FREEWAT

FREE and open source software tools for WATer resource management

Report on market and business model and application scenario

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Executive Summary

This document describes the FREEWAT open source software highlighting its successful selling points and it presents an analysis of its potential market and business model. It includes a non-exhaustive list of competing services available on the market and it aims at identifying, outlining and proposing ways how the FREEWAT software will be undertaken by the market.

The detailed description of the innovative elements of the FREEWAT final product in the context of the competition and the sector's needs should ensure the understanding of the reasons why its uptake by customers and final users shall be achieved in a smooth and effective way. The financial and market strategy will be also provided in order to ensure a complete coverage of all the business aspects and a SWOT analysis completes the document.

The Coordinator (SSSA), with an intervention of the more business oriented partners such as TEA-SISTEMI, OSLANDIA, AMALTEA and IEI, prepared this document, by supporting its preparation through their business expertise and experience.

1   Introduction

The European Water Framework Directive has been in place since 2000 and it shall be revised and implemented by 2019. The process has already started and it is in full swing. In this light projects, such as FREEWAT, and the scientific community are meant to provide important input to ensure that, thanks to innovative ICT software and services, water bodies, rivers, lakes, coastal waters and groundwater achieve a 'good status' by 2027.

This document, released at the end of the H2020 FREEWAT project, presents the FREEWAT platform - that was released at the beginning of April 2017, its characteristics, hence its benefits for the aforementioned achievements, and why its characteristics facilitate its adoption and market uptake, and a detailed business, market oriented plan.

The Deliverable, drafted by the SSSA (Coordinator) with the support of the SMEs partners these being TEA SISTEMI and AMALTEA, is partially a follow up of Deliverable 8.11 which described the steps put in place to ensure the exploitation of the FREEWAT free and open platform.

Case study scenarios are described in order to present the opportunities for the market uptake of the FREEWAT platform taking into account its open source and public domain nature.

1.1 Description of the Product

The FREEWAT platform (v 1.0) is a large plugin integrated into the QGIS GIS desktop (http://qgis.org) that includes several modules for tackling water management issues and specifically for groundwater. Groundwater numerical models (mainly from the MODFLOW USGS family) constitute the basis of the plugin (which also comprises modules for solute transport and density-dependent flow in aquifers). Below the complete list of so far integrated modules:

- Observations Analysis Tools (OAT) for time series analysis;

- akvaGIS for the analysis, interpretation and visualization of hydrogeological data;

- akvaGIS for the analysis of groundwater quality issues;

- Groundwater flow modelling (based on MODFLOW-2005);

- Calibration, uncertainty and sensitivity analysis (based on UCODE_2014);

- Solute transport in the unsaturated zone (based on MT3D-USGS and USB);

- Solute transport in the saturated zone (based on MT3DMS);

- Density-dependent groundwater flow (based on SEAWAT);

- Management of water in agriculture (based on FARM process);

- Water management and planning (based on MODFLOW-OWHM).

The FREEWAT architecture is based on the integration of different software tools (the so called FREEWAT pillars): SQLITE relational database manager, external (free and open source) codes like MODFLOW and MODFLOW-related programs as well as codes specifically developed. The way of interconnecting such tools is done via Python programming language, with extensive use of the Python library FloPy. A schematic representation of FREEWAT pillars and their interconnection is shown in Fig.1.
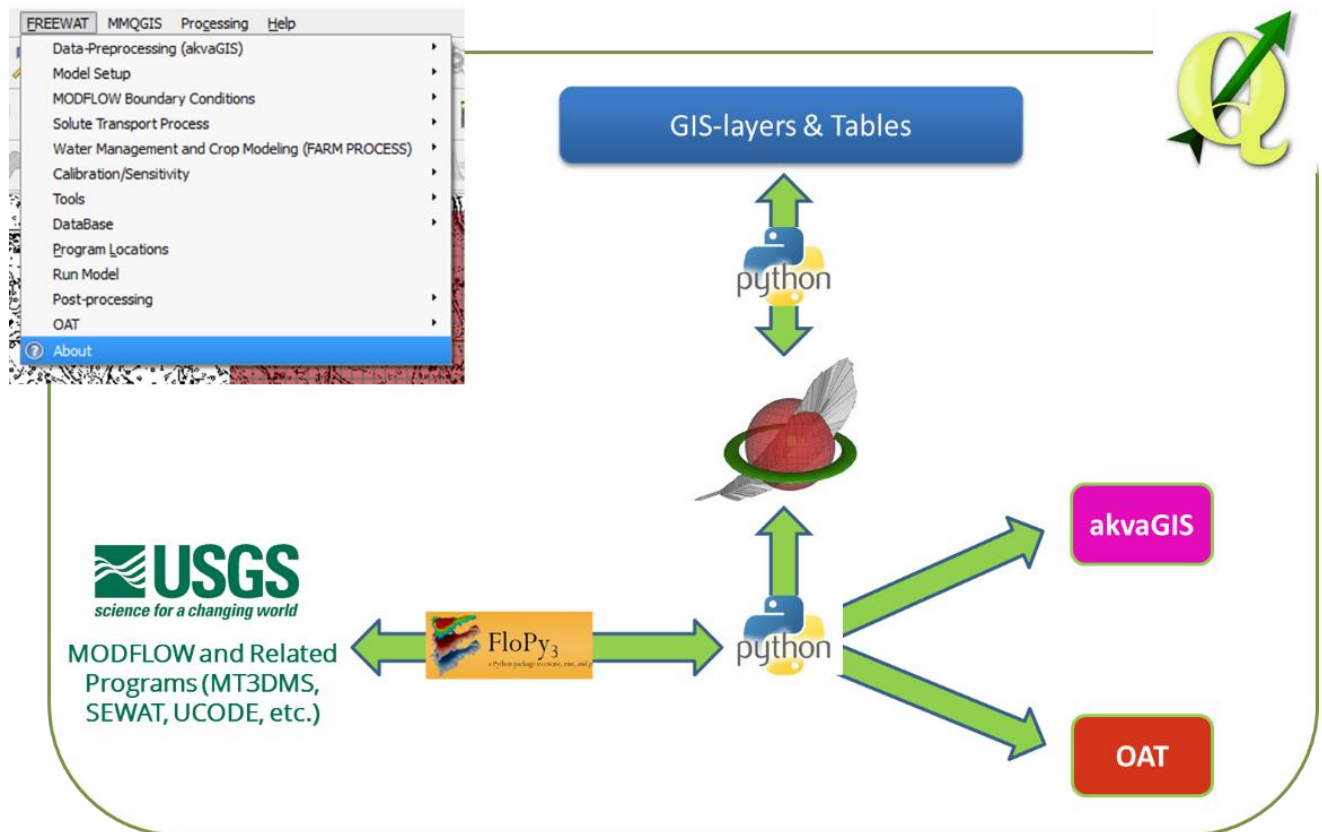

Figure 1. FREEWAT Architecture

The main features of FREEWAT capabilities are listed in a table available on the FREEWAT web site http://www.freewat.eu/software-0 . This table details the relationship between the components of the platform and the needs/priorities for ICT tools in water management as suggested by the stakeholders interviewed during an initial survey carried out by the Consortium in the initial months of the project.

It is worth mentioning that, as soon as the software was released (April 2017), a dedicated communication and dissemination activity was carried out to ensure awareness raising and clear information for all those users who might have been interested in downloading the software. In this light, the FREEWAT website was updated with specific pages with clear information on how and where to download the software. A user-friendly registration form was created in order to track the geographical coverage and the affiliation/interests of the users.

1.2 Target Market Sector

The target sectors are detailed in Tab. 1. They are divided in five main groups: i) Scientific world in EU and beyond; ii) Stakeholders from the water service sector (including water utilities, water management consultants, geo-engineering companies, irrigation sector); iii) Stakeholders from public authorities involved in management of the water cycle sector (all technical offices and functionaries in river basin authorities, local and national governmental authorities, environmental protection agencies, and any water related authorities); iv) Other similar or related projects; v) Decision makers and policy implementers in the EU. Thanks to the proactive behaviour of all partners involved in a training activities, not to mention the large number of international conferences and events that were attended, the geographical coverage includes almost all EU countries, neighbouring countries (Ukraine and Turkey) and several countries in Sub-Saharan Africa including Namibia and South Africa. Overall about 400 different stakeholder communities and about 1200 people were trained to the use of the platform. All of them are potential "evangelists" to facilitate the market uptake of the FREEWAT software.

TARGET group	*Further specifications*
Scientific world in EU and beyond	*universities and research centres both public and private*
Stakeholders from the water service sector	*water utility companies/organisations, geo-engineering companies, irrigation sector*
Stakeholders from public authorities involved in management of the water cycle sector	*river basin authorities, environmental protection agencies, hydrological services, governmental authorities, etc*
Other similar or related projects	*EU funded water related projects*
	projects involving water and water related directives, GIS applications
Decision makers and policy implementers in the EU	*Euro parliamentarians with specific interests in environmental issues, river basin authorities, local and national governmental authorities, environmental protection agencies, and any water related authority*

Table 1. Target market sectors.

2   Business overview

This chapter presents the advantages of the FREEWAT software and the assessment of the competition: who are the main players, their current offerings and market share.

The H2020 FREEWAT software is a free open source platform, which is an added value compared to proprietary systems. It is based on well-known and scientifically trusted simulation software. This represents an added value compared to some of proprietary vendors, having their own computation engine.

The open source characteristics of the codes and platform allow considering this an initiative open to the inclusion of other entities, allowing further research institutions, private developers and business companies, to contribute to the platform development and uptake. Moreover, development of tailored-made applications of the FREEWAT platform offers the possibility to adapt it to specific needs. In few words the business advantages for the market are based on the following assets:

- open source,
- public domain,
- scientifically trusted simulation software,
- tailored applications,
- customization,
- flexibility,
- pay what you use – cloud.

