FLOOD-serv

D6.5 Final Sustainability and Exploitation Plan

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List of abbreviations

<Abbreviation>	<Explanation>
ANO	A.N.O. SISTEMAS DE INFORMATICA E SERVICOS LDA
ANSWARE	ANSWARETECH SL
BILBAO	AYUNTAMIENTO DE BILBAO
BMC	Business Model Canvas
BSK	BRATISLAVSKY SAMOSPRAVNY KRAJ
CDF	Citizen Direct Feedback
CMVNF	MUNICIPIO DE VILA NOVA DE FAMALICAO
DDNI	INSTITUTUL NATIONAL DE CERCETARE - DEZVOLTARE DELTA DUNARI
DoA	Description of Action
EC	European Commission
EMC	Emergency Management Console
EU	European Union
EXDWARF	EXDWARF CONSULTING SRO
GA	Grant Agreement
GENOVA	COMUNE DI GENOVA *(Municipality of Genova)*
GIS	Geographic Information System
GOV2U	GOVERNMENT TO YOU
ICT	Information and Communication Technologies
IAS	Integrated Application Suite
IP TULCEA	INSTITUTIA PREFECTULUI JUDETUL TULCEA
Mx	Month X
REA	Research Executive Agency
SIVECO	SIVECO S.A. ROMANIA
SMC	Social Media Component
TMC	Territory Management Component
TRL	Technology Readiness Level
WPx	Work Package x

Executive summary

The deliverable titled D6.5 *"Final Sustainability and Exploitation Final Plan"* is part of the WP6 *"Stakeholders Engagement, Dissemination and Exploitation"* and forms a report on the final plan of the FLOOD-serv's consortium for furthering its results after the EC funding has ended. Specifically, it presents the reader with the exploitable results of the project, as were clearly defined by the DoA and focuses on the Business Model that will be adopted by the FLOOD-serv system.

This document aims to extend the scope of D6.4 "Sustainability and Exploitation Initial Plan", by providing additional information concerning the development of the project that has advanced since the previous deliverable and to outline future actions beyond the completion of FLOOD-serv. The Business Model Canvas template is used once again as a strategic management template commonly and successfully used by companies, start-ups and/or organizations for developing business models, so as to establish common ideas among the members of a team (i.e., the consortium) and align them with the final product/service that will be provided to potential customers, and their potential future exploitation directions. The exploitation strategy of the consortium as well as the individual exploitation plans of each partner are presented as specified in the DoA.

As mentioned in the D6.4, the FLOOD-serv Business Model assisted in deciding on the market where its value proposition will be offered in order to provide fullest benefit to society as there is no pre-existing market. Within this framework, the consortium after processing historical data from different sources concerning flood events across Europe during the past decades concluded that 32 areas of international river basins face the risk of flood events recurrence. Municipalities and/or prefectures based at the identified areas are considered as the most appropriate market for our project to start offering its solution. Nevertheless, a projection of the impacts due to climate change renders at flood risk even more areas in Europe. In terms of examining all possible revenue streams other markets have also been included such as the petroleum sector, forecasting institutes, livestock agricultural sector, insurance companies and so on. Beyond the above, this model presented the revenue models that were considered during this project's phase as the most appropriate ones for making a profit out of the offered solution. The D6.5 also includes a competitors' analysis for exploring potential *"threats"* from similar solutions to the FLOOD-serv system as well as for identifying possible collaborations with them.

A second online survey (questionnaire) was circulated among project partners with the purpose of collecting their input. The questions of this survey were similar as those used in D6.4, with some additions (Solutions, Benefits, Future Research, Key Application Areas, Risk Management Plan), which aimed to analyse the differences in the value proposition, when compared to the initial business plan for this project. Consortium partners' input created the basis for the plan of exploiting the FLOOD-serv's output in this final stage and identified its possible future directions.

Introduction

The current document will present information on the ways that the FLOOD-serv system will be rendered economically sustainable. However, it is important to first mention the plans and knowledge that the consortium partners, relying on their previous experience, attributed prior to joining the project. Once this information is presented, it is important to display the FLOOD-serv results as well as the intentions of the partners, which will be exploited after the end of the EC funding. Overall, the presented Business Model in this document is market-oriented and consistent with the DoA.

Furthermore, IT solutions similar to those of the FLOOD-serv system have been identified and researched, so as to determine what has been developed by similar (mainly EU funded) projects and how they are making their services available to the market. Subsequently, these EU funded projects could form future collaborations and share their expertise and results with the ones of FLOOD-serv. Eventually, such collaborations could possibly lead to the formation of a spin-off company *(or companies)* comprised of some or all project partners of FLOOD-serv.

The production of D6.5 is the outcome of the collaboration of WP6 leader with all private companies partners in the project-ANSWARE, ANO, EXDWARF and SIVECO, as well as of 2 of the pilots-BSK, DDNI and IP TULCEA. Each of the mentioned organizations provided its input by its nominated member in the Dissemination and Exploitation Board. The draft version of D6.5 was created by Gov2u and circulated among the consortium for reviewing and commenting. The final version incorporated all additions/corrections made by partners. A 2.0 version was created following the final review of the project and the comments that were instructed by the reviewers for improvement of this deliverable. According to the DoA the contents of the current deliverable are of confidential nature and thus will only be available for members of the FLOOD-serv consortium as well as the funding authority (*i.e. Research Executive Agency and European Commission*).

- **FLOOD-serv project partners:** Establishes a common understanding among the consortium and assists its members in performing joint actions for retaining and exploiting the project's outcomes beyond the EC funding.
- **Research Executive Agency /European Commission:** Reports the Business Model that the FLOOD-serv consortium has decided to follow in order to exploit its outcomes and drafts the market analysis of the provided solution

In order to ensure the quality of the current document, online discussions via Telcos and emails with the consortium members have been made so as to make sure that all views and perspectives have been expressed. In this context WP6 leader prepared the initial draft and distributed it to project partners for reviewing and contributing. Later on, all comments were evaluated and incorporated in the document. Language quality control has been performed and the official FLOOD-serv template for deliverables has been used.

FLOOD-serv Background

The acute problem of all types of floods that occur across Europe is mainly triggered by human intervention to the environment and the environmental pollution caused by the industrial revolution. During the past decades many programmes and projects have been implemented by European governments and the European Commission for improving the infrastructures that will assist in the reduction of flood effects such as human and economic losses. However, the climate change increases the risks of flood events and for this reason areas susceptible to and severely struck by floods have developed plans through the local authorities *(municipalities and prefectures)* for the prevention and alert mechanisms for the timely evacuation of the inhabitants before such incidents occur. The FLOOD-serv project was launched in 1 August 2016 with a lifetime of 36 months, aiming to develop and to provide a pro-active and personalised citizen-centric public service application that will enhance the involvement of the citizens and will harness the collaborative power of ICT networks (networks of people, knowledge, and sensors) to raise awareness of flood risks and to enable collective risk mitigation solutions and response actions.

Available Solutions in FLOOD-serv Pilot sites

The pilot sites of the FLOOD-serv project, described in detail in the DoA, due to their frequent coping with flood events have developed plans and/or IT solutions for protecting their citizens. Subsequently, before expanding on the Business Model that the project will follow for sustaining and exploiting the project's results, we present the measures that the pilot sites have undertaken prior to joining the project.

A. **Genova** *(Italy):* Tools for alerting citizens have been developed. Plenty of separate communication channels are used in order to inform operators and citizens i.e. **website, web app** and **SMS services**:
   - http://servizi-meteoliguria.arpal.gov.it/protezione-civile/index.html *(website)*
   - http://www.comune.genova.it/servizi/protezionecivile *(website)*
   - http://iononrischio.comune.genova.it/ *(Web App and App for IOS and Android)*
   - http://segnalazionisms.comune.genova.it/ *(SMS service)*
   - https://it-it.facebook.com/pages/Protezione-Civile-Comune-di-Genova/1501293710091897 *(media channel)*

B. **Tulcea** *(Romania):* The involvement in flood management related projects in **DANUBE FLOODRISK** and **SMARTWATER** has opened the communication channels regarding the flood mitigation in the Danube Delta area and has offered the basis for FLOOD-serv success.

C. **Bilbao** *(Spain):* There is a local GIS tool where a lot of information can be accessed
   - *Plan de Emergencia Municipal de Bilbao.* In this document the risks and actions to follow are laid out.
   - Municipality OPENDATA PORTAL,
   - Municipality GEOPORTAL
   - DATA RIVER FLOWS *(Province Government Diputación Foral de Bizkaia)*
   - METEOROLOGICAL DATA

D. **Bratislava** *(Slovakia):* There is a geoportal called **Geoportál BSK** which aims to provide a map of cultural, sports and historical objects. Additionally, there is a third degree of water planning in the municipalities *(local water planning*) and the application of integrated water resources management into practice through the compilation of plans.

E. **Famalicao** *(Portugal):* The occurrence of flood incidents has become so common in this council, **forcing** the outlining and structuring of contingency plans to prevent its recurrence. One of these plans is called **PGRH** *(Plans River Basin Management)*, aimed at structuring a set of steps to support the management, protection and environmental valorisation, social and economization of the water.

Developed Components from FLOOD-serv Commercial partners

The commercial partners of FLOOD-serv prior to joining the project were involved in the development of the components presented in **table 1**. These components were deployed within the frame of the FLOOD-serv system and further expanded during the project's lifecycle. This table also provides information about the level of technology readiness of the components.

Component	*Comment*	*Technology Readiness Level (TRL)*	*Cluster*
Social Media Sourcing and Communication	*The prototype exists from a R&D project, needs to be integrated and improved*	**TRL 7**	Prototyping and incubation
Text analysis (Tagging) and visualisation	*The prototype exists from a R&D project, needs to be integrated and improved*	**TRL 7**	Concept validation
Emergency Management Console	*The EMC component is based on OPTIME, a decision support system addressed to Decision Makers and in-field First Responders on the Preparedness, Alert, Response and Post Emergency phases. This tool cover different disasters (fire, flood, earthquakes, spills, ...). OPTIME was created within two European - Projects: ITEA2 DiCoMa and FP7 E-SPONDER. OPTIME needs from the support and knowledge of the end users to define the engine of rules which proposes response measures based on the data received. Data are obtained from different data sources, e.g. sensors and mobile or social media reports from emergency personnel and citizens.*	**TRL 7**	Pilot production and demonstration

Territory Monitoring System	The TMS component is based on an imaging processing engine with the capability to identify changes during a period of time and measure water levels	**TRL 6**	Pilot production and demonstration
Citizen Direct Feedback	The CDF component is based on a process and ticked management system, address to optimize and foster interaction between organizations and its citizens. The under lined technology of the component is already in live production mode in several clients.	**TRL 6**	Pilot production and demonstration
Semantic Wiki	Technology demonstrated un relevant environment (industrially relevant environment in the case of KETs)	**TRL6**	Pilot production and demonstration
FLOOD-serv Portal	Technology demonstrated un relevant environment (industrially relevant environment in the case of KETs)	**TRL6**	Pilot production and demonstration

Table 1 : TRLs of the FLOOD-serv system

The project is situated in the spectrum from "**lab to market.**" The starting point for the technical solution of the FLOOD-serv system consists of **four existing prototypes** that are integrated into **one common platform.** All four prototypes have been developed as part of extensive complex R&D projects and have been tested in several settings.

In **Appendix I** the reader can find a detailed description of all TRLs as given in a paper under the title *"The TRL Scale as a Research & Innovation Policy Tool, EARTO Recommendations".*

FLOOD-serv Exploitable Results & Individual Plans

Exploitable results of FLOOD-serv project

The knowledge that was produced throughout the project's duration can be grouped in two categories:

i. **Knowledge products** *(deliverables, software products, reports);*
ii. **Supportive knowledge material** i.e. material that is required for the production of knowledge products *(such as background materials, surveys conducted etc.).*

An overview of the results that have been produced and exploited by the project partners are shown in **table 2.**

Exploitable results	*Exploitable products or services*	*Sector of application*
The FLOOD-serv system as a whole	Decision Support Systems in flood risk management and in other application areas related to sustainability	- Flood risk management, Early warning of flooding and other types of disasters. - Early warning of terrorism Community policing Humanitarian aid & Civil protection
Mobile app	Disaster and crisis management apps, Sensor-based mobile apps	- Disasters alert - Emergency preparedness
Social networks data mining techniques and methods	Social networks data mining software and applications-semantic technologies for recognition of topics related to hazards, for mining public data for supporting early warning decisions and meaning extraction.	- Early warning of disasters - Emergency response
Visual analytics of network data *(network data = large and complex data sets acquired from various external data sources: sensors, social media, mobile sensing).*	Visualization and data analysis systems	- Early warning of disasters - Emergency response - GIS-based applied decision making - Geospatial predictive modelling - Situational awareness

Table 2 : Exploitable results of FLOOD-serv

Exploitation strategy

Within this section, we will present relevant aspects concerning the common exploitation strategy:

Why does the project exist?	H2020 project to develop a personalised citizen-centric public service application to raise awareness on flood risks and to enable collective risk mitigation solutions and response actions
Who do we need to be to do that?	A diverse, passionate consortium of partners with various expertise and background willing to empower local communities to directly participate in the design of emergency services dealing with floods mitigation actions
Big Goal	To provide a complex and innovative integrated ICT portal to give the citizens and the local authorities the opportunity to encourage the development and implementation of long-term, cost-effective and environmentally sound mitigation actions related to floods
What are we building to accomplish this?	- A suite of web-based applications and mobile devices - Accessible from computers and smartphones
How will we build this project?	- Engaging all partners both commercial and public institutions involved in the Consortium - Engaging relevant public authorities
What is the work to be done in the coming months? Key activities	- Go-to market strategy approved by the Consortium - Launching first marketable Integrated Application Suite (IAS) prototype - Commercial effort - Dissemination
Measurable outcomes	- Suite of applications (IAS) ready to be used - Marketing strategy established - X number of users willing to use the respective IAS - X number of local authorities willing to use the respective IAS - X number of private clients interested in buying the respective - IAS

Table 3: Exploitable aspects of FLOOD-serv

The members of consortium considered that the joint ownership of software with specific rules for individual owned results is the most suitable exploitation strategy.
The legal document, agreed by all partners, which governs the exploitation issues and collaboration framework is the IPR Agreement. The IPR Agreement presents relevant aspects addressing the ownership share and commercial exploitation.

