THE CO AGENDA FOR RESEARCH AND NATURAL RESOURCE MANAGEM ENT</b>	Post concerns/ideas in discussion fora	NO	NA		
	Take part in (live) online discussions	NO	NA		
	Organize offline activities	NO	final platform		
	Interpret exploratory data and set internal agenda	NO	NA		
	Develop a shared vision	NO	NA		
<b>SUPPORT IMPLEMEN TATION OF</b>	Communicate new policies/plans	NO	Final platform		



FIRST VERSION PLATFORM IMPLEMENTATION					
HEADLINES	SUBHEADLINES	YES/NO	WHY NOT?	TOOL	WHERE? / HOW? DETAILS
<b>PLANS AND POLICES WITH MONITORING AND INFORMATION SHARING</b>	Access info how to comply/participate	YES		Website Contact form	<a href="http://vattenfokus.akvotest.org/flen-vattenblitz-resultat/#">http://vattenfokus.akvotest.org/flen-vattenblitz-resultat/#</a>
	Create, promote or find offline activities	YES		Calendar WordPress	<a href="https://vattenfokus.akvotest.org/kalender/">https://vattenfokus.akvotest.org/kalender/</a>
	Track progress of activities	NO	NA		
	Monitor status of a resource	YES		Akvo Lumen	?
	Encourage compliance and facilitate communication with formal authorities	YES		Calendar WordPress	<a href="http://vattenfokus.akvotest.org/flen-vattenblitz-resultat/#">http://vattenfokus.akvotest.org/flen-vattenblitz-resultat/#</a>
<b>PARTICIPATE IN POLICY CONSULTATIONS AND DESIGN PLANNING ACTIVITIES</b>	Post policy drafts and request feedbacks	NO	final platform		
	Provide feedback on policy drafts	NO	NA		
	Organize/Invite to off-line activities	YES		Calendar WordPress	<a href="https://vattenfokus.akvotest.org/kalender/">https://vattenfokus.akvotest.org/kalender/</a>
	Report on results of the planning process	NO	NA		
	Platform features to co-design mutually	NO	NA		

The following table (Table 3) shows the different sections of the platform, the content of the section and the relation with the Story Map and Headlines.

Table 3 Summary of contents of each page of the platform (first version)

Page <sup>1</sup>	Content <sup>2,3</sup>	Sweden Story Map <sup>4</sup> Headline - User card
<i>Hem</i> [Home page]	Links to all website pages and platform functionalities.	H1. Discover the observatory - 1.1. Read portal and info pages
<i>Om oss</i> [Introduction]	Brief introduction of the initiative.	H1. Discover the observatory - 1.4. Access public data/materials
<i>Om oss –</i> [ <i>VattenFokus partners</i> ]	Brief description of the participating organizations and link to the website of each one	H1. Discover the observatory - 1.4. Access public data/materials
<i>Om oss –</i> [ <i>Ground Truth 2.0</i> ]	Brief introduction of GT 2.0 project and link to the project website.	H1. Discover the observatory - 1.4. Access public data/materials
<i>Om oss –</i> [ <i>Vår vision och uttmoning</i> ]	Vision, Mission and Objectives.	H1. Discover the observatory - 1.4. Access public data/materials
<i>Om oss –</i> [ <i>Kontakt</i> ]	Contact form.	H1. Discover the observatory - 1.4. Access public data/materials
<i>Mälardalen projekterna</i> [ <i>VattenBlitz</i> ]	General information about Water Blitz	H1. Discover the observatory - 1.4. Access public data/materials
<i>Mälardalen projekterna</i> [ <i>Grupperna</i> ]	Information about community groups & ways of participation in the CO.	H1. Discover the observatory - 1.4. Access public data/materials



Page <sup>1</sup>	Content <sup>2,3</sup>	Sweden Story Map <sup>4</sup> Headline - User card
<i>Blogg</i>	Information about activities and public events (meetings, work sessions, conferences and so on) related to water quality.	H11. Reach out and raise awareness - 11.9. Find/join/promote offline activities
<i>Kunskapcentrum</i> [Introduction. Water quality indicators. Causes, drivers and roles]	Page in development. It will contain information about indicators (link to Chemical, Ecological and Optical parameters), causes and drivers (link to page about causes and drivers) of water health, and the role/opportunities of personal and policy decisions (link to a learning page) to reduce one's impact.	H5. Train and learn
<i>Kunskapcentrum</i> [Resultat]	Information about the results of campaigns (Water Blitz), in the form of reports. It also contains a link to FFW platform to display an overview of results for the whole Sweden.	H11. Reach out and raise awareness - 11.9. Find/join/promote offline activities
<i>Plattformen</i>	Page in development. EW and Akvo will present how the platform is created.	H1. Discover the observatory - 1.4. Access public data/materials
<i>Nyheter &amp; Calendar</i>	Latest news and information about public events (meetings, work sessions, conferences and so on) related to water, for the next months and year.	H11. Reach out and raise awareness - 11.9. Find/join/promote offline activities
<i>Jag vill delta</i> [Subscribe]	Registration as user of platform. The enquire is sent to SU and EW, to register new users. A voluntary registration is opened in EW platform in order to initiate a database of users, grouped by community. Name and e-mail address is asked in the first platform version. The database of users fulfil the UE regulations on data protection.	H2. Join the CO community - 2.1. Register account and agree terms

Page <sup>1</sup>	Content <sup>2,3</sup>	Sweden Story Map <sup>4</sup> Headline - User card
<i>EW app + Web platform</i> [Data collection]	Call citizen participation in the observatory for occasional as well as recurrent observations.	H3. Submit and process data - 3.1. Submit open observations for exploration and discovery - 3.5. Submit observations according to research protocols and instructions