In addition to the software, there are other services that companies may be providing by using FREEWAT products such as training, integration with other tools, custom development in FREEWAT core, support and assistance.

2.1   Current development stage

Currently, FREEWAT is a composite QGIS plugin, available within the official QGIS repository. Using FREEWAT in QGIS, the User has the capability of simulating all the main component of the hydrological cycle, as described in Chapter 1. From a technical point of view, FREEWAT is usable under Windows (XP, Vista, 7 or 10) or Linux OS. Some possibility to apply FREEWAT also under MacOS have been experimented during the project. From the main modelling part (what are call MODFLOW-related codes), FREEWAT is based on the Pyhton library FloPy, which is continuously growing in its capabilities and accuracy. This gives to FREEWAT a solid base for current and near future development.

The actual version (v.1.0) is considered "stable", meaning that all the capabilities included have been tested and the tools are working in any standard model. Difficulties in

FREEWAT application can be experienced only by applying the plugin to extensive models, in terms of number of cells (more than 700000) or with a huge number of stress periods.

2.2 Competitive advantage

The advantage of using FREEWAT to deliver modelling services is based on two pillars related to the license type: free (no investments needed for license costs) and open (high customization capability). Furthermore, besides the numerical modelling tools (MODFLOW, MT3DMS, etc.) integrated also in other software instruments, the FREEWAT platform has the advantage of integrating specific tools that maximize results coming from simulations, like the Water Management Module (also linked with Agricultural management issues), as well as all the tools needed to pre-process the data coming from sensors and/or dataset archives. Hence, FREEWAT plays a strategic role in improving water resource management by providing a single integrated hub of software modules for water management with unique features and therefore competitive value for money compared to the existing fragmented alternatives. The FREEWAT Value Proposition is featured in Fig. 2, highlighting the assets to be delivered to the market.
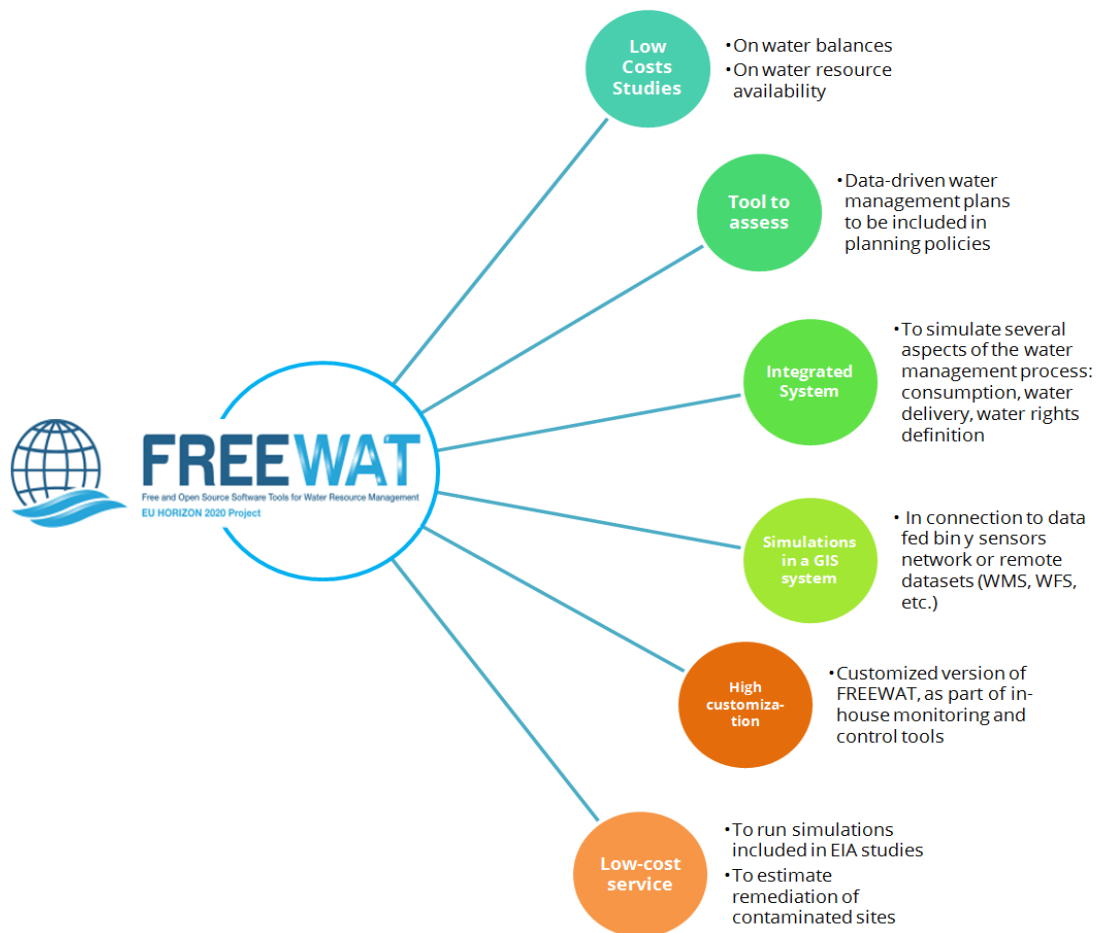

Figure 2. FREEWAT Assets.

3   MARKET

3.1   Competitors

It was recognised by those companies taking part in the FREEWAT project, that competition should not be seen as a problem though a stimulus to release an excellent product. In fact, having a network of FREEWAT service providers is rather a strength for the market uptake. A non-exhaustive list of competitors is presented below.

Environmental Simulations, Inc. is a small business designed to provide clients with cost-effective groundwater modelling services in the following areas:

- Site-specific model applications, includingkk groundwater flow, contaminant fate and transport, density-dependent flow (seawater intrusion), and unsaturated flow and transport.

- Peer review of modelling studies performed by other consultants or agencies. They can also serve as mentors to your modelling staff.

- Software development for environmental modelling and data management in the following languages: FORTRAN, C, C++, Visual Basic.

  (http://www.groundwatermodels.com/Consulting.php)

DHI Group (http://www.dhigroup.com/). Owner of the MIKE-SHE model, DHI is a big international consultancy, which performs hydrological simulations and provides technical solutions to many issues related to water.

Alterra (http://www.wageningenur.nl/en/Expertise-Services/Research-Institutes/alterra/About-Alterra.htm) is a private body, but closely related to Wageningen University. Alterra has conducted several studies, supported by the EU Commission and National Governments, regarding WFD implementation. Alterra is the contact for commercial applications of Wageningen' models, such as WOFOST and SWAP. Alterra is also one of the main partners of the Netherlands Hydrological Instrument (http://www.nhi.nu/nhi_uk.html), which is in fact quite similar to FREEWAT.

Deltares (https://www.deltares.nl/en). An independent institution for applied research in the field of water. Owner of several models, such as RIBASIM, including some open-source tools. Deltares has conducted several EU projects regarding hydrological simulation. It is also partner of NHI.

Pöyry (http://www.poyry.com/). Pöyry is an international consulting and engineering company. Pöyry has conducted several studies for de DG Environment regarding water accounting.

HydroOffice2015 (https://hydrooffice.org) is a stable and long term developed software package for hydrology and hydrogeology. HydroOffice includes 14 independent software tools with more than 1 500 000 rows of code. HydroOffice has around 17 000 installations in more than 150 countries.

Indirect competitors:

3liz (based in France) offers a full range of services around QGIS, to escort all software users, from beginners to the insiders. Depending on your needs, 3Liz gives training sessions to QGIS, provides the Web mapping portal LizMap — based on QGIS Desktop & QGIS Serveur — which allows easy publication of data on the Web, and also proposes support, development and consulting on QGIS. (http://www.3liz.com/)

Boundless Spatial (based in Washington, D.C., USA and operating worldwide) provides commercially supported, open source, geospatial software. OpenGeo Suite and QGIS enable a feature-rich, enterprise GIS without the high licensing costs associated with proprietary software. The experts at Boundless reduce the cost and time of deploying and managing spatial software with packaging, support, maintenance, professional services, and expert training. (http://boundlessgeo.com/)

Digital Mapping Solutions (based in Australia) has been working with Government and Commercial organisations for over 15 years and have the products, services and skills to help you take full advantage of your GIS investment. (http://www.mapsolutions.com.au/)

Faunalia (based in Italy and operating worldwide) provides development services (both core and plugins), training, and commercial support for QGIS, GRASS, GDAL/OGR, and PostgreSQL/PostGIS. (http://www.faunalia.eu/en/)

Geoinformatikbüro Dassau (based in Düsseldorf, Germany) provides commercial consulting, training, support and programing for QGIS, GRASS and other FOSS applications. (http://www.gbd-consult.de/home.html)

It Open (based in Italy) provides commercial support and C++/Python development services for QGIS Desktop and Server, PostGIS, Django and other free and open source software packages for both the web and the server side. (http://www.itopen.it/)

Kartoza (Pty) Ltd. (with offices in Swellendam and Paarl in the Western Cape Province of South Africa). Provides commercial support and training for QGIS Desktop and Server and carry out feature development for QGIS on a contract basis. They also develop plugins in Python and C++ for QGIS. Note: Kartoza was formerly known as Linfiniti Consulting. (http://kartoza.com/)

Lutra Consulting (based in the UK) provide training, support and bespoke software development services for QGIS. (http://www.lutraconsulting.co.uk/)

NaturalGIS (based in Portugal) provides training, development and commercial support for a number of Open Source GIS software. We specialize in QGIS (Desktop, Server and Web), PostGIS and custom WebGIS development. (http://www.naturalgis.pt/)

norBIT GmbH (based in Norden, Germany) provides commercial support and custom programming for QGIS. (http://www.norbit.de/64)