The IPR Agreement encompasses the general and individual obligations of the parties in connection with the scope of exploiting *the foreground* resulting from the project.
The purpose of the IPR is to set out the terms and conditions governing the mutual relationship and respective rights and obligations of the parties regarding the ownership and commercial exploitation of the project results.

The exploitable foreground of the consortium could be ranged in three major groups: (a) for further research (parts of software applications,…); (b) for creating and commercialize a marketable product (e.g. FLOOD-serv IAS or components/applications of the FLOOD-serv solution); (c) for creating and providing a service for others (e.g. joint venture/partnership).

IPR Management - Legal framework of FLOOD-serv

The stipulations of the IPR Agreement follow the preliminary aspects concerning the exploitation approach as it is presented within the Description of Action (DoA) and the Consortium Agreement (CA). These documents depict the general provisions about the jointly ownership for results, dissemination approach and exploitation strategy.

The IPR Agreement represents the regularized framework of our exploitation approach. We present in the following some relevant aspects concerning the terms and recommendations of the IPR management. The integral version of the IPR Agreement is presented in ANNEXES.

Purpose and scope

The IPR Agreement, based on the Consortium Agreement (CA), provides obligations and rights of the project partners related to FLOOD-serv Foreground IP ownership and exploitation. The purpose of the IPR Agreement is to specify in respect of the Project the relationship between the parties in particular concerning the rules of devolution of intellectual property rights results of FLOOD-serv and the related rights and obligations of the parties.

The IPR Agreement is to facilitate commercial exploitation of the Project outcomes and of its Foreground with the provision of taking into account each party individual expectations and creating an enabling environment for FLOOD-serv to reach the market.

Ownership share

Parties agree to respect their individual Background. All Background remains in the ownership of each Party providing the Background. Foreground shall be owned by the Party who carried out the work generating the Foreground, or on whose behalf such work was carried out. Where several Parties have jointly carried out work generating the Foreground and where their

respective share of the work cannot be ascertained, they shall have joint ownership of such Foreground. The IPR regarding the FLOOD-serv Solution is jointly owned by the partners in the quotas reported in the IPR Agreement.

Commercial exploitation

The parties may exploit the Foreground resulting from the project in two different ways:
a) Joint exploitation of the FLOOD-serv solution developed under the project
b) Individual exploitation of the individual contributions of the parties in the FLOOD-serv solution developed under the project.

The exploitation of the FLOOD-serv solution developed under the project, may be done individually by each project partner. In this respect, each party may individually market their components for the FLOOD-serv solution to third parties at a price that is mutually defined by the parties in writing yearly, by signing an amendment to this agreement.

In case of a joint exploitation, the revenues from such sale will be split as follows:
a) The party which concluded the sale will receive 40% of revenue remaining after the taxes are deducted plus a % of the rest of 60% corresponding to the contribution in the final product (if it is the case;
b) The rest of 60% of the net revenue, will be split between the parties in the proportions defined in the IPR Agreement.

The FLOOD-serv partner organization will identify potential benefits and market opportunities, from either a commercial or non-commercial perspective.

FLOOD-serv will consider the following staged process from the pilot towards a full-scale production. As in any research pilot project and new product development project, benefits from a staged release process, is what FLOOD-serv will follow. This staged release will provide the benefit of incremental investment, incremental validation of the business value through the customer feedback, and checkpoints for transparency with local stakeholders for feedback.

The stages will be as follows:

1. Identification of production-suitable of software and hardware components
    - The **Commercial partners** *(SIVECO, ANSWARE and ANO)* will apply the project outcomes as a commercial offering by enhancing their existing products and services by creating of new ones. In this regard, they could integrate some of the modules of the project system into their existing commercial software and license their use by third parties. They will apply and further develop the methodology and individual software implementations of the FLOOD-serv in subsequent contracted research projects, either in publicly funded research (national and EU) or funded through industry. Consultant services can be also offered as technical consultancy or business consultancy by these partners. Focusing on customization and personalization of the FLOOD-serv system while taking the nature and the business of the end-user into consideration simultaneously, integration, training, technological support services can be offered within the framework of the consultancy services. Thus, swap out pilot hardware components for those that meet the full criteria needed for the final solution in regard to cost, size/dimensions, regulatory compliance (e.g. UL,

FCC), durability (e.g. lifespan), and tolerance to environment (e.g. outdoor temperatures).

2. Plan for security and periodic updates
    - The **Technical partners** *(SIVECO, ANSWARE, and ANO) will* consider security aspects before full-scale production. Periodic updates will be required for various reasons, such as compatibility with new operating systems (e.g., new iOS versions and software versions), security patches for newly identified security threats, new features, and bug fixes. A plan will be developed on how the components will be maintained and updated on a regular basis.

3. Conduct scale testing at anticipated production levels
    - The **Technical partners** *(SIVECO, ANSWARE, and ANO)* will ensure that the entire solution, end-to-end, will still operate as intended at scale for the number of devices, amount of data, and upload interval as planned.

4. Conduct reliability testing
    - For the full-scale production, the FLOOD-serv solution has to be reliable and have consistent uptime. It will also need to handle unexpected and abnormal conditions like power outages, intermittent communication, user error, etc. The partners will thoroughly test any components that are built specifically for the FLOOD-serv project and test the full system end-to-end to validate reliable interfaces between the components.

5. Extension of knowledge
    - The Academic partner (DDNI) will use the project knowledge in further internal academic research activities and/or in their teaching programs. They will continue to publish the research results in international conferences, workshops and journals after the end of the project.

6. Consider all upcoming activities
    - Once we have scaled our FLOOD-serv solution to full-scale production and towards the commercialization stage we will aim towards a saleable product.
    - The **public authorities** (GENOVA, BILBAO, IP TULCEA, BSK and CMVNF) can use the project outcomes to set up the FLOOD-serv new technologies to provide situational awareness services to citizens and/or to support more public participation in the decision-making process related to flood risk management. Partners will look further into collaboration opportunities with local governments. Ie. Romania's current launch of 112 Emergency Services to be further exploited for possible future collaboration, and similar practices in pilot cities as well as at global level.
    - The **non-profit partners** *(GOV2U)* will exploit the knowledge and new contacts resulting from the project in the context of future R&D projects. It will also support the exploitation strategy the Consortium will set-up by promoting the project results at third party events and by posting news on social media about exploitation of the project results after the project completion.

7. Current collaboration engagement following the completion of the project
    - The CDF is expected to be exploited in Famalicão for flood and non-flood related issues in the following period of time. The App for citizens and the integration of the Backoffice with an online portal will be used for a smart city and citizen engagement approach project. It is also expected to implement the

CDF on 3 new clients, in a period of 2 years after the project conclusion. For the TMS the expectation is to also implement it in Famalicão for urban area. ANO currently has a few prospects in Brazil.

- It is also important to note that the IT company which provides services to the 112 Emergency services in the Murcia Region (Spain) has already signed a contract with FLOOD-serv partner ANSWARETECH SL to adapt and sell the EMC for Public resources management in Public Administrations, like in public parks, gardens, buildings, etc. This version of the EMC is called EMC Garden.

The Business Model Canvas

To ensure that this report is self-contained, the Business Model Canvas that was described in D6.4 will be replicated here.

What is the Business Model Canvas?

A business model is a representation of the value logic of an organization in terms of how it creates and captures customer value in economic, social, cultural or other contexts. The process of business model construction is part of business strategy. The definition of Business Model according to Osterwalder and Pigneur (2010) is:

"A business model describes the rationale of how an organization creates, delivers, and captures value"

In theory and practice, the term business model is used for a broad range of informal and formal descriptions to represent core aspects of a business, including purpose, business process, target customers, offerings, strategies, infrastructure, organizational structures, sourcing, trading practices, and operational processes and policies including culture

The most celebrated framework used by organizations is the Business Model Canvas *(BMC)* created by Osterwalder and Pigneur (2010)**.** The BMC provides a shared language *(i.e. common terms)* in order to assist the organizations to describe, visualize, assess and change business models. It is focused on design and innovation, in particular by using visual thinking which stimulates a holistic approach and storytelling. [1]

This template is a visual chart consisting in nine blocks *(elements):*

- Key partners
- Key activities
- Key resources
- Value proposition
- Customer relationships
- Channels
- Customer segments
- Cost structure
- Revenue streams

The Business Model Canvas *(template)* presented in **figure 1** is provided by Strategyzer AG under a Creative Commons license and can be used without any restrictions for modelling businesses.

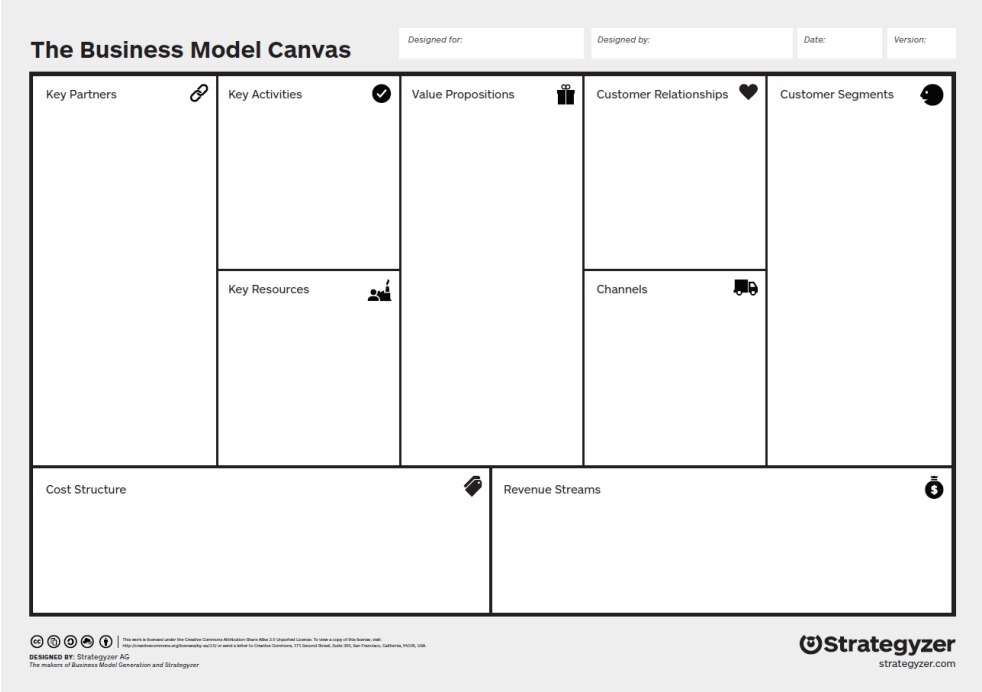


Figure 1: Business Model Canvas (BMC)

According to **Smith et al. (2014)** the segments of BMC are described as follows:

- **Customer Segments** are the groups of people and/or organizations a company or organization aims to reach and create value for with a dedicated value proposition.
- **Value propositions** are based on a bundle of products and services that create value for a customer segment
- **Channels** describe how a value proposition is communicated and delivered to a customer segment through communication, distribution, and sales channels.
- **Customer relationships** outline what type of relationships are established and maintained with each customer segment, and they explain how customers are acquired and retained.
- **Revenue streams** result from a value proposition successfully offered to a customer segment. It is how an organization captures value with a price that customers are willing to pay.
- **Key resources** are the most important assets required to offer and deliver the previously described elements.
- **Key activities** are the most important activities an organization needs to perform well.
- **Key partnerships** show the network of suppliers and partners that bring in external resources and activities.
- **Cost structure** describes all costs incurred to operate a business model. [2]

The use of Business Model Canvas in FLOOD-serv

This deliverable consists of a collective approach of the FLOOD-serv consortium on how the FLOOD-serv system will be sustained after the end of EC funding. For achieving the aforementioned we engaged once again the questionnaire that was circulated to all partners during the creation of D6.4, with the addition of some questions (*Solutions, Benefits, Future Research, Key Application Areas, Risk Management Plan*) that are in accordance with the DoA's description of the tasks that need to be addressed within the current deliverable. This questionnaire was based on the segments of the Business Model Canvas and its questions were

derived from it. Complementary to the BMC questions and in an effort to make quantitative estimations, a set of multiple-choice questions were circulated to assist in defining and drafting the potential revenues. The recirculation of the questionnaire aims to ensure that the information and plans, which were used in D6.4 are updated.

The **online questionnaire** was divided into four parts *(A, B, C and D)*. In **part A,** the partners were asked to complete questions based on BMC with a limitation of 200 words maximum per answer. In **part B,** the questionnaire focused on the risk management, in order to identify actions that arose during the project in order to prevent them from occurring and reduce their impact should they eventuate. In **part C,** the focus turns to IPR matters with the purpose of identifying any modifications and/or additions. Moreover, quantitative questions were included that could help in forming assumptions about potential revenues from exploiting the FLOOD-serv system. In **part D**, partners were asked to give examples of solutions developed by the private sector and/or EU funded projects that provide similar services with the FLOOD-serv system.