North Road (based in Australia) specialises in custom development solutions for QGIS features and fixes, and also offers training and commercial support in the open source geospatial stack. North Road has a established history in quality QGIS development, and has been responsible for thousands of feature and fixes within the QGIS codebase since 2013. (http://north-road.com/)

OPENGIS.ch (based near Bern and Chur, Switzerland, operating worldwide) provides support, training and development for your open source GIS stack. Our QGIS core developers are proficient in C++, Python, SQL, geospatial analysis, mobile development (including Android) and more. (http://www.opengis.ch/)

Sourcepole (based in Zurich, Switzerland and operating worldwide) provides FOSSGIS training, commercial support and maintenance contracts as well as cloud based geo hosting for QGIS. With three leading core committers Sourcepole is able to offer sophisticated developments for QGIS. (http://www.sourcepole.com/)

CartoExpert (based in France) is a geomatics competence center offering both national and international services, consulting in cartography as well as geographical information systems. CartoExpert provide with technical support on QGIS, assistance in implementing QGIS within your organization, as well as GIS training on QGIS (Initiation, Improvement, workshops, mobile etc). (http://www.cartoexpert.com/)

Camptocamp is an open source service company based in Europe offering training, support and development around QGIS, mobiles apps, 3D, geoportails and GeoBI using a high expertise. (http://www.camptocamp.com)

Gaia3D, Inc. (based in South Korea) is a leading open source GIS company in Korea. Gaia3D offers professional development services, training, consulting and supports for QGIS, PostGIS, GeoServer and OpenLayers. (http://www.gaia3d.com/)

Zuidt (based in Haarlem, The Netherlands) wants Geographical Information to be open and simple. Zuidt wants to be THE Dutch (international) QGIS specialist, and provides consulting, plugin coding and training services. (http://zuidt.nl/blog/html/pages/index.html)

NextGIS (based in Moscow, Russia) provides commercial support, custom programming and training for QGIS, PostGIS and GRASS. (http://nextgis.com/

Others:

Astun Technology (based in UK) provides training for QGIS. (https://astuntechnology.com/)

AdventGX (based in College Station, TX) provides installation, training, and implementation support for QGIS. (http://adventgx.agxdev.com/)

Bird's Eye View GIS (Based in Albuquerque, New Mexico) provides commercial GIS services and support and training in QGIS, GRASS GIS and other FOSS GIS applications. (http://www.birdseyeviewgis.com/)

GeoICON (based in Singapore and operating in South East Asia) has been working with Government organizations for over 10 years and offers a full range of services around QGIS including training and commercial support. (http://www.geoicon.com/)

gis3w (based in italy) provide geographic and ecological analysis services and support and assistance with qgis. (http://www.gis3w.it/)

Karttakeskus (based in Finland) provides commercial support and training for QGIS and open spatial data. (http://www.karttakeskus.fi/)

Soluciones en Tecnologías de Información Geográfica (SOLTIG) (based in Costa Rica) provides training, support, consulting and programming for QGIS and other FOSS applications. (http://www.soltig.net/)

The Institute For Mapping Technology (based in Austin, TX) provides support and training for QGIS and PostGIS. (http://learninggis.com/)

nGNUity.net - FOSS advocate from the Philippines providing commercial GIS services, training, and consulting for QGIS, spatial data visualization assistance to local governments, non-profits, research agencies and community groups since 2007. Offers various mobile data collection and mapping services using the Open Data Kit / KoBo Toolbox software stack. (http://ngnuity.net/)

North River Geographic Systems, Inc is a small GIS Consulting firm located in the South-eastern United States. We provide Geospatial services such as data conversion, ESRI and FOSS4G software support, cartography, and data analysis. (http://www.northrivergeographic.com/)

Livio Stump (based in Lucerne, Switzerland) provides commercial GIS consulting, support and training in QGIS. (http://www.liviostump.ch/)

GKG Kassel, Germany (Dr.-Ing. Claas Leiner) provides training, services and support around the free geographic information systems QGIS, GRASS, SAGA and PostGIS as well as spatial data management, analysis and cartography. (http://www.gkg-kassel.de/)

SunGIS (based in Valmiera, Latvia) provides commercial support, consulting, data processing and custom programming for QGIS, GRASS GIS and FOSS GIS based SDI solutions. (http://www.sungis.lv/)

TAXUS IT (based in Warszawa, Poland) provides commercial GIS services also support and training in QGIS and GRASS. (http://taxusit.com.pl/)

Terrestris (Bonn, Germany) provides commercial services and training for QGIS. (https://www.terrestris.de/service-2/schulungen-und-support/)

thinkWhere (Stirling, Scotland) thinkWhere is one of the leading independent GIS consultancies in the UK. We provide a broad range of innovative GIS products and services including "Location Centre" (a hosted Cloud-based GIS built from open source technologies). As a QGIS site, our team of geospatial experts use QGIS on a daily basis and provide QGIS Support to customers. We also run regular QGIS and PostGIS Training courses. (http://www.thinkwhere.com/)

Service providers and the FREEWAT Consortium will position the FREEWAT platform as a unique GIS-simulation integrated tool on the market. Having a decompartmentalized offer is a good opportunity for business. The service range for IT services, as might be seen from the above list, is quite large: IT/GIS/Modelling consulting, training, support (GIS/FREEWAT), assistance, development, among others. As an example, a non-exhaustive list of contractors for the QGIS GIS desktop is provided at the following link http://www.qgis.org/en/site/forusers/commercial_support.html.

3.2 Customers

According to the specific requirements gathered and resulting features and modules integrated and developed until now, the FREEWAT software is addressed to the following customers:

- Public Bodies: local governments, river basin authorities, environmental protection agencies, hydrological services;

- Private sector: water utilities, geo-engineering companies, irrigation sector, water management consultant, hydrogeologists and engineers, construction works companies, agricultural consultants, farm managers/owners;

- universities and research centres both public and private

For each of the identified customers the concerning profile has been depicted (Fig. 3 to 6). Thus, the following figures highlight the FREEWAT "personas" profile, namely concrete representations of the current/future customers. This technique allows better understanding customers, targeting market and user profiles (social environment, professional sector, technology use, etc.). By actually defining user needs and requirements, marketing messages will be suitably created, tailoring content and format to each identified "persona".

Figure 3. Customer 1 Profile (Public Body - Local Government)

Figure 4. Customer 2 Profile (River Basin Authority; Water Utility; Environmental Protection Agency)

Bastian Van Atten

Man, 30 years old, Farm Owner, is interested in using ICT for the management of his daily farm activities

JOB DESCRIPTION	Management of Farm production
PAINS	High nitrate content in water resources used for irrigation of his field
GAINS	Access to high quality water resources with no pesticedes

Figure 5. Customer 3 Profile (Agricultural Managers, Farm Managers)

Veronique Arnau

Woman, 37 years old, Researcher Associate at the International Research Center On Water and Environment (C.I.R.S.E.E.), she has a PhD in Civil and Environmental Engineering

JOB DESCRIPTION	Modelling ecosystem-specific water quality indices
PAINS	Water Quality in Distribution Systems in Rural Areas
GAINS	Integrated tools for modelling and interpretations of monitoring data

Figure 6. Customer 4 Profile (Research institutions)

3.3   SWOT and critical success factors

The following Table 2 summarises the SWOT analysis carried out for FREEWAT-based services. The competing solutions analysis allowed to draft a series of strengths and opportunities, as well as to identify potential weaknesses and threats.

Strengths	Weaknesses
No-cost: no license costs for the software applied. **Tailored**: software product can be easily customized. **Accuracy**: software tools apply certified and well-tested numerical codes. **High Usability**: full GIS-integration of the modelling environment.	**Dependence**: QGIS development perspective, as well as for other codes used within the platform (MODFLOW and MODFLOW-related). **Visualization:** not so appealing visualization tools, as in other (commercial) modelling GUIs.

Opportunities	Threats
Market growth: business models based on open source are growing. Open source allows an exponential expansion in terms of new functionalities and services built on top of FREEWAT. **Awareness**: GIS-based software tools are going to be the standard for environmental applications. **Open Data**: availability of open data production and maximizing re-use of existing data. **Dissemination:** dissemination activity done during FREEWAT H2020 project boosted the initial market strategy.	**Data quality**: low quality of data provided resulting on little accuracy of model outputs. Progressive diffusion among administrations will make this instrumental for the improvement of data quality and knowledge. **Final Users' skill**: possible low-level of capacity will imply higher longer training periods than the one foreseen (technical barrier). However, this threat holds true also for competing commercial solution. **Competing solutions:** strong market activity of competing commercial GUIs.

Table 2. SWOT analysis table for the FREEWAT software.

Concerning these issues, identified in SWOT table, the more relevant aspects are summarised below:

- (S): the key point is the possibility to have a software with an high customization potential (to be compliant as much as possible with the specific User's requirements), as well as the full GIS integration of the modelling environment.
- (W): dependence upon the status of code(s) behind the platform (for both the framework software QGIS and the numerical codes) is the main risk.
- (O): dissemination and capacity building activity done during the H2020 project is the main driver to start a new business (an initial marketing strategy could be based on this).
- (T): the strong market activity of existing commercial software is the main barrier for a strong market penetration.

4   IPR and Licensing

The FREEWAT partners will be in charge of defining IPR routes in order to guarantee a smooth market uptake of the project outputs. As the successful development of the FREEWAT project will represent a breakthrough for water resource management, IPR issues are considered of key importance and therefore, a specific paragraph has been foreseen in the present deliverable to deal with it.