The tool that we used for circulating this questionnaire was the Google forms *(free tool)***.**

Part	*S/N*	*Question*	*Explanation*	*Answer*
Part A	**1.**	**Value Proposition**	The offer to the consumer, including how and why it addresses their need. How would the consumers themselves describe the benefit? It's all about their lives! So how can we add value to the process for their possible survival?	Partners' Input
	2.	**Customer Segments**	Who do you see gaining from this product/service? How big are these target groups at present and what do you foresee that size to be in the future? Describe the communities involved and those you believe should/could be involved.	Partners' Input

	3.	**Solutions**	What does the solution consist of? Additional software? Alternative/complimentary framework?	Partners' Input
	4.	**Benefits**	How and why does it address the consumer's needs? How would the consumers themselves describe the benefits?	Partners' Input
	4a.		Identification of the project results and exploitation policies towards further use.	Partners' Input
	5.	**Channels**	How do you suggest the value proposition is communicated and delivered? For example: methods, means, format, etc.	Partners' Input
	6.	**Customer Relationships**	How do we intend to relate and interact with the consumer (customer)?	Partners' Input
	7.	**Key Activities**	Identify the key activities you consider crucial to our Business Models. Which are the most important tasks that must be carried out in order to fulfil our business purpose following the completion of the project?	Partners' Input
	7a.	**Future Research**	Identify the future research directions made possible by the project.	Partners' Input
	8.	**Key Resources**	Which resources do we really need in order to create the value proposition?	Partners' Input
	9.	**Key Partners**	Who will we need to partner with or what is the input that we are dependent on in order to develop/deliver the value proposition following the completion of the	Partners' Input

			project? The conditions for future adoption of FLOOD-serv-like system.	
	9a.	**Key Application Areas**	Identification of other application areas related to sustainability where the FLOOD-serv technology and methodology set could offer significant added value.	Partners' Input
	9b.	**Key Competitors**	Identify key competitors and FLOOD-serv's points of difference versus each of them.	Partners' Input
	9c.	**Revenue Streams**	If the consumer is expected to pay fees what would be the cost type.	Partners' Input
	9d.	**Revenue Streams**	If the product will be available to consumer at no cost, what will the alternative means of revenue be?	Partners' Input
	10.	**Cost Structures**	What are the forecast development costs of the value proposition? For example, costs for: personnel, travel, IT development, etc.	Partners' Input
PART B				
	1.	**Risk Management Plan**	Describe/specify /identify actions that occurred during the project to prevent them from occurring and reduce their impact should they eventuate.	Partners' Input
PART C				
	1.	**IPR**	Describe/specify compensation amounts your organization may demand on rights outside those	Partners' Input

			mentioned in the Grant Agreement (page 158). In case of amendments made in IPR you are kindly requested to provide details on the topic.	
		Quantitative Questions		
	A.	Minimum number of consumers (users) per year	5 companies/municipalities/NGOs etc 3 companies/municipalities/NGOs etc 1 companies/municipalities/NGOs etc Other:	Partners' Input
	B.	How many times per year will the consumers be using our service/system?	Per risk exposure to natural hazards Cannot be defined 4 times per year more than 4 times per year Other:	Partners' Input
	C.	Suggest a price you believe consumers would be willing to pay per use case. Please mention an example - if available.		Partners' Input
PART D				

	1.	Potential Competitors	Please give examples of EU funded projects or companies that provide or will provide services similar to the FLOOD-serv solution.	Partners' Input

Table 4:The Questionnaire

FLOOD-serv Business Model

The current section provides information concerning the elements that will enable the FLOOD-serv consortium to form a successful Business Plan that will ensure the sustainability of the project's developed system as well as its outcomes after the end of EC funding. In this final plan the main goal is to clearly define the value proposition as well as the customer segments. Moreover, it contains estimations about what the partnership would need to plan, establish and acquire in order to implement the FLOOD-serv Business Model beyond the project's lifecycle.

Lastly, the Business Model presented in this chapter has been created in collaboration with members of the consortium (Answare, SIVECO, ANO, Exdwarf, Gov2U).

Value proposition

The value proposition describes the offer to the consumer as well as how and why the FLOOD-serv system satisfies their needs.

In our case, the FLOOD-serv system offers **timely alerting** to its end users **before** any type of **flood event** occurs, **analysis** of the **crisis situation** and **proposes appropriate response** to fight against it. It also provides flood events reports and access to data from various outside sources such as meteorological and hydrological data. In addition, the system involves citizens in the process of flood management by providing them a portal where they can submit messages to the relevant authorities. The system will deliver its offer to the customers via a **web portal** and a **mobile application.**

- FLOOD-serv is a citizen - driven / user centric solution
- FLOOD-serv is governance profile – focused solution
- FLOOD-serv provides real time support and on demand support
- Innovative architectural approach
- FLOOD-serv is a targeted business field solution.

In short, the FLOOD-serv system is comprised of five components, which could be commercialized in applications packages as IAS (Integrated Application Suite):

i. **Emergency Management Console** *(EMC):* analyses the situation of the crisis and proposes the appropriate response measures to fight it against based on the data received.
ii. **Social Media Component** *(SMC):* Consists of multichannel social media sourcing, two-way communication and related analysis.
iii. **Territory Monitoring System** *(TMS):* identifies flood risks within an extensive geographic area, through the analysis of satellite or airplane images of the territory, and **generate alerts** to the EMC.
iv. **Citizen Direct Feedback** *(CDF):* provides a direct communication channel from the citizens to the respective local authorities and inform them about any flood related information, in terms of risks or prevention**.**
v. **Semantic Wiki Component** *(SW):* is a multi-lingual component to accompany the educational and the emergency management's facilities of the FLOOD-serv system. It presents text human readable and annotated, machine readable content about floods and flood management.
vi. **Portal**

Figure 3 represents how the data flow occurs within the system as well as their integration in order to provide the offer to customers *(users).* The Emergency Management Console extracts data from three modules i.e. SMC, TMC, CDF as well as sensors and open data.

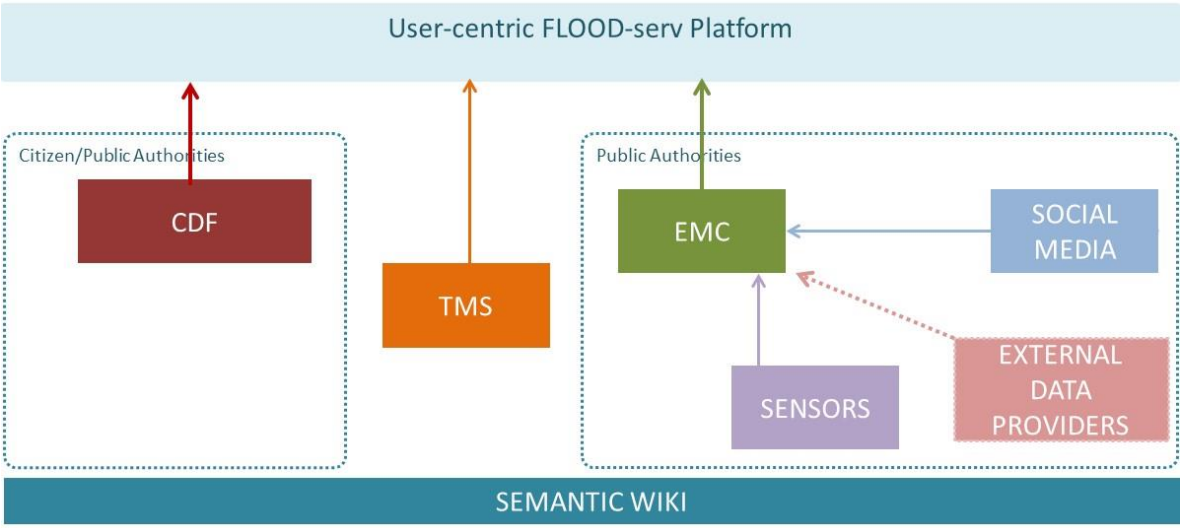


Figure 2: Representation of the data flow of FLOOD-serv system

Specifically, most of the system's components are prototypes which have been already developed from past R&D projects. The only exception is the Semantic Wiki component which is a new one and was developed during our project's lifecycle. These prototypes were clustered into different TRLs *(Technology Readiness Levels)* as presented in **Table 1.** All components will be further improved and integrated under the umbrella of the FLOOD-serv system.

Customer Segments

The current block of customer segments in FLOOD-serv Business Model underlines the difference between consumers and customers and presents the groups of potential customers that may generate income for the FLOOD-serv system. The consumers of the FLOOD-serv solution can be divided into three large groups:

- **Citizens** *(communities)* who inhabit areas with high risk of flood events;
- **Public authorities** such as municipalities located in areas with high risk of flood events and in general ministries and governments that will use the FLOOD-serv system as a communication channel with citizens. The communication among citizens and public authorities will define better emergency plans that will reduce flood effects in human losses and in local economy. It will also build trust and increase transparency in decision making processes.
- **Emergency personnel** such as fire fighters, civil protection, police, the pan-European emergency service of 112 and so on that will be able to be signalled by the system before flood event in order to evacuate areas in risk and proactively save lives. During and after the flood events to acquire information quicker than before and provide help where necessary.

It is important to mention that the FLOOD-serv system will be given free of charge to the citizens of the pilots. However, the financial viability of the system is primarily required in order to achieve its sustainability after the end of EC funding. The offered solution needs to generate income from resources that are not dependent to end users *(consumers).* The system needs to have customers *(individuals and/or organizations)* who are willing to pay a price either for the whole offered FLOOD-serv solution or for the developed components. For this reason, the components of the FLOOD-serv system could serve as assets and generate income from the following groups of customers identified so far:

1. **Construction companies;**
2. **Municipalities/prefectures** *(not involved in the FLOOD-serv project)*
3. **Transportation companies;**
4. **Tour operators** and **accommodation providers** in touristic areas that confront the risks of flood events;
5. **Insurance companies;**
6. **Car manufactures** incorporating the flood signalling/warning system within the cars' software;
7. **Organizers of expos, festivals, concerts** and in general events/happening that involve a large number of attendants/participants;
8. **News and media providers;**
9. **Search and retrieval operators** such as marketers;
10. **Organizations/companies working on geographic and sociographic data** such as surveys, financial and business planners;
11. **Livestock/agricultural holdings;**
12. **Food companies;**
13. **Forecasting institutes;**
14. **Water companies;**
15. **Monitor gardens;**
16. **Monitor municipalities' resources;**
17. **Petroleum industry** *(in order to avoid economic losses & environmental pollution);*
18. **Data filtering for reducing "noise"** *(irrelevant content);*
19. **Extensions on different kind of disasters like fire, earthquake, and spills.**

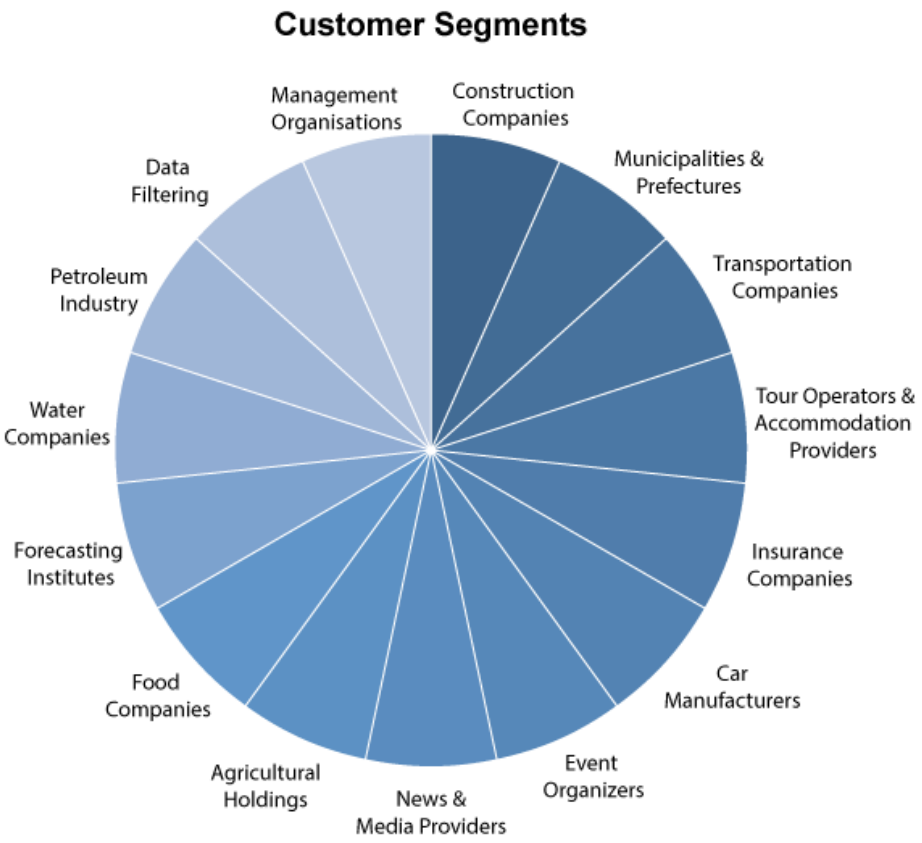


Figure 3: Customer Segments

Estimations about the FLOOD-serv Business Model

In the current section, we estimate what the partnership would need to plan, establish and acquire in order to implement the FLOOD-serv Business Model beyond the project's lifecycle. The estimations are categorized according to the following topics:

- Channels;
- Customer Relationships;
- Key Activities;
- Key Resources;
- Key Application Areas;
- Key Competitors;
- Future Research;
- Revenue Streams;
- Cost Structure.