Intellectual property rights are exclusive rights on intellectual creations in all the fields related to technology (patents), business (trademarks), and arts (copyright) capable of protection under a specific law. Once a creative innovation is protected, the related rights can be sold, bought and licensed. Intellectual property right (IPR) rules have strong impacts on economic growth, environmental protection and social objectives.

In D8.3 FREEWAT Exploitation Agreement, partners have agreed that all software and software's documentations developed will be distributed with an open source license. Apparently, an open innovation model (which allows economic actors and companies to use external and internal ideas to advance their technology) could be viewed in contrast with an IPRs' protection system generally designed to exclude others from using a company's ideas and invention. However, due to the recent rise of open source software and open innovation models, IPR rules are supporting and encouraging a sustainable innovation and creativity, attracting investment and technology transfer. They can serve as an incentive for partners to invest in research and development improving their publicity and reputation and attracting funding and political support.

4.1   Trademark

A trademark is a sign capable of distinguishing the goods or services of one enterprise from those of other enterprises. Trademarks are protected by intellectual property rights. Trademark protection ensures that the owners of marks have the exclusive right to use them to identify goods or services, or to authorize others to use them in return for payment.

One of the pillars of the market strategy – detailed in Chapter 6 - will be to position the brand in the market. It is advisable to register the FREEWAT brand name at the European Union Intellectual Property Office (EUIPO) as EUTM. In case of registration, trademark protection is valid for a period of 10 years and may be renewed indefinitely. It is recommendable to register the project acronym "FREEWAT" since a massive communication campaign has been performed during the project lifecycle. It has lead target stakeholders and prospective customers to recognise the FREEWAT mix of word plus figurative trademark specifically as a suite of tools and services with particular characteristics and quality, distinguishing it from competing solutions.

The trademark search performed on both WIPO and EUIPO trademark databases has shown that similar word and figurative trademarks exist. They refer to goods that have no FREEWAT analogous value proposition. This is an advantage but in case of confusing long shot it will be critically managed by project partners.

The misleading trademarks could be the following listed:

- registered word EUTM "FREEWATERS"[1], whose ownership belongs to FREEWATERS LLC to distinguish their Beach shoes; Leisure shoes; Sandals; Sandals and beach shoes.

- registered figurative EUTM "FreeWater"[2], owned by Freewater ApS for distinguishing goods as Machines and machine tools, including filtering machines, in particular filtering machines for drinking water, bottling machines, bottle sealing machines, bottle washing machines, filters (parts of machines).

- registered figurative EUTM "FreeWater"[3], refereed to Stationery; Paper, cardboard and goods made from these material included in this class; Printed matter; Bookbinding material; Photographs by Peter Weghorn.

4.2   Copyright

Copyright is the legal protection automatically given to original literary, dramatic, musical or artistic works; sound recordings, films, and broadcasts; databases; and computer programs. Copyright protection arises automatically upon the creation of an original work of authorship. There is no need to apply for a copyright or register the copyrighted work in order for protection to exist.

Copyright also protects the graphics and original layout developed for the software. Although copyright applies also to the original graphics and layouts of software, it may be possible to acquire further protection in some jurisdictions by registering them as designs. This has the advantage of providing clear evidence that the partner that creates them is the owner of the rights in these elements of the program.

Generally, the duration of a copyright is the author's life plus fifty years.

4.3   Licenses

The business strategy selected to deliver FREEWAT software to customers is an Open Source License. Through the Open Source software-licensing model, the source code of the software is made available royalty-free allowing redistribution, modification and addition, although often with certain restrictions.

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[1] https://euipo.europa.eu/eSearch/#details/trademarks/009262189
[2] https://euipo.europa.eu/eSearch/#details/trademarks/006877161
[3] https://euipo.europa.eu/eSearch/#details/trademarks/011440741

Open Source software license is a long term sustainable strategy since it allows the licensee some freedom. In particular, Open Source software licences must comply with four specific unrestricted criteria on the use to be made of the software, which have to be granted by the creator to any users: a) freedom to run the program; b) freedom to study and change; c) freedom to redistribute; d) freedom to distribute.

Usually, Open Source software are being distributed through the GNU General Public License. Under the General Public License, all derivative works of the software and subsequent versions down the chain must be licensed and distributed on the same terms as the original software. Source code subject to the GPL permanently remains subject to it. This nature constrains the options available to developers building on GPL software in creating, distributing or commercializing products using existing GPL source code. Thus, FREEWAT will be distributed through GNU General Public License.

FREEWAT software documentations will be made available through Creative Commons License. CC licenses and tools are based on the GNU General Public License (GNU GPL). They offer some-right reserved alternatives to traditional copyright law, allowing various types of content to achieve full Web potential and compatibility. CC licenses allow creators to maintain copyrights on their works while allowing third parts/users to copy and distribute those works. In Creative Commons licenses, work can be freely shared and distributed, as long as the creator is given proper credit and the work is distributed under the license's specified conditions.

For the purpose of the project, Attribution License (CC BY) is a practicable option since it lets third party distribute, remix, tweak, and build upon your work, even commercially, as long as they credit FREEWAT Team for the original creation. This is the most accommodating of licenses offered, suggested for its high impact. Regarding Training Materials that was developed during the project (User Manuals and Tutorials), Creative Common license was also applied.

This license grants an easy way to share, copy, distribute, and transmit the documentation developed, and permits to make commercial use of the it, provided that the work is attributed again to the FREEWAT Team and that the work may not be altered, transformed, or be used to build upon.

A potential risk for the IPR's protection is that granting permission to use a work ahead of time has the inevitable consequence to do not be sure who is using the work or making money from it. In order to avoid that someone else mark the FREEWAT Training Materials with a Common Creative license without any authorization, it is advisable to register the copyright in order to protect work from unauthorized uses.

However, from a sustainable point of view and due to a free and easy-use's nature, the Common Creative license model has the positive effect to be considered as standard, interoperable and with a transferability character: Creative Commons licenses encouraging others to use and redistribute a specific work offering a good publicity for

the future. Recommended CC License is Attribution-NonCommercial-ShareAlike (CC BY-NC-SA). It lets users to remix, tweak, and build upon FREEWAT work non-commercially, as long as they credit project partners and license their new creations under the identical terms.

5   FINANCIAL STRATEGY

FREEWAT distribution will be realised through an open access model. It entails that the software and source code are available for free. However, some personalised services (e.g., training, support, assistance, customisation, etc) will have a cost. It should be taken into account that all derivative works from FREEWAT source code will be made available under the same license, the GPL. It entails that any further customisation built on top of FREEWAT will be realised under the same license. In details, the free offering consists in accessing to the tools and services represented in Fig. 7.
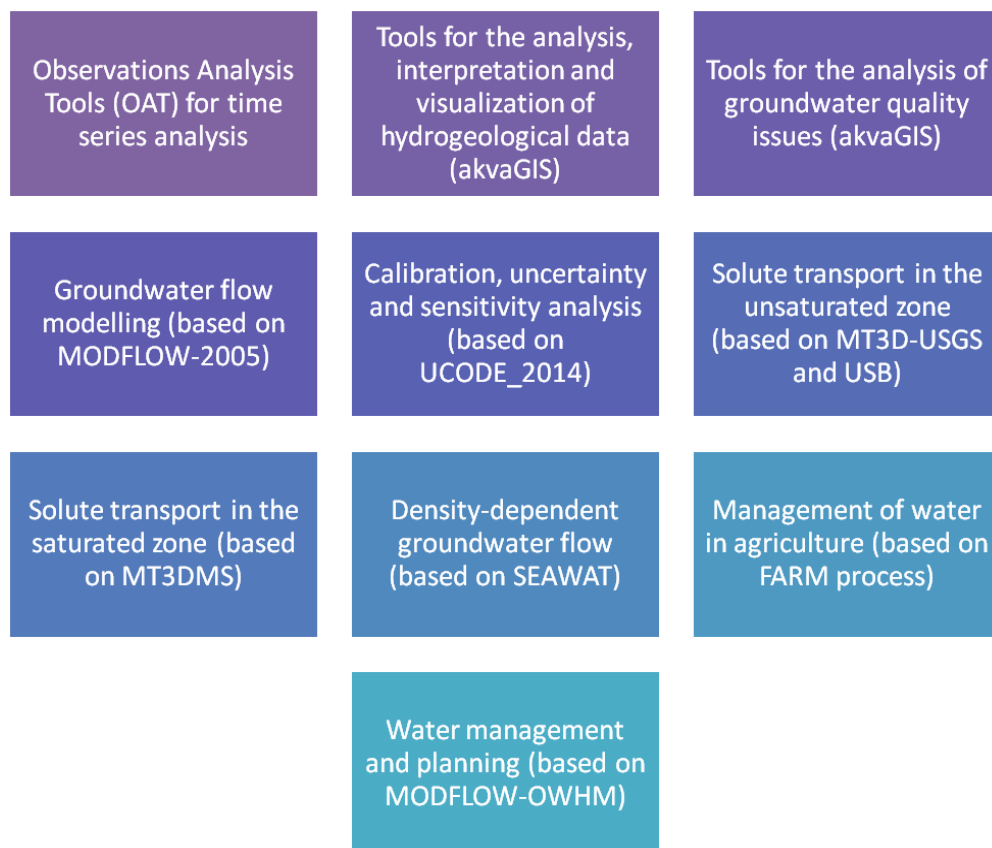
Figure 7. FREEWAT open access offering.

5.1   Capital Expenditures (CapEx) and Operational Expenditures (OpEx)

To secure the maintenance of FREEWAT software, project partners participating in the joint exploitation of this outcome will have to incur CapEx (Capital Expenditures) and OpEx (Operational Expenditures). CapEx comprise mainly costs to be incurred for the maintenance of IT infrastructure. OpEx refer to human resources costs, travels and general costs associated to personnel costs. Details of the costs have been provided in the tables 3 to 5 and Fig. 8 below.

	Y1	Y2	Y3	Y4	Y5
IT INFRASTRUCTURE (€)					
IT infrastructure					
Cloud	12.000,00	12.000,00	25.000,00	50.000,00	50.000,00
Any other IT cost	10.000,00	5.000,00	20.000,00	20.000,00	30.000,00
Total IT Infrastructure	**22.000,00**	**17.000,00**	**45.000,00**	**70.000,00**	**80.000,00**

Table 3. FREEWAT CapEx

	Y1	Y2	Y3	Y4	Y5
SALARIES (€) * including payroll taxes					
G&A					
Founders	15.000,00	15.000,00	40.000,00	45.000,00	60.000,00
Finance Manager	6.000,00	6.000,00	15.000,00	15.000,00	20.000,00
Office Manager	-	8.000,00	20.000,00	20.000,00	20.000,00
Total G&A Salaries	**21.000,00**	**29.000,00**	**75.000,00**	**80.000,00**	**100.000,00**
R&D					
Designer	8.000,00	5.000,00	30.000,00	30.000,00	30.000,00
Sr. Developer	5.000,00	12.000,00	50.000,00	60.000,00	70.000,00
Jr. Developer		5.000,00	10.000,00	15.000,00	20.000,00
Total R&D Salaries	**13.000,00**	**22.000,00**	**90.000,00**	**105.000,00**	**120.000,00**
Marketing					
VP Marketing	15.000,00	15.000,00	30.000,00	30.000,00	50.000,00
Designer	10.000,00	10.000,00	25.000,00	30.000,00	30.000,00
Content Writer	6.000,00	6.000,00	6.000,00	6.000,00	6.000,00
PR Manager	15.000,00	15.000,00	30.000,00	30.000,00	50.000,00

Total Marketing Salaries	46.000,00	46.000,00	91.000,00	96.000,00	136.000,00
Sales					
Sales Directors	45.000,00	50.000,00	80.000,00	10.000,00	10.000,00
Total Sales Salaries	45.000,00	50.000,00	80.000,00	10.000,00	10.000,00
Total Salaries	125.000,00	147.000,00	336.000,00	291.000,00	366.000,00
OTHER COSTS (€)					
Travel					
G&A	3.000,00	3.000,00	5.000,00	5.000,00	8.000,00
R&D	3.000,00	3.000,00	10.000,00	12.000,00	15.000,00
Sales	15.000,00	20.000,00	30.000,00	30.000,00	30.000,00
Total travel costs	21.000,00	26.000,00	45.000,00	47.000,00	53.000,00
General Costs					
20% of Salaries	25.000,00	29.400,00	67.200,00	58.200,00	73.200,00
TOTAL COSTS	146.000,00	173.000,00	381.000,00	338.000,00	419.000,00

Table 4. FREEWAT OpEx.

As consequence, total costs to be incurred in 5-year period are summarised in the table 5 below.

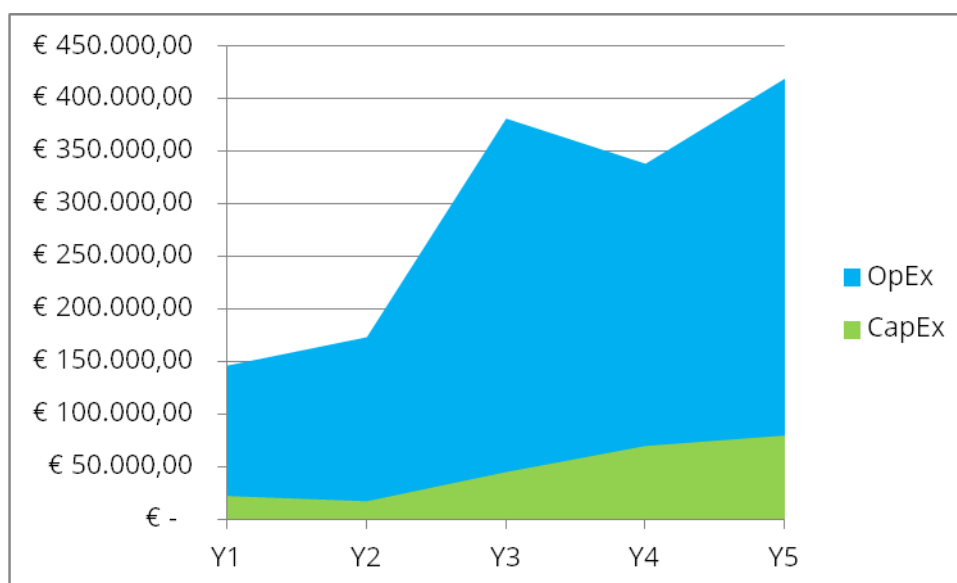|	Y1	Y2	Y3	Y4	Y5
OpEx (€)					
Tot	146.000,00	173.000,00	381.000,00	338.000,00	419.000,00
CapEx (€)					
Tot	22.000,00	17.000,00	45.000,00	70.000,00	80.000,00
Tot Costs (€)	168.000,00	190.000,00	426.000,00	408.000,00	499.000,00

Table 5. FREEWAT Total costs.

Figure 8. FREEWAT Total Costs in 5-year period.

5.2   Sales Forecast

The first assumption made is that FREEWAT suite of tools and services will be accessed for free. Thus sales flow originates from the following streams (Tab. 6):

- Customised services (Premium services);

- Fees for training sessions (Customer Relationship, CR, services);

- Advertising.

Concerning the Premium services, by the time of writing, project partners have assumed three potential levels of customisation, namely Service 1 (the forecasted price is €5.000,00), Service 2 (the forecasted price is €10.000,00), Service 3 (the forecasted price is €15.000,00).

	Cost per unit	Y1	Y2	Y3	Y4	Y5
Premium services						
Service 1						
Unit sold		2	5	30	50	50
Value (€)	5.000,00	10.000,00	25.000,00	150.000,00	250.000,00	250.000,00
Service 2						
Unit sold		6	10	20	25	25

Value (€)	10.000,00	60.000,00	100.000,00	200.000,00	250.000,00	250.000,00
Service 3						
Unit sold		1	5	12	15	20
Value (€)	15.000,00	15.000,00	75.000,00	180.000,00	225.000,00	300.000,00
Total Premium (€)	-	85.000,00	200.000,00	530.000,00	725.000,00	800.000,00

CR services						
Training						
Unit sold		2	4	15	30	50
Value (€)	7.000,00	14.000,00	28.000,00	105.000,00	210.000,00	350.000,00
Total CR (€)	-	14.000,00	28.000,00	105.000,00	210.000,00	350.000,00

Advertising						
Icon						
Unit sold		5	40	100	100	100
Value (€)	250,00	1.250,00	10.000,00	25.000,00	25.000,00	25.000,00
Banner						
Unit sold		10	30	150	200	250
Value (€)	500,00	5.000,00	15.000,00	75.000,00	100.000,00	125.000,00
Total Adv (€)	-	6.250,00	25.000,00	100.000,00	125.000,00	150.000,00

Table 6. FREEWAT revenues.

5.3 Financial Projections (Break-even point)

In order to appreciate and determine the productivity of the investment for FREEWAT team it is necessary to focus the attention on the profit expected within the five-year period. This accounting function is obtained by subtracting the costs to be incurred from the expected net income amount (revenues; Tab. 7).

	Y1	Y2	Y3	Y4	Y5
Tot Costs					
Tot (€)	168.000,00	190.000,00	426.000,00	408.000,00	499.000,00
Revenue					
Tot (€)	105.250,00	253.000,00	735.000,00	1.060.000,00	1.300.000,00
Profit					
Tot (€)	- 62.750,00	63.000,00	309.000,00	652.000,00	801.000,00

Table 7. FREEWAT Total Financial Projections.

The break-even point is reached when revenue are equal to costs. According to the assumptions above, the break-even point will be reached in the second year, as highlighted in Fig. 9 below.
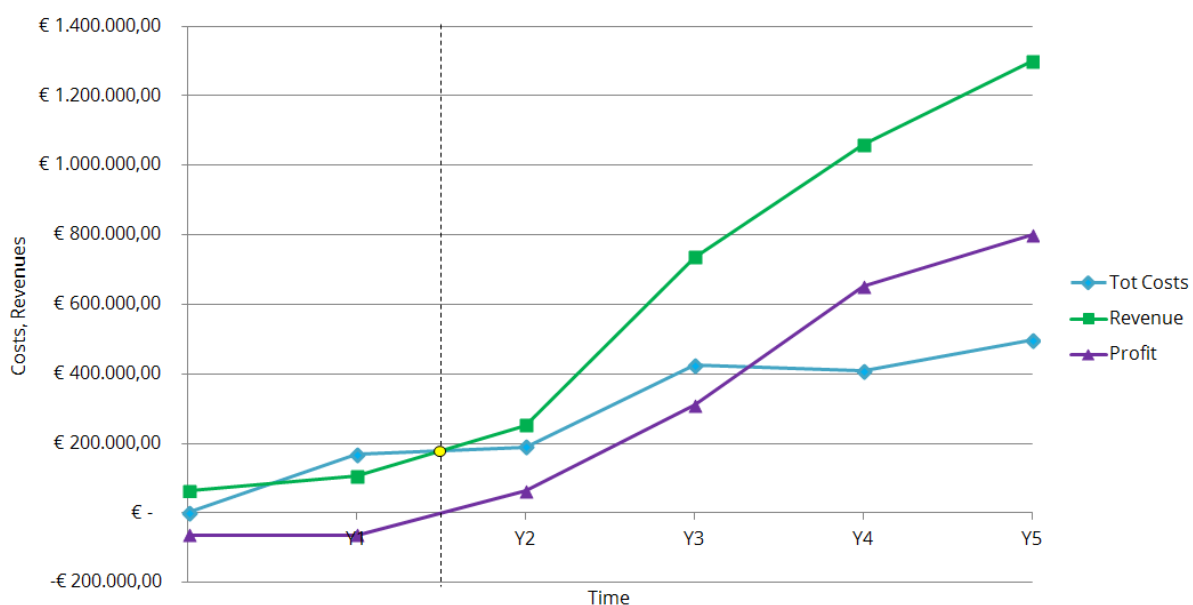

Fig.9. FREEWAT Break-even point.