Channels

The consortium can deliver the value proposition of the FLOOD-serv system to its potential customers through its own channels *(web portal and mobile app)* as well as partners' channels. These channels can serve as efficient and cost-effective tools for conveying the desired "message" to the potential customers.

The FLOOD-serv system is developed by a consortium consisted in commercial partners, academics, public authorities as well as non-profit ones. On one hand, the commercial partners that come from various countries across Europe are pioneers in developing innovative IT tools. Their valuable sales networks can also act as channels for approaching customers and deliver to them the services of the system. The commercial partners have strong sales network at national and pan-European level where few of them international one.

The possible use of WPRO sales channel *(or establishing new one)* would require significant resources as face to face meetings among vendors and customers should be made in areas suffered from flood events, offer the solution and make price comparison with other administration designed instruments *(e.g. electronic archive, accounting programmes, document management, etc.).*

On the other hand, academic and non-profit partners as well as public authorities can reach out their wider network of contacts so as to promote the project's results. This network is comprised of students *(university and school)*, professors, decision makers, policy makers, institutions, civil protection organizations, NGOs related to the project's topic, press, and media and so on. By the aforementioned networks the system will be communicated. So far, the FLOOD-serv project has been communicated through:

- Publications;
- Post on blogs related to flood topics;
- Social media posts on FLOOD-serv accounts*;*
- Newsletters *(published by the involved organizations in the FLOOD-serv project);*
- Promotional Materials;
- Press releases *(published by the involved organizations in the FLOOD-serv project);*
- Articles and posts at partners' organizational websites and social media accounts;
- Presentations of the system at relevant conferences;
- Presentations of the system in workshops open in public;
- Presentations of the system in local universities, institutions and schools.

Given that the majority of the expected customers are governmental and business organizations, the most appropriate means for **Business-to-Government** *(B2G)* and **Business-to-Business** *(B2B)* communication is direct one through face-to-face meetings and live demonstrations of the system. Before B2B and B2G face-to-face communication, research to identify relevant contacts and phone and email communication will have been preceded. Moreover, recommendations about the FLOOD-serv system from prestigious customers such as municipalities, hydrological institutes, civil protection and so on that have already used the system could be send to potential customers via post or email.

Customer Relationships

The hands-on experience of consortium partners in providing services/products has showed that **building consumer trust** is one of the most important aspects in sustaining in the market. For this reason, the FLOOD-serv Business Model will be based initially on personal contacts of project partners with potentials customers and as a consequence their well-established networks will act supportively on that. By this practice, the costs for these types of activities will be kept low.

The consortium will rely upon these well-established contacts across Europe with municipalities, civil protection organizations, fire-fighters, mayors and decision makers, public authorities, hydrological institutions, academia, IT companies, innovative entrepreneurs that through the word of mouth will act as a **multiplier factor** by attracting more end users and generally audience beyond these contacts. Supplementary, the constant participation of

project partners in public events *(local, national and international*) accompanied by **live demonstrations** of the FLOOD-serv system will foster trust around it.

It is important to mention that the **satisfied end users** who will be the first ones to deploy the FLOOD-serv system would deed as "promoters". Their experience as users as well as their recommendations will motivate more stakeholders to use it and be benefited by the offered solutions.

Key Activities

The FLOOD-serv system was developed and delivered to end users for testing and evaluation during the project's lifecycle. Thus, further actions that consider the development of the system will not be required after the end of EC funding. We have identified, though, the most significant actions that should be made after the end of the project's duration in order to sustain the FLOOD-serv solution and further exploit its outcomes. This will be achieved by executing the system's value proposition and deliver to its customers. The actions that are needed are:

- **Demonstration of the system**;
- **Marketing & sales activities**;
- **Training program** for institutions, public authorities, emergency personnel and citizens in order to enable them use the FLOOD-serv system. Moreover, by this practice it will be easier to identify what kind of problems to advise the end –user *(online tutorials could be used);*
- **Foster awareness** on flood events to citizens;
- **Engage public administrations** & **Emergency personnel;**
- **Collect messages from citizens** via social media;
- **Collect data from social media;**
- **Collect data from sensors;**
- **Collect data from UAV and airplane photos;**
- **Collect Data from satellites;**
- **Provide support to customers** *(helpdesk)* via email, hotline, skype etc.;
- **Research and development** for customization *(extension)* of the components *(tailor made solutions).*

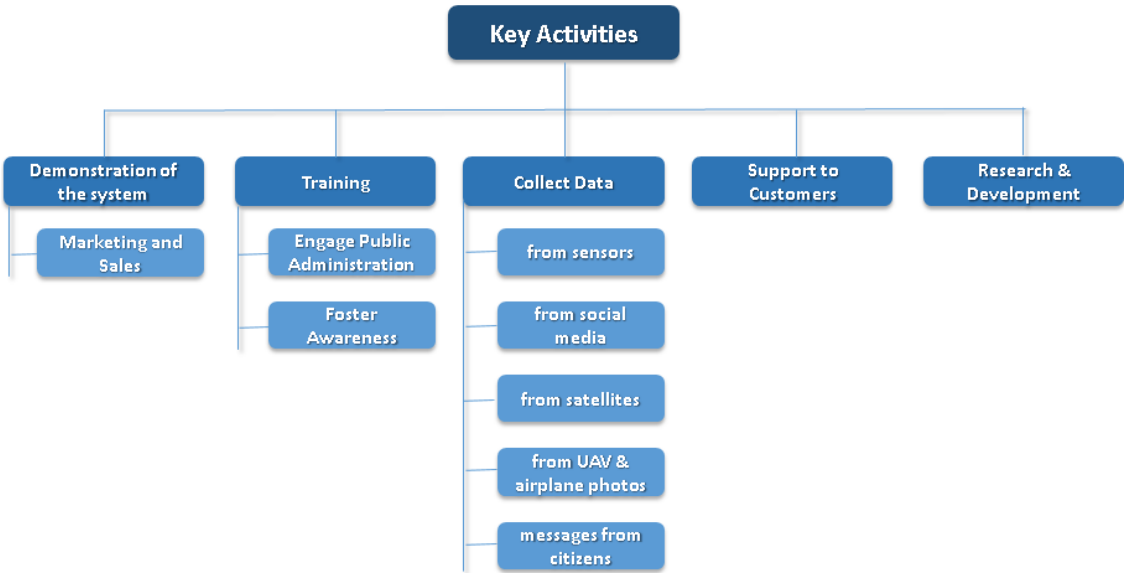


Figure 4: Key Activities

The FLOOD-serv system for its proper and seamless operation needs to collect data from sensors, satellites, social media and receive messages from citizens *(input of the system)* in order to deliver the value proposition *(output of the system)* to the end users. The figure below depicts the input that the system needs as well as its output.

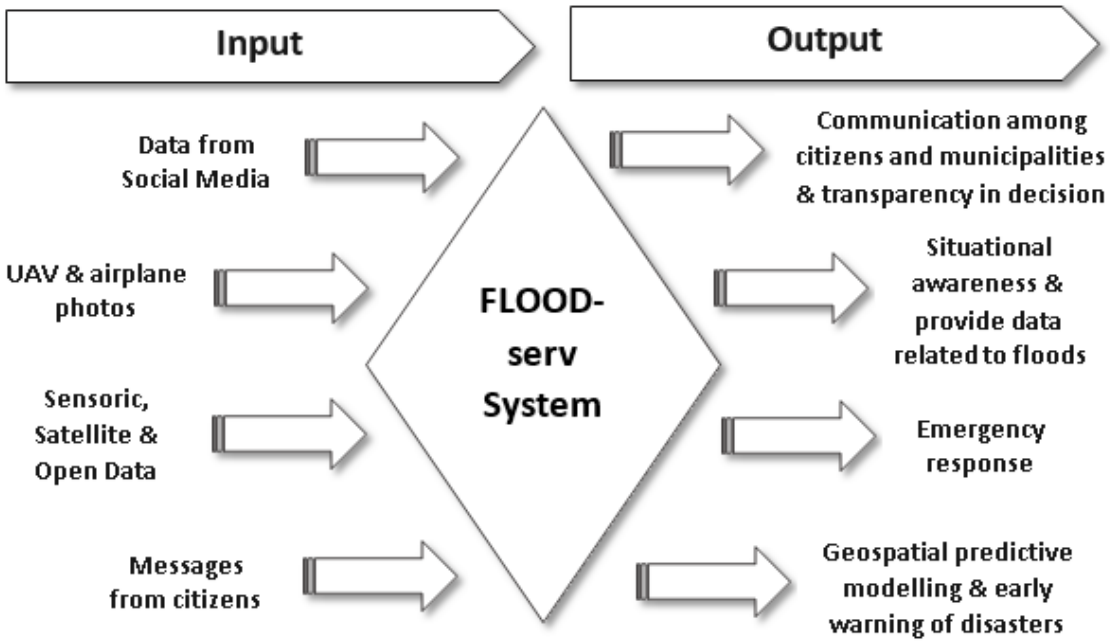


Figure 5: FLOOD-serv system's input & output

Of utmost importance is a training program addressed to institutions, emergency personnel, citizens and generally the end users, so as to familiarize with the system's functions and be benefited by its full capabilities. Hence, a possible knowledge gap would not consist a barrier that might demotivate the individuals to deploy the system. In this context, support to customers should also be provided via various communication channels such as telephone *(hotline)*, email, skype etc.

The demonstration of the system across Europe and beyond will assist in attracting publicity and in combination with marketing activities will grow the customer's base and the sales network. This means that components extensions *(other hazards besides flooding)* might be asked by customers as tailor made service to them and further research and development actions would be required.

Key Resources

The resources that are necessary to create the value proposition for the customer of the FLOOD-serv system are considered as assets in order to sustain it beyond the end of the project. The resources that have been identified so far are categorized as:

- **Hardware** for the components' function *(servers, sensors, drones, etc.);*
- **Data from satellites**, **UAV** and **airplane photos** for TMS *(Territory Monitoring System)*
- **Messages from citizens** collected via social media channels
- **Data from social media for SMC** *(Social Media component)*
- **Data from weather forecasts** and **water levels**
- **Human resources** *(developers, trainers, sales personnel etc.)*
- **Financial resources**

The **financial resources** are needed in order to realize a range of activities for the creation of the system's offer to customers. Such activities are: **a)** maintenance and extensions of the

FLOOD-serv system *(in case of tailor made solutions to customers),* **b)** research and development for future enhancements, **c)** travel and subsistence costs for demonstration of the system to potential customers, **d)** design and print marketing materials *(when needed),* **e)** promote a culture of risks prevention in civil society through organizing targeted campaigns, **f)** organize training events for attracting local authorities, foster public awareness on flood risks etc.

Human resources, specifically staff of developers, play an important role in key resources since the solution could be customized and it might require significant developments and extra effort for each client. A development team knowledgeable of the FLOOD-serv system and its components is needed which means that each technical partner of the project has to ensure that their team is able to implement the solution for new customers.

Figure 6: Key Resources

Key Partners

Key partners in every Business Model are considered significant because they provide the necessary input to the business for delivering the value proposition. The cultivation of buyer-supplier relationships assists in optimizing the operations and reduces any potential risks which eventually lead the business to focus on its core activities. For this reason, as an initial step, we identified who we need to partner with in order to deliver our service. According to the consortium's input the key partners are:

- Municipalities of pilot cities;
- Satellite data providers;
- Airplane image providers;
- Social media networks;
- Crisis response stakeholders *(Civil protection, fire-fighters, police);*
- Sensoric data providers;
- Weather forecasts data providers;

- Water level data providers such as water companies;
- First flood reporters *(end-users who report in social media network flood events);*
- Technical and consulting partners of the FLOOD-serv project;
- Civil Society, IGOs such as International Red Cross, World Health Organisation (WHO), The United Nations and its organisations, etc
- Sales partners network active in public administrations.

The first line of partnership includes the technical partners involved in the development of the FLOOD-serv system. They have the know-how on the system's components, its extensions and the integration of it. This means that any customization and/or further extensions either of the system or the components individually the delivery will be undertaken by the technical partners of FLOOD-serv project.

The pilots are also important because through their hands-on experience around the uniqueness of the area and the flood risks are collected, they assist in fostering awareness to citizens on flood risk so they can participate in the process of decision making. These actions ensure transparency and offers the benefits of the system in their totality. The pilots locally introduce to citizens the system while approaching institutions related to flood risks and municipalities or public administrations from the same country that would be possible customers.

Hydro-meteorological institutions provide data for weather forecasts, water level, airplane images which is actually input to the FLOOD-serv for alerting end users for the flood risks that would occur a certain period of time. For example, in Slovakia's pilot the Slovak Hydro meteorological Institute, Bratislava Water Company, Slovak water enterprise. Furthermore, what should not be overlooked is the group of citizens who first report flood events and provide information around them in social media as well as communicating and sending messages to public authorities through the system. Without their input to the system, communication among the public authorities and citizens would not exist.

Other partnerships that are also important is sales network active in public administration as system's is possible paying customers are mainly public authorities involved in the flood management process. Moreover, in the context of marketing and communication *(e.g. trade associations, conference organizers, etc.)* for attracting more potential customers.