Calculating ROI (return on investment) the result is positive.

Return on investment of FREEWAT = 1,04

When ROI is > 0 the global operational results are positive.

Finally, the assumptions presented in this Business plan are advantageous for the period of activity considered.

5.4   Risk Analysis

Risks inherent to the take-up of the project result have to be managed along this market preparation phase. The risk management process assists in decision-making by taking into account the uncertainty and possibility of an event occurring that may either be intended or unintended, plus how they will affect the post-project objectives.

The table below identifies internal (Financial and Administrative) and external risks, thus Market and Business-related risks, that have to be correctly managed.

In addition, actions to be undertaken in the event that project risks are realised have been proposed accordingly.

Risk	Description	Contingency plan
Financial Risks	Limited financial resources to maintain the software as expected. Misuse of the company's budget. Delays in the investors payments that could block the development of premium services undermining the business extension.	The budget has been thoroughly estimated to cover all costs associated to work to be performed but partners are also to cofinance in case it is necessary. The chief financial officer (CFO) will monitor all the costs on a regular basis to ensure that they are properly used to achieve the company's objectives. CFO will be in constant touch with investors to ensure that no delays occur.
Administrative Risks	• Delays in submitting the work development reports and deliverables to investors. • Partner(s) withdrawal during the joint exploitation of FREEWAT.	The CEO will arrange regular Board Meetings with investors to make sure that the partners involved in the joint exploitation of FREEWAT provides work development reports by the appointed time. In the event that a partner

		leaves the post-project phase, the coordinator will evaluate the possibility to continue with the business without this partner. If this is possible, two options will be evaluated: 1) the redistribution of the remaining tasks among other partners, and
		2) the inclusion of a new partner that substitute it. The coordinator will contact investors to inform and agree on the best option.
External Risks	• Possibility of appearance / positioning on the market of similar suites of tools with more advanced features. • Low interest of the potential final users and relevant stakeholders.	Constant technology watch will be performed. In case of appearance of similar products, development of new tools to be integrated in FREEWAT software is foreseen. This will secure our competitive edge. Intensify the dissemination and marketing activities, focusing on the benefits of using the FREEWAT suite of services.

Table 8. Risk Assessment and Contingency Plan.

6 MARKETING STRATEGY

FREEWAT Consortium has planned a set of specific marketing activities with the purpose of attracting the interest of prospective customers to the software as well as extending the use of the software and related services to as many end-users as possible.

To successfully achieve this endeavour three actions will be strategically undertaken:

- sending emails (DEM campaign, paragraph 6.1).

- digital PR - including social networks - to generate natural traffic to the FREEWAT (paragraph 6.2).

- google search engine (SEO campaign, paragraph 6.3).

6.1 Direct Email Marketing (DEM)

Direct Email Marketing is one of the most direct web communication channels, allowing brands to promote themselves, their products or services online.

It can be used to cultivate relationships with target audience, provide information, news and updates and lead, in some cases, to service or product purchases – in FREEWAT business, premium services.

This strategy will lead to the achievement of two objectives: new customer acquisition and customer loyalty, achieved by cultivating and maintaining a strong and lasting relationship with users, ensuring that they return to use the software over the time.

DEM strategy will be structured in:

- Acquisition of new users.

- Retention of existing users.

6.1.1 Acquisition

To attract new users to the FREEWAT cloud, three targeted DEM campaigns will be planned and executed, focusing on the customers defined in Section 3.2. This DEM will consist of 3-email campaign, to be deployed every two weeks. It will be designed to support the software growth and deliver important information or updates. The primary objective is to convert these contacts (software subscribers) and, as a result, to trigger an autonomous traffic of users. Each campaign will feature highlights, advantages, service description and ad hoc news for each Persona category.

Valuable content will be created accurately measuring tone so that does not irritate the users, but conversely encourages them to use FREEWAT as a working tool. An example is provided below displaying how to introduce the software and encouraging recipients to access the software (Fig. 10).
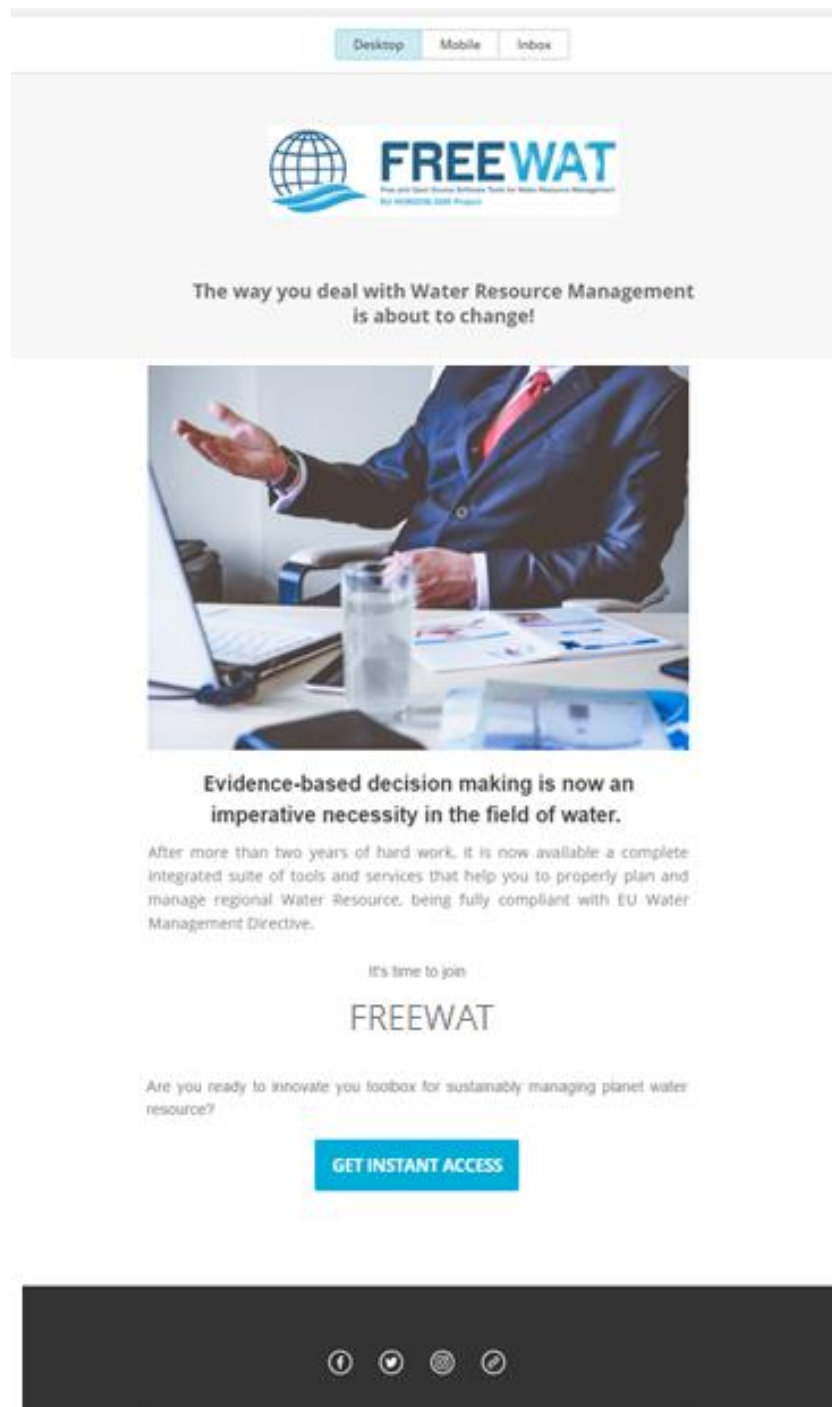
Figure 10. DEM example – Persona 1

The email template consists of: the hero image, which advises and helps the recipient, the main textual message, and the call-to-action (in this case, 'Get instant access'), which invites recipients to further investigate the content.

6.1.2 Loyalty and Automation

The second DEM phase - retention of existing users - will be achieved by structuring a newsletter lead nurturing programme that builds a non-invasive, continual communication channel with users subscribed to the mailing list. Thus, primary to the

initiating of this phase, prospect users mailing list will be created. The retention campaign will feature integration and development of new services and tools; new analysis modules; special discounts for training session, new pieces of source codes developed.

Newsletters will be sent every three months using an accurate automated system, which easily manages contact lists and email delivery. By sending regular information and updates, users have been informed and aware about the FREEWAT products and services. This will allow stimulating a perception of FREEWAT brand as a tool in tune with customer needs and qualified to provide information, advice and solutions. 'Alerts' can be scheduled and integrated when new modules or tools are available, or when a new service o training class is released.

6.2 Digital Public Relation (P.R.)

Digital PR includes all online activities that aim to raise awareness about FREEWAT brand, while promoting its software and services. Digital PR involves a series of strategic actions that are closely related with, and amplified by, local activities and the dissemination of open content. This creates spontaneous interest and a natural word-of-mouth effect in the right communities and with the right customers.

The channels selected for this activity are:

- Social networks: LinkedIn, Facebook and Twitter, the best-performing platforms for this sector, target audience and interests.

- Newspapers and magazines, which target audiences use as a source of information.

- Blogs, the most content-focused reading resources online.