Revenue Streams

As the project is designed for collective problem solving, knowledge sharing, social exchange and community-wide participation at local and global scale, the partners cannot charge the citizens. It is public service oriented! Therefore, in the current section, after identifying the customer's segments, we explore the revenue sources that will generate income for the FLOOD-serv system and render it viable after the end of the EC funding. However, it should be noted once again that we do not expect any income and/or profit by the deployment of the system from the citizens of pilot cities. Yet, it can't be overlooked that municipalities from the pilot cities might finance only the cost for the maintenance of the FLOOD-serv system.

The above points do not contradict income generation by a wider range of potential customers. The assumptions made so far led to the following revenue sources:

- Extension of EMC customized per customers' request
- Subscription of components as SaaS *(Software as a service)*
- Provide a yearly fee for keeping the service up on behalf of the local authority (or whichever identified authority)
- Sell it outright to the authority and collect a yearly maintenance fee

- Provide the system free of charge and collect on transactions that might be associated from an emergency situation
- Project based integration and customisation of Flood-serv SaaS

Other possible sources of revenue that could also be considered are sponsorships from institutions as well as grants and funding from governments, municipalities, etc. that will ensure the sustainability of the FLOOD-serv system and its further enhancement.

For the creation of this document several **revenue models** *(income generation models)* have been discussed and examined among the consortium partners. There are 3 models that were perceived as the ones that better fit in our case and are presented below.

- **Accessories Revenue Model:** The consortium could continue offer the system to citizens of pilot cities for free *(i.e. sustain the system beyond the EC funding by covering the maintenance costs)* and generate income from selling extensions *(accessories)* of the components that could be individually deployed by customers according to their needs.
- **Freemium Revenue Model:** The consortium could provide its core services to citizens for free and act as a gateway to the paid version. For example, the free version of the system could come with adverts and the paid one without. However, there are several matters that should be examined in the frame of this revenue model. While advertising revenue is in principle possible, it is highly unlikely to be a path to follow for the following reasons: **a)** Most users are citizens and are likely to see the services as free public services and they would be non-paying customers; **b)** Advertising on a public *(or public like)* site dedicated to emergencies may be inappropriate, for example advertisements that suggest to isolated and surrounded by water people to buy a boat or a survival kit.
- **Construction Revenue Model:** The consortium can offer and install the product, hardware plus software, to paying customers on their premises. The customers would pay for the product up-front or over the period of installation. Maintenance costs are considered separately, usually as a subscription (see below subscription revenue model).
- **Subscription Revenue Model:** Expecting that most of the system's customers will be governmental and business organizations *(B2G and B2B)* one of the most appropriate revenue model is to secure the customer on a long-term contract with a pre-determined fee so that they will be able to consume the service without any disruptions. In order to follow this revenue model, the consortium should take into serious account that the cost of customer acquisition could be high. Long term subscription could also give as a "reward" to loyal customer extensions of system's components free of charge. Variants of this revenue model have been examined by the consortium. The examined variants were: **a)** the **payment plan** where the consortium will make on customer's premise installation and integration of system's hardware and software for free. The customer will pledge a high annual fee under a long-term contract *(more than 10 years).* **b) 5-year contract plan** where the client will be burden by the initial costs of hardware and software installation. In this case the annual *(or monthly)* fee *(subscription)* will be lower compared to payment plan.

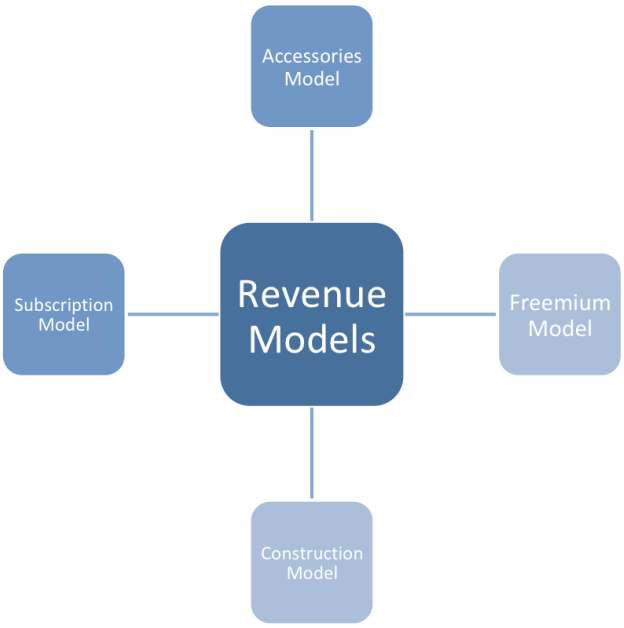


Figure 7: Revenue Models explained for FLOOD-serv system

Cost Structure

The production of any product/service, in general, involves two types of costs: the fixed and the variable. Our initial attempt to define the main costs that occur for sustaining the value proposition and deliver it to customers led us to the conclusion that both cost types exist in the cases of **a)** in making extensions to the components tailor made to the needs of customers, and **b)** in further improvements to the FLOOD-serv system. These costs can be clustered into the following categories:

- **Cloud infrastructure costs**
- **Training costs**
- **Travel costs**
- **Marketing & sales costs**
- **Maintenance costs of IT structure**
- **Staff costs** *(project managers, consultants, developers, trainers, sales representatives, customer support agents)*

The main costs that concern the extensions and/or improvements on the system are consisted by staff costs and development costs. Staff costs though do not include only the salaries of the developers but also the employees who will undertake sales, training and customers' support activities.

The travel costs and the marketing & sales costs cannot be overlooked as there is a high possibility of demonstrating the system in municipalities/governments as well as to companies across Europe and beyond. Moreover, costs for targeted campaigns to promote a culture of risk prevention in civil society, training programs and events for different kinds of audiences may be calculated on a long-term business vision. In the context of promoting the culture of risk prevention according to the FLOOD-serv model, the possibility of a synergy between international organisations related to flood disaster management and the civil society (International Red Cross, World Health Organisation (WHO), The United Nations and its organisations, etc) could assist as partners for the funding.

It should be mentioned that in this section we do not examine the costs of creating the value proposition of the FLOOD-serv system as they have been already covered by the European Commission's funds.

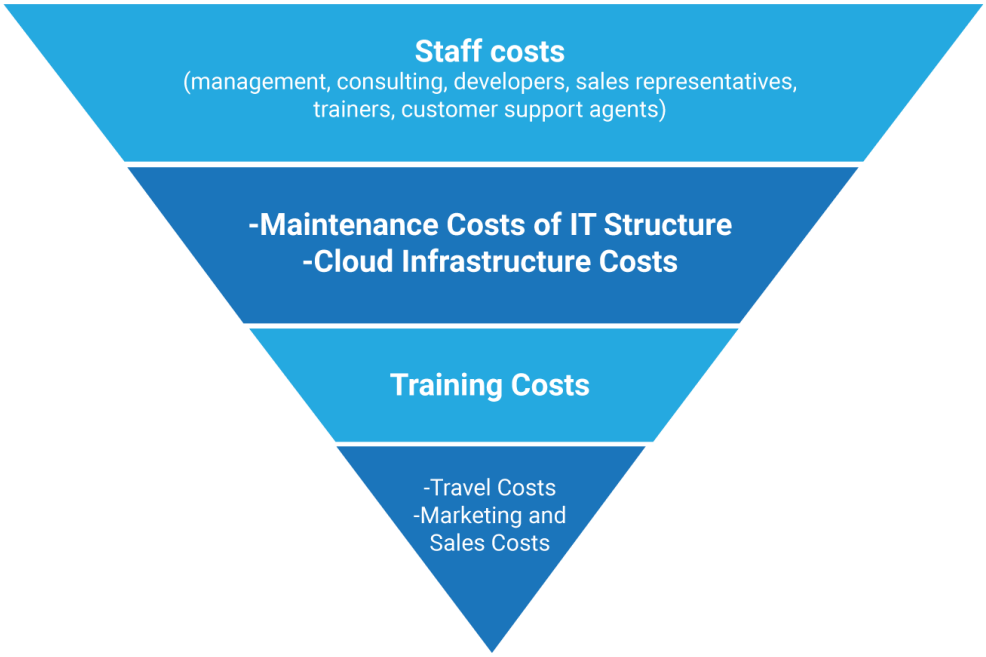


Figure 8: FLOOD-serv system's Potential Cost Structure

Draft Marketing Plan

Market & Competitors Analysis

As mentioned in the previous deliverable, the FLOOD-serv project does not fall under a pre-defined market that could be examined, the most reliable path in conducting our analysis is to identify the areas *(i.e. cities/municipalities across Europe)* that have already faced floods, or due to climate change effects are in high danger of facing such events in the near future.

The European Environment Agency in its publication under the title **Floods and health** mentions that "*Climate change can increase the severity and frequency of extreme weather events, such as heavy precipitation, and floods, storms and storm surges. Floods caused by these events can affect people immediately (e.g. through drowning and injuries) and after the event (e.g. through displacement, the destruction of homes, water shortages, disruption of essential services and financial loss).* [3]

In the current section an updated market analysis is formed by the identified EU funded projects that are related to the FLOOD-serv topic and are either ongoing or have ended their lifecycle. Our aim at the current phase is to present to the reader all the available information that concern the Business model of each one of these projects. the Draft Market Analysis and offers a more up-to date version of the market analysis that was presented in deliverable D6.4 "Initial Exploitation Plan". According to the Business Model that we presented in the previous chapter; municipalities/cities is one of the important customer segments of the FLOOD-serv system. Within this context as "competitors" to our project's offer can be considered the other EU funded project that provide similar solutions with the FLOOD-serv. However, in our analysis we do not exclude solutions/services that have been developed by the private sector.

No.	*Name*	*Description*	*Business Model*	*Status*
1.	**FIWARE** Website: https://www.fiware.org/	FIWARE is a smart solution platform, funded by the EC (2011-16) as a major flagship PPP, to support SMEs and developers in creating the next generation of internet services, as the main ecosystem for Smart City initiatives for cross-domain data exchange/cooperation and for the NGI initiative. **Funded Under:** H2020	Fiware4Water intends to link the water sector to FIWARE by demonstrating its capabilities and the potential of its interoperable and standardised interfaces for both water sector end-users (cities, water utilities, water authorities, citizens and consumers), and solution providers (private utilities, SMEs, developers). Specifically, we will demonstrate it is non-intrusive and integrates well with legacy	Ongoing project

		Start Date: 1 June 2019 **End Date:** 31 May 2022	systems. In addition to building modular applications using FIWARE and open API architecture for the real time management of water systems, Fiware4Water also builds upon distributed intelligence and low-level analytics (smart meters, advanced water quality sensors) to increase the economic (improved performance) and societal (interaction with the users, con-consensus) efficiency of water systems.	
2.	**SCOREwater** Website: https://www.scorewater.eu/	SCOREwater focuses on enhancing the resilience of cities against climate change and urbanization by enabling a water smart society that fulfils SDGs 3, 6, 11, 12 and 13 and secures future ecosystem services. It introduces digital services to improve management of wastewater, stormwater and flooding events. **Funded Under:** H2020 **Start date:** 1 May 2019 **End Date:** 30 April 2023	These services are provided by an adaptive digital platform, developed and verified by relevant stakeholders (communities, municipalities, businesses, and civil society) in iterative collaboration with developers, thus tailoring to stakeholders' needs. Emerging digital technologies such as IoT, Artificial Intelligence, and Big Data are used to provide accurate real-time predictions and refined information.	ongoing project
3.	**HEGS** Website: https://cordis.europa.eu/project/rcn/221972/factsheet/en	The project's ambition is hence to better understand the global space-time variability of hydrologic extremes, using a three-pillar research strategy based on methodological innovation, extensive data analysis and proof-of-concept case studies. **Funded Under:** H2020 **Start Date:** 17 May 2019 **End Date:** 16 May 2022	Successful completion of the project will deliver new tools to analyse extremes at the global scale and will hence contribute to more efficient risk management.	ongoing project

4.	**FOReSEE** Website: https://www.tecnalia.com/en/	Based on cutting-edge algorithm technology, it has developed a disruptive online platform that harnesses the descriptive power of big geometric data sets to provide cost-effective and updated decision support for end-users working with flood risk and climate change adaptation. **Funded Under:**H2020 **Start Date:** 1 January 2019 **End Date:** 31 May 2019	FOReSEE aims to pursue a major market opportunity by expanding its business into new geographical markets, addressing standing technical and market-related challenges by adapting and demonstrating the capabilities of our platform with reference end-users. Overall, leveraging on the opportunity provided by the SME instrument, this project opens not only an important economic opportunity for SCALGO ApS, but will importantly enable a more systemic approach to flood risk management, leading to strategic decisions at various levels for a range of end-users (the public sector, businesses, and individuals), and supporting EU mitigation and adaptation policies.	closed project
5.	**PROCESS** Website: https://www.process-project.eu/	The main tangible outputs of PROCESS are five very large data service prototypes, implemented using a mature, modular, generalizable open source solution for user friendly exascale data. The services will be thoroughly validated in real-world settings, both in scientific research and in industry pilot deployments. **Funded Under:** H2020 **Start Date:** 1 November 2017 **End Date:** 31 October 2020	In addition to providing the service prototypes that can cope with very large data, PROCESS addresses the work programme goals by using the tools and services with heterogeneous use cases, including medical informatics, airline revenue management and open data for global disaster risk reduction. This diversity of user communities ensures that in addition to supporting communities that push the envelope, the solutions will also ease the learning curve for broadest possible range of user communities. In addition, the chosen open source strategy maximises the potential for uptake and reuse, together with mature software engineering practices that minimise the efforts needed to set up and maintain services based on the PROCESS software releases.	Ongoing project

6.	HydroSocialExtremes Website: https://cordis.europa.eu/project/rcn/214680/factsheet/en	this project aims to unravel the mutual shaping of society and hydrological extremes. A combined theoretical and empirical approach will be developed to uncover how the occurrence of hydrological extremes influences society's wealth, institutions and population distribution, while, at the same time, society in turn alters the frequency, magnitude and spatial distribution of hydrological extremes via structural measures of water management and disaster risk reduction. **Funded Under:** H2020 **Start Date:** 1 April 2018 **End Date:** 31 March 2023	To explore the causal mechanisms underlying this mutual shaping, this project will propose explanatory models as competing hypotheses about the way in which humans drive and respond to droughts and floods. These alternative explanations will be developed and tested through: i) empirical analysis of case studies, and ii) global investigation of numerous sites, taking advantage of the current unprecedented proliferation of worldwide datasets.	Ongoing project
7.	**ARCADIA (Advanced platfoRm for ClimAte Data Intelligence and Action)** Website: http://www.arcadia-framework.eu/	The business opportunity to be seized by this project lies in the concern lately raised on climate change in the light of recent environmental disasters. Vizzuality owns a leading technology to make meaningful the large volumes of environmental data extracted from Earth observation in the form of powerful visualizations, a technology of high interest for knowledge purveyors, but scarcely used by societal end-users such as SMEs, which represent 99% of the European business realm. **Funded Under:** H2020 **Start Date:** 1 February 2018 **End Date:** 31 July 2018	This strategic project aims to make that technology available for the private sector (especially SMEs) through a software platform for freemium access, a new business model for the company which would need a feasibility study to confirm expectations laid on it, and then a stronger business plan to face a successful market uptake based in this new model, since it shapes a financial challenge likely to introduce a new way to earn incomes for the company while contributing to the creation of a European market for climate services.	closed project

8.	**ANYWHERE** (EnhANcing emergencY management and response to extreme WeatHER and climate Events) *Website:* http://anywhere-h2020.eu/	ANYWHERE is to enable society as a whole and the main civil protection agencies to respond more rapidly than today to extreme climate and weather events, and to better cope with the high social, environmental and economic impacts related to these extremes. The platform will serve as decision-making tool for various authorities when faced with a situation of crisis, and will provide state-of-the-art early warning systems to help exposed populations avert disaster. **Funded under:** EU H2020 research and innovation programme **Start Date**: June 2016 **End Date:** August 2019	The platform will be adapted to provide early warning products and locally customizable decision support services proactively targeted to the needs and requirements of the regional and local authorities, as well as public and private operators of critical infrastructures and networks. It will be implemented and demonstrated in 4 selected pilot sites to validate the prototype that will be transferred to the real operation. The market uptake will be ensured by the cooperation with a SME and Industry Collaborative Network, covering a wide range of sectors and stakeholders in Europe, and ultimately worldwide. At this phase it is not feasible to derive any information from project's website concerning its Business Plan. Also, we don't know if in the future there will be any, as its Exploitation Plan could be either confidential or public concerning dissemination level.	**Ongoing Project**
9.	**i-React** (Improving Resilience to Emergencies through Advanced Cyber Technologies) *Website:* http://www.i-react.eu/	I-REACT will empower stakeholders in the prevention and management of disasters. Citizens will be involved in reporting first-hand information, policymakers will be supported in the decision-making process, and first responders will be equipped with essential tools for early warning and response. Overall, I-REACT aims to be a European-wide contribution to build more secure and resilient societies to disasters.	I-REACT will develop a solution through the integration and modelling of data coming multiple sources. Information from European monitoring systems, earth observations, historical information and weather forecasts will be combined with data gathered by new technological developments created by I-REACT. These include a **mobile app** and a **social media analysis tool** to account for real-time crowdsourced information, **drones** to improve mapping, **wearables** to improve positioning, as well as **augmented reality glasses** to	**Closed Project**

		Funded under: EU H2020 research and innovation programme **Start Date**: June 2016 **End Date:** May 2019	facilitate reporting and information visualisation by first responders. I-REACT will integrate multiple systems and European assets, including the Copernicus Emergency Management Service, the European Flood Awareness System (EFAS), the European Forest Fire Information System (EFFIS), and European Global Navigation Satellite Systems (E-GNSS), e.g. Galileo and EGNOS	
10.	**Odkaz Pre Starostu** *Website:* https://www.odkazprestarostu.sk/	NGO based platform for citizens and municipalities, where citizens can report specific problems in their city. The incentives are communicated with local government, so the solution is shared with the public. It is a non-profit project offered by the SGI *(NGO.)* **Funded by:** Slovak Governance Institute *(SGI)*	N/A	**Offered solution to citizens of Slovakia**
11.	**COMRADES** *(Collective Platform for Community Resilience and Social Innovation during Crises)* *Website:* www.comrades-project.eu	The project will create an open-source, community resilience platform, designed by communities, for communities, to help them reconnect, respond to, and recover from crisis situations. COMRADES is researching how technologies can help communities to be more resistant to crisis situations and by providing a way to optimally share information enable them to proceed with needed help action in due time. **Funded under:** EU H2020 research and innovation programme **Start Date**: January 2016	The developed tools of the project will be able to: - Quickly filter the citizen reports as they arrive from social media and mobile texts - Remove uninformative and irrelevant ones - Point out unreliable sources - Pick up, and alert to several lone messages requesting urgent help during a crisis - Extract, group, and monitor unfolding emergency micro-events.	**Closed** **Project**

		End Date: December 2018	Any information from project's website concerning its Business Plan cannot be extracted. We don't know if in the future there will be any available at its website, as the Plan for exploiting project's results could be either confidential or public concerning dissemination level.	
12.	**SPACE-O** *(Space Assisted Water Quality Forecasting Platform for Optimized Decision Making in Water Supply Services)* *Website:* http://www.space-o.eu/	It integrates state-of-the-art satellite technology and in-situ monitoring with advanced hydrological, water quality models and ICT tools, into a powerful decision support system. This generates real-time, short- to medium-term forecasting of water flows and quality data in reservoirs, used to optimise water treatment plant operations and establish a complete service line from science to the water business sector. **Funded under:** EU H2020 research and innovation programme **Start Date**: November 2016 **End Date:** October 2018	-Satellite remote sensing has evolved into a tool for global monitoring of surface waters. Earth Observations and remote sensing are widely used to quantify the physical parameters of reservoirs, as well as to retrieve selected concentrations of water constituents. -A service platform will be designed to increase the interoperability of Earth Observation and modelled services. Data acquisition and the integration of near-real time Earth Observation data in the hydrological and water quality models will provide improved real-time, short to medium term water quantity and quality forecasting in reservoirs. -A risk-based decision support system will be developed to enable cost-effective and environmentally sustainable water treatment. This will be based on water quality forecasts at the reservoir, in-situ monitoring data, and data collected through supervisory control and data acquisition (SCADA) systems used in water treatment plants. **-Copernicus Services** (C3S) will be assessed with site-specific data sets generated through the satellite,	**Closed Project**

			modelling, in-situ data and citizens monitoring services, to produce continuous monitored indicators that enable water quality risk assessment analysis on a catchment level.	
13.	**STOP-IT** (Strategic, Tactical, Operational Protection of water Infrastructure against cyber-physical Threats) *Website:* https://stop-it-project.eu/	Identifies current and future risks and co-develops an all-hazards risk management framework (based on the EU ISO Risk Management Framework *(ISO 31000:2009)*, for the physical and cyber protection of critical water infrastructures. Prevention, detection, response and mitigation of relevant risks at strategic, tactical and operational levels of planning will be taken into account to generate modular solutions *(technologies, tools and guidelines)* that will be embedded into an integrated, scalable, adaptable and modular software platform. **Funded under:** EU H2020 research and innovation programme **Start Date**: June 2017 **End Date:** May 2021	The STOP-IT integrated platform will be **scalable** *(scaling from small utilities to large ones),* **adaptable** *(including various modules addressing different needs, with expandability for future modules),* and **flexible** *(the water utility managers can decide how to use it and it will be usable by experts, novices, and even non-technical staff).* It also will support strategic/tactical planning, real time operational decision making and post-action assessment for the key parts of the water infrastructure. STOP-IT delivers high impact through the creation of hands-on training, tools and technologies, best practice guidelines, support for certification and standardization as well as by fostering market opportunities and leveraging an EU water technology multi-stakeholder network. STOP-IT solutions consist of an integrated STOP-IT platform with modular components, such as: • Risk assessment and treatment framework; • Secure wireless sensor communications module;	**Ongoing Project**

			• Toolbox of technologies for securing IT and supervisory control and data acquisition (SCADA); • Toolbox of technologies for protection against physical threats, such as coordinated network cameras, XACML Authorization Engine, human presence detection using Wi-Fi signals, water quality monitoring technologies for the early detection and impact minimization of contamination events (intentional attacks) and applications to service employees and to central management systems; • Cyber threat incident service; • Real-time anomaly detection system; • Public warning system – secure information exchange technologies; • Reasoning engine; • Enhanced visualization interface for water utilities.	
14.	**STAR FLOOD** (STrengthening And Redesigning European FLOOD risk practices: Towards appropriate and resilient flood risk governance arrangements) *Website:*	The project was focused on analysing, explaining, evaluating and designing policies to better deal with flood risks from rivers in urban agglomerations across Europe. **Funded under:** EU seventh Programme for Research, Technological Development and Demonstration **Start Date**: October 2012 **End Date:** March 2016	N/A	**Closed Project**

	http://www.starflood.eu/			
15.	**URBAN FLOOD** *Website:* http://www.urbanflood.eu/	UrbanFlood is a European project investigating the use of sensors within flood embankments to support an online early warning system, real time emergency management and routine asset management. Application of the concepts to support routine asset management, which includes the regular inspection of dikes, will also be considered. Safer dikes are not only stronger but also smarter dikes. **Funded under:** EU seventh Programme for Research, Technological Development and Demonstration **Start Date**: December 2009 **End Date:** November 2012	The UrbanFlood project will create an EWS framework that can be used to link sensors via the Internet to predictive models and emergency warning systems. The data collected from the sensors will be interpreted to assess the condition and likelihood of failure; different models will be used to predict the failure mode and subsequent potential inundation in near real time. Through the Internet, additional computer resources required by the framework are made available on demand	**Closed Project**
16.	**RAIN** (Risk Analysis of Infrastructure Networks in response to extreme weather) *Website:* http://rain-project.eu/	RAIN contributes to minimizing the impact of extreme weather events on transport, energy and telecommunication networks. The project will develop early warning systems, decision support tools and engineering solutions to ensure rapid reinstatement of the network. This will improve reliability of critical infrastructures and reduce disruption for citizens. **Funded under:** EU seventh Programme for Research, Technological Development and Demonstration **Start Date**: May 2014	The RAIN project is expected to deliver engineering and logistical solutions that will improve the robustness of critical land-based infrastructure networks from within a risk-based decision-making framework. These solutions will improve the operational performance of the network in extreme weather events, minimise the impact of such events through early warning strategies and will accelerate the repair and replacement of key infrastructure following such events. Ultimately, the risk modelling approach adopted in the RAIN project aims to aid infrastructure managers to make the correct operational and development decisions when	**Closed Project**

		End Date: April 2017	planning their infrastructure resilience/security. In terms of hazard identification, the RAIN project aims to provide a better understanding of present-day early-to medium- range warning systems and climate watch systems, develop proxies and methods for the assessment of extreme weather hazards, map the frequency of individual extreme weather hazards, and define a list of the most probable threats to critical transport Infrastructure with associated thresholds. In the area of land transport infrastructure, the project will produce a list of the most probable threats to critical transport infrastructure, while also defining indicators of social vulnerability to hazards and provide approaches to measure this vulnerability. Within the Energy and Telecommunications Infrastructure sectors, the RAIN project will identify critical infrastructure failures and methods of protecting such infrastructure during extreme weather events. The project will also provide an assessment of the social impact of failures of elements within such networks.	
17.	**FloodCitiSense** (Early warning service for urban pluvial floods for and by citizens and city authorities) *Website:*	The FloodCitiSense project aims at developing an urban pluvial flood early warning service not only for, but also by citizens and city authorities. It builds upon state-of-the-art knowledge, methodologies and smart technologies provided by research units and private companies to create an innovative public service that reduces the vulnerability of urban areas and citizens to pluvial floods	The FloodCitiSense project aims at integrating crowdsourced hydrological data, collaboratively monitored by local stakeholders, including citizens, making use of low-cost sensors and web-based technologies, into a flood early warning system. A co-creation of this innovative public service in an urban living lab context with all local actors is targeted, building upon the state-of the-art knowledge,	**Ongoing Project**