6.2.1 Social communities

For each "Persona" type identified in target customer analysis phase (paragraph 3.2), the main pages and groups available have been surveyed. The criteria to perform such analysis have been the following: i) relevance of FREEWAT software and services, ii) relevance to Persona interests, iii) number of followers, iv) community activity and likelihood to share.

Personalised conversations in these social segments will be initiated, personalising messages and tailoring the tone of voice to each community. Preferences and needs will be carefully taken into account while having conversations.

6.2.2 Facebook

The Facebook page had been used as a dissemination and communication channel in the last year of the project lifespan. Regularly updated with news and related events, it

collected over 200 followers and will be exploited for disseminating the various elements of this deliverable to facilitate the market update of the software. A regular updated fan base reporting the brand news is a key asset of the digital strategy, allowing users to feel themselves as part of an active community.

6.2.3 LinkedIn

The Consortium has been always very active in the LinkedIn professional social media. In fact a FREEWAT project page was created and maintained by uploading project's information and news on a weekly base. It collected over 700 followers. This social media will be exploited for disseminating the FREEWAT product.

6.2.4 Social Network Advertising

The social networks that we have been selected will allow building paid campaigns with different objectives. Advertising campaign helps to increase traffic on the FREEWAT cloud-based software and increase brand awareness. This is crucial, especially for a software tool that aspires leading the market. Advertising campaigns can be targeted to specific groups: unlike Google campaigns (SEM), which are based on a user's search keywords, Social Network Advertising campaigns allow to actively positioning our messages into a user's ordinary activity flow.

The ads will be triggered on Facebook or LinkedIn, which can be monitored and paused as necessary. Each campaign will be tracked, monitored and modified to optimise costs and performance.

6.2.5 Newspapers and Magazines

Relevant newspapers and magazines have been analysed taking into account the following criteria: topic and content relevant for FREEWAT, publication frequency, authority and overall quality (Table 9). The editorial staff of the selected newspapers and magazines will be contacted by email, in order to publish and share information concerning the services offered by FREEWAT across the web. After getting in touch with the editors, the collaboration could take several directions:

- FREEWAT-authored advertorial.

- Sharing information to allow autonomous creation of ad hoc articles.

FREEWAT	Newspaper & Magazines
Persona 1	Innovation&Tech Today, The Parliament, Water Online, Environment Analyst, Circle of Blue
Persona 2	Water Resources and Industry, ENGINEERING.com, Business Review Europe, DIGITALLOOK
Persona 3	AgroNotizie, La France Agricole, Agriculture.com, ICT in Agriculture, e-

	Agriculture
Persona 4	Water Research, Millionaire, Science Daily, Cordis News, Innovators Magazine

Table 9. List of selected media outlets.

6.2.6 List of Communities selected for Digital PR activities

Table 10 below figures all the communities that have been analysed and will be preferred.

FREEWAT PERSONAS	Communities selected
Persona 1	WISE- Water Information System in Europe, European Union of Water Management Associations (EUWMA), , UN-Water, Netwerc H2o
Persona 2	ACQUEAU cluster, Water Network, Veolia, EU Environment, Environmental Blog, Environmental News Network, Climate-ADAPT, European Network of Environmental Professionals (ENEP)
Persona 3	Copa-Cogeca, Farm-Europe, Forum for Agriculture, Agra-Europe, Plant Life, Ag Wire, EIP-Agri, CAPIGI, Open Food Network
Persona 4	EIP-Water, HighTech Europe, EurEau, Earth Times, WssTP, European Water Association (EWA), Water-JPI

Table 10. List of communities selected.

6.3 Search Engine Marketing (SEM)

Search engine marketing (SEM) refers to a series of online marketing activities that concern search engines. It includes all activities carried out to generate qualified traffic to a website. Within the FREEWAT marketing strategy the purpose to be achieved consists in bringing the largest number of interested visitors to the software for water resource management.

Some SEM activities are based on 'passive' actions that only become active, in the form of sponsored content, when a user is performing a specific online search. Other SEM activities instead use the circuit of Google Partner sites via display ads, used mainly for remarketing. This technique is usually employed when the user is already in contact with at least one of the brand's ads in the past. By doing this, the user's memory of the brand and its services can be strengthened.

6.3.1 Trends

The SEM campaign focuses primarily on keywords and user queries. To estimate the potential market, trend of the keyword "water resource management" over the past 5 years have been analysed (Fig. 11 to 22).

Figure 11. Keyword analysis, Worldwide.

Figure 12. Keyword analysis, Italy.
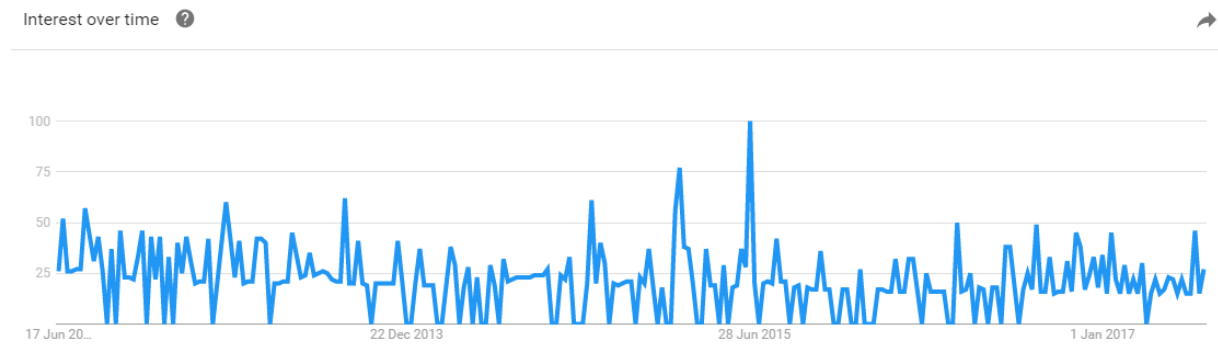

Figure 13. Keyword analysis, Germany.

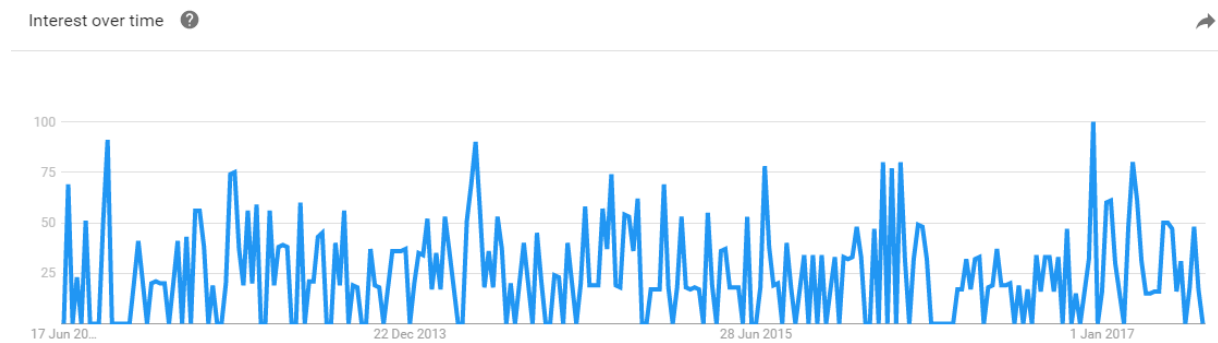Figure 14. Keyword analysis, Spain.
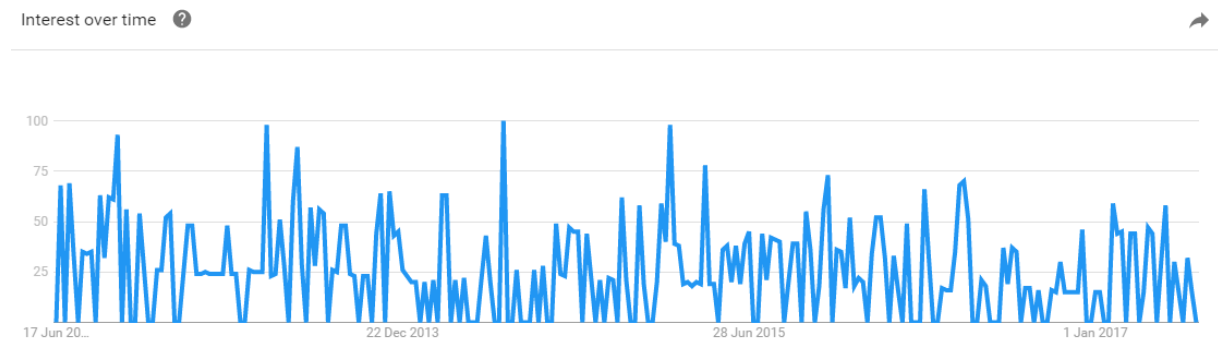

Figure 15. Keyword analysis, France.

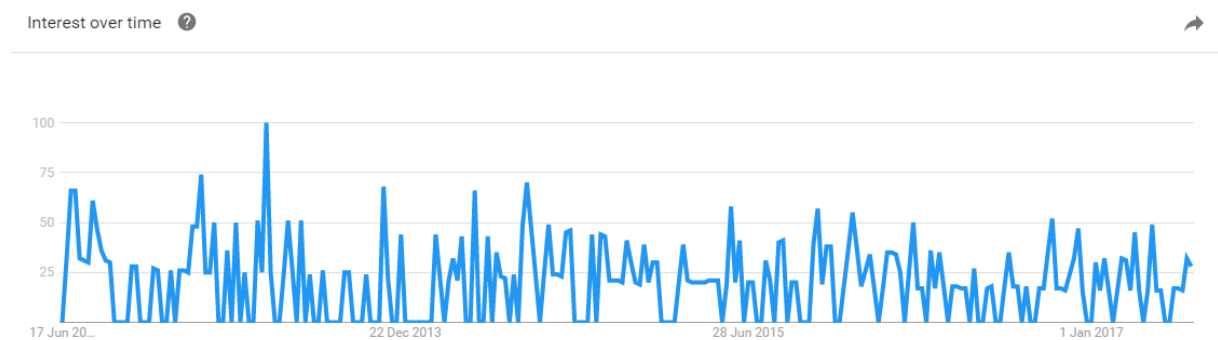Figure 16. Keyword analysis, Czech Republic.