	https://jpi-urbaneurope.eu/project/floodcitisense/	**Funded under:** JPI Urban Europe *(EU H2020 research and innovation programme)* **Duration:** 2017 - 2020	methodologies and smart technologies provided by research units and private companies. The expected results and impacts of the project are: • Operational crowdsourced data collection 'FloodCitiSense' platforms in pilot cities • Urban pluvial flood early warning systems co-created in living labs • Summary of lessons learnt of the crowdsourcing and co-creation of flood early warning service More info about the system that will be developed can be found here.	
18.	**Muffin** (Multi-scale Urban Flood Forecasting, from local tailored systems to a pan-European service) *Website:* goo.gl/RWL5xP	The project is expected to generate innovative tools for generation and communication of urban flood forecasts in different spatial contexts, based on new technology as well as an improved understanding of end-user's needs and limitations. **Duration:** 2016 – 2019 **Funded under:** JPI Europe, Waterworks	In MUFFIN, meteorologists and hydrologists work closely together to improve urban rainfall estimation and flood forecasting. Data from the Xband polarimetric rainfall radar in Rotterdam are used in combination with local weather stations to develop high resolution rainfall nowcasts over the urban area.	**Ongoing Project**
19.	**FloodProBE** *Website:* http://www.floodprobe.eu/	FloodProBE is a European research project with the objective of providing cost-effective solutions for flood risk reduction in urban areas. FloodProBE aims to develop technologies, methods and tools for flood risk assessment and for the practical adaptation of new and existing buildings, infrastructure and flood defences	N/A	**Closed Project**

		leading to a better understanding of vulnerability, flood resilience and defence performance. This research supports implementation of the Floods Directive through the development of more effective flood risk management strategies. The work is being undertaken in close partnership with industry, and is utilising pilot sites across Europe, to help provide practical industry guidance and cost-effective construction solutions. **Funded under:** EU seventh Programme for Research, Technological Development and Demonstration **Start Date**: November 2009 **End Date:** October 2013		
20.	**Rain Gain** *Website:* http://www.raingain.eu	RAINGAIN is a European project aimed at improving the prediction of pluvial floods in our cities. The frequency and the damages of pluvial floods in urban areas are expected to increase as a consequence of climate change and urban development. New solutions are needed to cope with intense storms and to reduce the risks for populations and infrastructures. RainGain develops and tests innovative tools and practices based on the use of high-resolution radars in four pilot cities: Leuven, London, Paris and Rotterdam. **Funded under:** INTERREG IVB North-West Europe Programme	Weather radars are the only measuring devices that provide estimates of rainfall in time and space. In the RainGain project, four **different types of radar techniques** will be tested in four pilot cities: Leuven, London, Paris and Rotterdam. The fine-scale rainfall data will provide urban water managers with detailed peak rainfall information at temporal and spatial scales appropriate to the fastness of urban run-off processes. The information will be applied in flood prediction models at pilot sites to identify flood-prone locations and develop effective solutions for better flood protection *(such as early warning systems and optimised, real-time storage basin operation).* These will be tested based on the detailed rainfall data and flood models. The end users	**Closed Project**

		Period: 2011-2016	of the rainfall equipment, data and models will be **trained** so they will be able to take over the project deliverables and to resume responsibility in operation and management.	
21.	**BRIGAID** (Bridging the Gap for Innovations in Disaster Resilience) *Website:* http://brigaid.eu/	BRIGAID BRIdges the GAp for Innovations in Disaster resilience. BRIGAID's approach is supported by three pillars. (1) At first BRIGAID takes into account the geographical variability of climate-related hazards and their interaction with socio-economic changes, (2) BRIGAID establishes structural, on-going support for innovations that are ready for validation in field tests and real life demonstrations and (3) BRIGAID develops a framework that enables an independent, scientific judgement of the socio-technological effectiveness of an innovation. **Funded under:** EU H2020 research and innovation programme **Start Date**: May 2016 **End Date:** April 2020	BRIGAID is developing a Public-Private Investment and Financing (PPIF) model for securing investments in innovations during and beyond BRIGAID's lifetime to produce an assessment of the 'investment readiness' of an innovation. The PPIF includes a Business Plan Development Process, where innovators are learning how to create a high-quality Business Plan by use of face-to-face sessions and online tools. Furthermore, the innovators receive support for the production of pitch decks. All this information will be made available for investors interested in BRIGAID solutions through our online Climate Innovation WinDoA.	**Ongoing Project**
22.	**RainSense** *Website:* https://www.ams-institute.org/solution/rain-sense/	Rain Sense will make Amsterdam more resilient to flooding, and to damage from severe weather conditions like those experienced several times this summer, not least the torrential rainfall on 28 July 2014.	Thanks to smart innovations such as monitoring stations umbrellas that double up as mobile rain gauges, and an app that residents can DoAnload onto their phones, the researchers can track the rainfall in Amsterdam right DoAn to street level.	**Closed Project**

		Co-funded by: Amsterdam Institute for Advanced Metropolitan Solutions **Start Date**: October 2014 **End Date:** December 2015	People with the app will be able to report problems by uploading photos, noting the location of the rainfall, and remote-checking that their own home is dry. This will enable partners like Waternet to visualise potential problems in good time and take appropriate precautions to contain any damage from heavy DoAnpours.	
23.	**TWIGA** Transforming Weather Water data into value-added Information services for sustainable Growth in Africa	Provide currently unavailable geo-information on weather, water and climate for sub-Saharan Africa by enhancing satellite-based geo-data with innovative in situ sensors and developing related information services that answer needs of African stakeholders and the GEOSS community **Funded under:** EU H2020 Research and Innovation Programme **Start Date**: February 2018 **End Date:** January 2022	A systematic feedback loop to reciprocally validate in situ measurements and satellite data in one integrated model. Over 500 in situ measurement stations using citizen science. State of the art advancement & Innovation potential: Building on and pushing further recent advances in sensor and communication technology to provide cheaper and more robust in situ measurements covering a wider area at a higher resolution in sub-Saharan Africa. Working with tech-hubs in Europe and Africa to feed creation and growth of European and African start-ups that develop sensors and geo-services, delivering complete value chains from sensor to customer-ready information delivery.	**Ongoing Project**
24.	**Crisisworks** *Website:* http://crisisworks.com	Crisisworks is a complete system for managing emergencies, risk and recovery across the full lifecycle on any device. **Funded by:** Private sector	The similarities with the EMC are the use of geospatial data represented on a map. It is also possible to manage the on-duty users send messages to them.	**Offered solution in market**

			The system is available on web and also in IOS and Android app.	
25.	**Haystax** *Website:* https://security.haystax.com/products/emergency-management/	Haystax has a cloud-based Constellation for Emergency Management suite of software applications that helps the decision maker. **Funded by:** Private sector	This solution also uses a map for displaying emergencies and any related data, and it is also possible to planning exercises to the users, like the "be trained" EMC functionality. The field personnel can share reports with photos. This functionality it's also available in the EMC, sending reports from the mobile app to the web console. In addition to a web page, this solution has also a mobile application available on IOS and Android.	**Offered solution in market**
26.	**OS City** *Website:* http://www.oscity.eu/	Offers analytics, visualization and combines data to gain insight on spatial planning **Funded by:** Private sector	N/A	**Offered solution in market**
27.	**Tell us Toolkit** *Website:* http://www.tellus-toolkit.com/	Provides an intelligence gathering system that pinpoints geographical information, connections and patterns for making better, more insightful decisions. **Funded by:** Private sector	N/A	**Offered solution in market**

28.	**Social Media Analytics tools**	• Facebook Insights • Pinterest Analytics • Twitter Analytics • Instagram Insights • YouTube Analytics • Google Alerts • Google Analytics **Funded by:** Private sector	The Analytics tools mentioned support one social media channel	**Offered solution in market**
29.	**Cross Platform Social Media Analytics tools**	We have identified the following platforms: • Brand24 • Twazzup • Simply Measured • Social Mention • SumAll • Cyfe • Quintly • Brandwatch **Funded by:** Private sector	The tools mentioned support one or two social media channels *(Twitter, Facebook)* and they don't provide the "reading of the content of the postings", which is the main difference.	**Offered solution in market**
30.	**Slovenský vodohospodársky podnik** *Website:* https://mpompr.svp.sk/	It provides flood hazard maps and flood risk maps of Slovak watercourses. **Funded by:** Slovak Management Company	N/A	**Offered solution to citizens of Slovakia**

31.	**Slovenský Hydrometeorologický Ustav** *Website:* *http://www.shmu.sk/sk/?page=1*	It is the official hydro/meteo forecasting portal which includes information about floods and water levels. **Funded by:** Slovak Republic, Ministry of Environment	N/A	**Offered solution to citizens of Slovakia**

Table 5 : Competitors Analysis

Market & Competitors Analysis Summary

In the recent years we have seen emergency flooding situations on the rise at a global level. Just in November of 2019 and across the continents the damages reported are shattering. FLOOD-serv offers a means to the solution of prevention for life threatening incidents. Once the application is largely used, lives and material losses may be prevented. The solution offers precise information in real time during a flood situation in a particular area either by accessing a web portal or by using a mobile application. The benefits can be either of saving human lives or of saving material resources.

FLOOD-serv links citizens and institutional stakeholders, enabling collaboration through system availability as Web and App; Knowledge (flood, legislation, processes); it is available in six languages; and has the capability of generating emergency data and the ability to connect and process sensor data.

FLOOD-serv offers support to the authorities by providing the possibility of estimating and preventing flood risk one day in advance; with more official data centralized on the same portal; display on the map for faster decision making; possibility of recovering historical data for each emergency; possibility of using the tool in simulation model for user training; thus setting the foundation for a more effective coordination between authorities and emergency responders.

As mentioned, once the application is largely used, lives and material losses may be prevented but the loss prevention is not limited to only that. Some of the components can be applied for other use as well. For instance, the EMC is a tool which can be used to any resource management such as: public gardens, maintenance of public or private facilities, coordination for cleaning companies, notification of incidents by citizens, etc.

Furthermore, what makes FLOOD-serv unique is that it combines services. The application consists in a portal integrating 5 components. Emergency Management Console (EMC) analyses the situation of the crisis and proposes the appropriate response measures to fight it against based on the data received. The collected data are related mainly to the following data associated to the different pilot cities:

- Points of Interest (PoIs) and population data
- Daily measured weather (temperature, rain, wind and water level of target rivers)
- Daily weather forecast for tomorrow (temperature, rain, wind and water level of target rivers)
- Daily flood situation (flood risk, water level in target rivers, etc.)
- Historical data associated to every emergency situation.

The Territory Monitoring System (TMS) identifies flood risks within an extensive geographic area, through the analysis of provided images of the territory. Citizen Direct Feedback (CDF) provides a direct communication channel from the citizens to the respective local authorities and inform them about any flood related information, in terms of risks or prevention. Semantic Wiki Component (SW) is a multi-lingual component to accompany the educational and the emergency management's facilities of the FLOOD-serv system.

Across the market, there may be similar portal , but they do not necessarily integrate any local official data sources or may be too complex to be used in the everyday operation of the flood management services.

The FLOOD-serv system stands out for its:

- Co-creation process- The flood management system has been developed in this project with the participation of different specialist actors with extensive experience in flood management (services of civil protection of different countries and cities, municipalities, research institutes related to floods, etc.);
- High level of interoperability with third parties;
- User-centric approach;
- FLOOD-serv management system which is an agile, intuitive and easy to use tool for any non-technical users;
- Different components that make the FLOOD-ser system very versatile and which can be purchased by modules;
- FLOOD-serv management system developed in this project which is easily applicable to other incidents management process, like fires, earthquakes, accidents.

Go-to Market strategy and Exploitation Plan

In this section we explore relevant aspects of the exploitation approach which will guide the Go-to market strategy for the four companies involved in the project, interested in commercializing the FLOOD-serv solution: SIVECO, ANSWARE, ANO and EXDWARF.

We will analyse each company background, the capabilities, the components developed which can be exploited and the business opportunity identified for each Integrated Application Suite.

Company Profiles

SIVECO Romania SA

SIVECO Romania is specialized in developing innovative IT solutions and implementing complex IT projects for education, health, agriculture, customs organizations, European institutions, private companies and public sector.

- **Knowledge transfer / innovation process**

  SIVECO is currently involved in more than 25 EC-funded research projects. Current practice of SIVECO consists in licensing technology and customized IT solutions to the targeted market actors. SIVECO aims to turn research outputs into products, which will be commercialized in the European market.

- **Identified exploitable items**

  Within the FLOOD-serv project, SIVECO developed the FLOOD-serv portal integrating the components developed within the project by the technical partners involved: EMC (developed by ANSWARE), CDF (developed by ANO), TMS (developed by ANO) and WIKI (developed by SIVECO)

ANSWARE

ANSWARE is an ICT-based SME operating in national and international markets. The portfolio includes the provision of ICT consultancy services and development of turn-key and R&D projects in a large spectrum of technological sectors (ICT, Telecommunications, Aeronautics, Space, Defence, eHealth, Energy and Tourism).

- **Knowledge transfer / innovation process**

Answare has various lines of R&D: Software & Services Engineering, Monitoring and control systems, Decision making systems (expert systems), Augmented Reality, 3D models, Optimization and Planning, Security, Mobility, and Geospatial Information Systems (GIS).

- **Identified exploitable items**

Within the FLOOD-serv project, Answare contributed its expertise in emergency response and decision making.

ANO

ANO is an SME based in Oporto, Portugal and with offices in São Paulo, Brazil. The company's main activity is Software's conception, development and commercialization (with consulting and implementation services as well).

- **Knowledge transfer / innovation process**

ANO's business core is made of eight areas: Electronic Documents Management, eGoverment Systems, eProcurement, Traffic and Fines Software Systems, Management and Billing for Utilities, Land Monitoring, Voice to Text Transcription and Outsourcing.

- **Identified exploitable items**

Within the FLOOD-serv project, ANO developed 2 components CDF and TMS.

EXDWARF

Exdwarf consulting is Slovakia based startup with office in Bratislava. The company specializes in project management services, business intelligence consulting and scientific advisory.

- **Knowledge transfer / innovation process**

Exdwarf has track of records in H2020/FP innovation projects and multiple research projects.