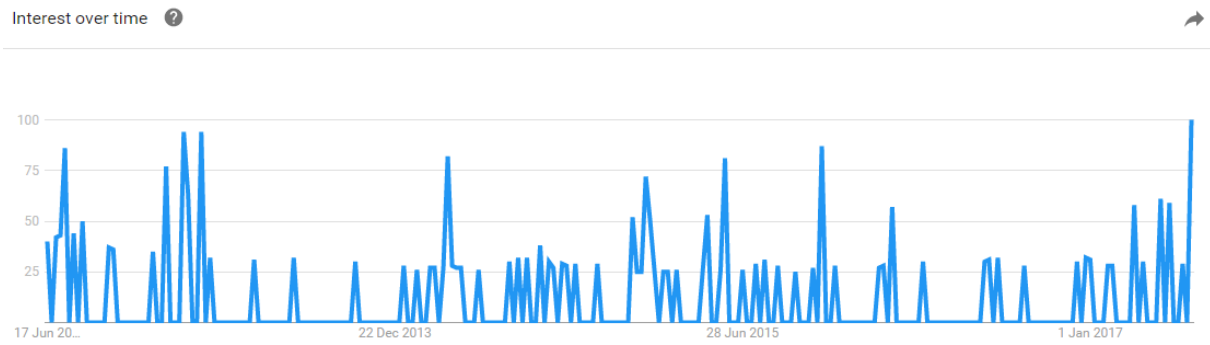
Figure 17. Keyword analysis, Turkey.

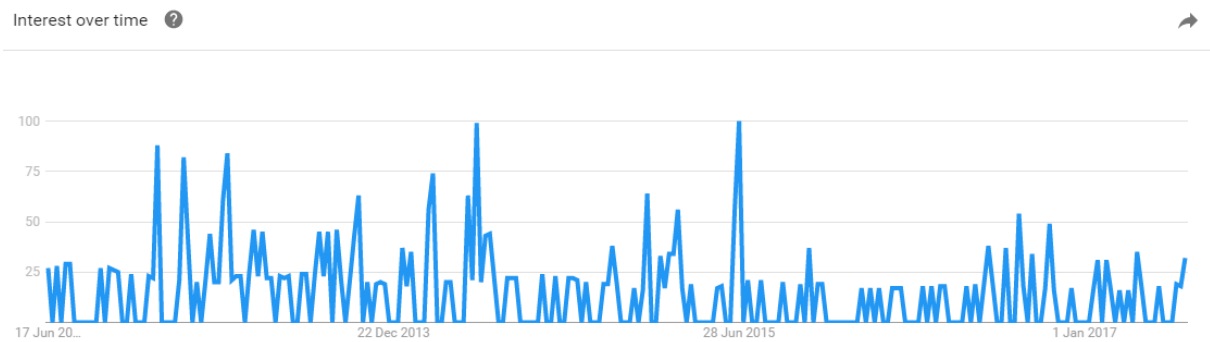Figure 18. Keyword analysis, Greece.

Figure 19. Keyword analysis, Romania.

Figure 20. Keyword analysis, Ukraine.
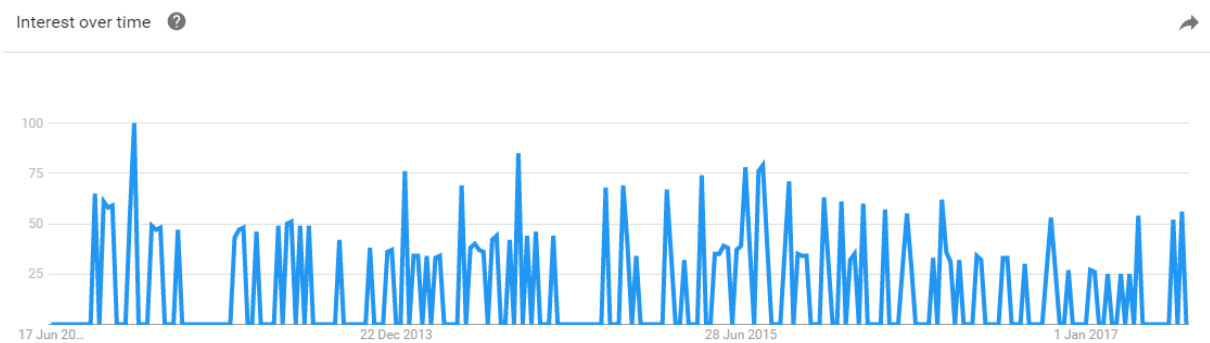

Figure 21. Keyword analysis, Netherlands.

	Keyword	Related % ⇅	Volume ⇅	KD ⇅	CPC (EUR) ⇅	Com. ⇅	Results ⇅	Trend	Last Update	SERP
☐	water resources management	45.00	70	78.49	0.00	0.05	28,400,000		2 days ago	
☐	water management	10.00	70	61.87	2.54	0.22	47,400,000		5 days ago	
☐	resources management	10.00	10	74.28	0.00	0.04	53,600,000		14 May 2017	
☐	resource management	5.00	70	73.78	0.00	0.14	160,000,000		5 days ago	
☐	about water resources	5.00	10	71.85	0.00	0.00	116,000,000		14 May 2017	

Figure 22. Related keywords.

No data concerning trends in Slovenia, Estonia, and Malta has been found.

6.4   Investment Forecast and Gantt

All the actions planned in the present chapter can be split into two main groups: i) marketing campaign requiring a media investment, and ii) marketing actions that can be carried out without a media budget, thus free of charge. The estimated ROI has been calculated accordingly.

According to the traffic target, set at 6300 users in two-year who land on the software, the estimated media investment will be € 4153,5 detailed as follow.

Source	Clicks expected	Cost per click (€)	Cost 2-year period (€)
S.E.M.	4000	0,12	480
Facebook	1350	1,18	1593
Linkedin	950	2,19	2080,5
Total	6300		4153,5

Table 11. Investment Forecasts.

Planned activities will be organised according to the proposed GANTT outlined in Tab.12.

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Target (no of users)
S.E.M		■	■		■	■		■	4000
D.E.M.	■		■		■		■		1700
Digital PR	■	■	■						2000

Facebook adv		■		■		■		■	1350
LinkedIn adv		■	■						950
Content creation	■	■	■		■	■	■		-
Tot									10000

Table 12. Marketing Plan – 2-year period.

Even if the SEM channel is the most profitable in terms of cost/performance, it may fail to reach the target personas. The less profitable channel in terms of cost/performance is LinkedIn. We have estimated the media budget as the starting point from which we can monitor the results of digital PR and email marketing. Having a well-defined objective, we can measure all our activities and decrease the estimated budget in case results of our marketing activities are optimal that expected.

7   Conclusions

The present deliverable details the business model of the FREEWAT software. After having presented the market framework, in terms of scenario, primary and secondary competitors, and SWOT analysis, the financial strategy has been detailed. It highlights costs structure and revenue streams within five-year period. In order to estimate the profitability of the business, break-even point has been calculated as well as the associated ROI, which demonstrate high level of business appeal.

Although the FREEWAT software will be released under the GPL license, different aspects of Intellectual Property Rights and Licensing have been investigated. Open source and open access are the leit motive of FREEWAT, but importantly competitiveness of the partners participating in the joint exploitation and the innovation of water management sector have been the engine of the planned strategy.

In order to sustain a smooth penetration of the FREEWAT software among the target users a detail marketing campaign has been planned. Profiles of each prospective customer typology as well as preferred marketing channels have been traced. The Preliminary Business Model Canvas for FREEWAT-based services is presented in Table 13.

Key Partners	Key Activities	Value Proposition	Customer Relationships	Customer Segments
FREEWAT's Consortium partners Communications Agencies Smart Sensors Providers Members of international networks for water (Custer ICT for water, EIP Water, etc.)	Software installation and maintenance • Training Running simulations	Low-cost study on water balances and water resource availability A tool to assess data-driven water management plans to be included in planning policies An integrated system to simulate several aspects of the water management process: consumption, water delivery, water rights definition	Training Help Desk Users' Community	Public Body (Local Government) River Basin Authority; Water Utility; Environmental Protection Agency Environmental consulting company; Construction works company
	Key Resources Project manager IT Specialist Modeler Modeler External co-financing	Possibility to run and manage simulations in a GIS system, in connection to data fed by sensors network or remote datasets (WMS, WFS, etc.) Customized version of FREEWAT, as part of in-house monitoring and control tools Low-cost service to run simulations included in EIA studies Low-cost service for estimating remediation of contaminated sites	**Channels** User Group Meetings Workshops to stakeholders Professional fairs and congresses Professional Socials (LinkedIN, etc.) FREEWAT Project web site	

Cost Structure	Revenue Streams
• Fixed costs for: administration and management. • Variable costs for: software development, running service slots.	• SaaS (Software as a Service) • Service for software customization • Fees for training sessions

Table 13. Preliminary Business Model Canvas for FREEWAT-based services (red colour refers to all the Customer Segments

Document History

19.06.2017   Release of v0.1 first draft prepared by SSSA

01.09.2017   Release of v0.2 after revision of commercial partners

15.09.2017   Release of v0.3 after Coordinator's review

30.11.2017   Release of v1.0 Final version for submission