- **Identified exploitable items**

Exdwarf played vital role in the Flood-serv project covering areas such as business analysis, piloting and implementation, among others.

Business opportunity for each of the Integrated Application Suite identified to be exploited by the project:

Name	FLOOD-serv - suite of integrated applications (Portal+Wiki+EMC+CDF+TMS)
Exploitable items	FLOOD-serv system: Portal+Wiki+EMC+CDF+TMS
Description	The FLOOD-serv System is a multilanguage, multicomponent, integrated system aimed at serving citizens and public administrators in various aspects of flood risk management. The components of the FLOOD-serv System are the following: **1.The FLOOD-serv Portal**: is a portal dedicated to citizens of pilot and partner cities aiming to contribute to flood risk mitigation. It is conceived as a two-way information gateway; citizens can look up information about floods, or they can submit information to relevant public authorities in their city, and engage in a dialogue with them. The FLOOD-serv Portal offers news, multimedia galleries and data-based flood reports in each of the participating cities. It also contains

	the FLOOD-serv Semantic Wiki, providing to citizens and specialists, systematic information about floods. Citizens can also submit issues and information to public authorities by using the citizen involvement form. This Portal was developed under the FLOOD-serv Project, and it is the front end to a series of other information system components developed in the same project. 2.**FLOOD-serv Semantic Wiki (SW)** is a semantic wiki containing general information and knowledge about floods and flood management but also specific and contextualized knowledge related to the FLOOD-serv Project. The SW is dedicated for use by both specialists on the one hand, and regular citizens on the other. The entries in the SW are written in a brief encyclopaedic style of definition + further details. However, we aim at keeping the entries rather short, and often the development of further details is made into other entries. The FLOOD-serv SW is based on Mediawiki and Semantic Mediawiki technologies. The implementation of the SW component was done by SIVECO Romania, one of the partners and coordinator of the FLOOD-serv Project. 3. **Emergency Management Console (EMC)** is a data visualization or decision support system dedicated to employees of public authorities involved in flood emergency management. It receives and monitors relevant data from a variety of sources, internal to the FLOOD-serv project (from other components e.g. data submitted by citizens, or based on analysis of satellite pictures, etc) and from external sources (e.g. meteorological and sensor data). EMC generates various visualizations of data based on maps and charts, proposes response measures and tracks their evolution. **4.Citizen Direct Feedback (CDF)** module provides a direct communication channel from the citizens to the respective local authorities, enabling them to more effectively inform and engage in dialogue with those local authorities of any flood related information, in terms of risks or prevention. CDF empowers the citizen by allowing them to alert and discuss with local authorities of any potential flood risks or assess on prevention policies. **5.Territory Monitoring System (TMS)** is an instrument for producing situational awareness and risk analysis within a geographical area by means of analysis of satellite and aerial pictures (from airplanes or drones). By analysing successive images, its intelligent processing engine is able to generate reports about relevant change events related to flood occurrences or impacts, and is able to geographically localize them.
Target (type of companies / organizations that could buy it, type of industry interested)	Municipalities/prefectures; regional authorities; construction companies; transportation companies; tour operators and accommodation providers in touristic areas that confront the risks of flood events; insurance companies; car manufactures incorporating the flood signalling/warning system within the cars' software; organizers of expos, festivals, concerts and in general events/happening that involve a large number of attendants/participants; news and media providers; search and retrieval operators such as marketers; organizations/companies working on geographic and sociographic data such as surveys, financial and business planners; livestock/agricultural holdings; food companies; forecasting institutes; water companies; monitor gardens; monitor municipalities' resources; petroleum industry (in order to avoid economic losses & environmental pollution); data filtering for reducing "noise" (irrelevant content)
Progress and next steps	The technical partners aim to use the integrated solution in the future business engagements.

	SIVECO intends to use the FLOOD-serv solution in further similar R&D projects.
Outcomes envisaged / expected	- The mentioned IAS is ready to be used in the first quarter of 2020 - Marketing strategy established (first quarter of 2020) - 3 municipalities in each of the 2 years, adding each of the following years 1 extra municipality per year;1 regional authority in each of the 2 years, adding each of the following years 1 extra regional authority per year; - 2 agricultural holdings in each of the first 2 years, adding in the next 2 years 1 extra agricultural holding and in the 5th year 1 more agricultural holding; - 3 forecasting institutes in the 1st year, adding one extra institute in the next 2 years and one more institute in the 5th year; - For each category of clients-insurance companies, tour operators, construction companies and food companies, 1 extra company is added yearly.

Table 6: FLOOD-serv system: Portal+Wiki+EMC+CDF+TMS

Name	**FLOOD-serv - suite of integrated applications (Portal+Wiki+EMC}**
Exploitable items	FLOOD-serv system: Portal+Wiki+EMC
Description	The FLOOD-serv System is a multilanguage, multicomponent, integrated system aimed at serving citizens and public administrators in various aspects of flood risk management. The components of the FLOOD-serv System are the following: **1.The FLOOD-serv Portal**: is a portal dedicated to citizens of pilot and partner cities aiming to contribute to flood risk mitigation. It is conceived as a two-way information gateway; citizens can look up information about floods, or they can submit information to relevant public authorities in their city, and engage in a dialogue with them. The FLOOD-serv Portal offers news, multimedia galleries and data-based flood reports in each of the participating cities. It also contains the FLOOD-serv Semantic Wiki, providing to citizens and specialists, systematic information about floods. Citizens can also submit issues and information to public authorities by using the citizen involvement form. This Portal was developed under the FLOOD-serv Project, and it is the front end to a series of other information system components developed in the same project. 2.**FLOOD-serv Semantic Wiki (SW)** is a semantic wiki containing general information and knowledge about floods and flood management but also specific and contextualized knowledge related to the FLOOD-serv Project. The SW is dedicated for use by both specialists on the one hand, and regular citizens on the other. The entries in the SW are written in a brief encyclopaedic style of definition + further details. However, we aim at keeping the entries rather short, and often the development of further details is made into other entries. The FLOOD-serv SW is based on Mediawiki and Semantic Mediawiki technologies. 3. **Emergency Management Console (EMC)** can be used as a data visualization or decision support system dedicated to employees of public authorities involved in flood emergency management. It receives and monitors relevant

	data from a variety of sources, internal to the FLOOD-serv project (from other components e.g. data submitted by citizens, or based on analysis of satellite pictures, etc) and from external sources (e.g. meteorological and sensor data). EMC generates various visualizations of data based on maps and charts, proposes response measures and tracks their evolution. The Emergency Management Console (EMC) receives a Crisis Snapshot of the emergency with the elements defining the crisis. From the Crisis Snapshot, the EMC analyses the situation of the crisis and propose a Crisis Action Plan (CAP) a list of operations or activities to be executed in a timing sequential order making use of the necessary resources to fight against floods. The tool includes a GIS component, based on PostGIS tools. It has a User Interface for the visualization and management of the crisis; and a BackEnd component with an Expert System based on Drools (a JBoss component) that generates the Crisis Action Plan of the current emergency. The User Interface is a responsive HTML5 Web interface.
Target (type of companies / organizations that could buy it, type of industry interested)	Municipalities/prefectures; regional authorities; construction companies; transportation companies; tour operators and accommodation providers in touristic areas that confront the risks of flood events; insurance companies; car manufactures incorporating the flood signalling/warning system within the cars' software; organizers of expos, festivals, concerts and in general events/happening that involve a large number of attendants/participants; news and media providers; search and retrieval operators such as marketers; organizations/companies working on geographic and sociographic data such as surveys, financial and business planners; livestock/agricultural holdings; food companies; forecasting institutes; water companies; monitor gardens; monitor municipalities' resources; petroleum industry (in order to avoid economic losses & environmental pollution); data filtering for reducing "noise" (irrelevant content)
Progress and next steps	The technical partners aim to use the integrated solution in the future business engagements. SIVECO intends to use the FLOOD-serv solution in further similar R&D projects.
Outcomes envisaged / expected	- The mentioned IAS is ready to be used in the first quarter of 2020 - Marketing strategy established (first quarter of 2020) - 3 municipalities in each of the 2 years, adding each of the following years 1 extra municipality per year; 1 regional authority in each of the 2 years, adding each of the following years 1 extra regional authority per year; - 2 agricultural holdings in each of the first 2 years, adding in the next 2 years 1 extra agricultural holding and in the 5th year 1 more agricultural holding; - 3 forecasting institutes in the 1st year, adding one extra institute in the next 2 years and one more institute in the 5th year; - For each category of clients-insurance companies, tour operators, construction companies and food companies, 1 extra company is added yearly.

Table 7: FLOOD-serv system: Portal+Wiki+EMC

Name	FLOOD-serv - suite of integrated applications (Portal+Wiki+CDF+TMS)
Exploitable items	FLOOD-serv system: Portal+Wiki+CDF+TMS
Description	The FLOOD-serv System is a multilanguage, multicomponent, integrated system aimed at serving citizens and public administrators in various aspects of flood risk management. The components of the FLOOD-serv System are the following: **1.The FLOOD-serv Portal**: is a portal dedicated to citizens of pilot and partner cities aiming to contribute to flood risk mitigation. It is conceived as a two-way information gateway; citizens can look up information about floods, or they can submit information to relevant public authorities in their city, and engage in a dialogue with them. The FLOOD-serv Portal offers news, multimedia galleries and data-based flood reports in each of the participating cities. It also contains the FLOOD-serv Semantic Wiki, providing to citizens and specialists, systematic information about floods. Citizens can also submit issues and information to public authorities by using the citizen involvement form. This Portal was developed under the FLOOD-serv Project, and it is the front end to a series of other information system components developed in the same project. 2.**FLOOD-serv Semantic Wiki (SW)** is a semantic wiki containing general information and knowledge about floods and flood management but also specific and contextualized knowledge related to the FLOOD-serv Project. The SW is dedicated for use by both specialists on the one hand, and regular citizens on the other. The entries in the SW are written in a brief encyclopaedic style of definition + further details. However, we aim at keeping the entries rather short, and often the development of further details is made into other entries. The FLOOD-serv SW is based on Mediawiki and Semantic Mediawiki technologies. 3. **Citizen Direct Feedback (CDF)** module provides a direct communication channel from the citizens to the respective local authorities, enabling them to more effectively inform and engage in dialogue with those local authorities of any flood related information, in terms of risks or prevention. CDF empowers the citizen by allowing them to alert and discuss with local authorities of any potential flood risks or assess on prevention policies. CDF is a back-office component for use by public employees of relevant emergency services in the pilot cities. The front office to CDF is implemented in the Citizen Involvement mobile app and in the Citizen Involvement Form which are designed for use by citizens. 4. **Territory Monitoring System (TMS)** is an instrument for producing situational awareness and risk analysis within a geographical area by means of analysis of satellite and aerial pictures (from airplanes or drones). By analysing successive images, its intelligent processing engine is able to generate reports about relevant change events related to flood occurrences or impacts, and is able to geographically localize them. The TMS component receives satellite and/or aerial pictures (taken by drones or airplanes) and is able to localize and orient them on a digital map of the area of concern. By analysing successive pictures, taken at identified times, the TMS is able to recognize changes in the area and generate exactly localized events. The TMS intelligent processing engine is also able to classify the nature of the events which may be related directly to flood

	events: e.g. enlargement of surface covered by water or the braking of dikes or dams, or related to flood risk: e.g. apparition new elements like buildings, building sites in at risk areas. The TMS is able to generate periodic reports (based on periodicity of input pictures collection) and alarms that can be used by themselves in the TMS Graphical User Interface or exported in a decision support or emergency management system like EMC. Data generated by TMS is sent for further analysis to the EMC.
Target (type of companies / organizations that could buy it, type of industry interested)	Municipalities/prefectures; regional authorities; construction companies; transportation companies; tour operators and accommodation providers in touristic areas that confront the risks of flood events; insurance companies; car manufactures incorporating the flood signalling/warning system within the cars' software; organizers of expos, festivals, concerts and in general events/happening that involve a large number of attendants/participants; news and media providers; search and retrieval operators such as marketers; organizations/companies working on geographic and sociographic data such as surveys, financial and business planners; livestock/agricultural holdings; food companies; forecasting institutes; water companies; monitor gardens; monitor municipalities' resources; petroleum industry (in order to avoid economic losses & environmental pollution); data filtering for reducing "noise" (irrelevant content)
Progress and next steps	The technical partners aim to use the integrated solution in the future business engagements. SIVECO intends to use the FLOOD-serv solution in further similar R&D projects.
Outcomes envisaged / expected	- The mentioned IAS is ready to be used in the first quarter of 2020 - Marketing strategy established (first quarter of 2020) - 3 municipalities in each of the 2 years, adding each of the following years 1 extra municipality per year; 1 regional authority in each of the 2 years, adding each of the following years 1 extra regional authority per year; - 2 agricultural holdings in each of the first 2 years, adding in the next 2 years 1 extra agricultural holding and in the 5th year 1 more agricultural holding; - 3 forecasting institutes in the 1st year, adding one extra institute in the next 2 years and one more institute in the 5th year; - For each category of clients-insurance companies, tour operators, construction companies and food companies, 1 extra company is added yearly.

Table 8: FLOOD-serv system: Portal+Wiki+CDF+TMS

Currently, we have identified 6 aspects that can be considered as goals. These aspects are the **number of clients**, number of **trained end users**, number of **visitors** of the FLOOD-serv system's **web portal**, number of **downloads of the mobile app,** number of collaborations with future **EU funded projects** *(incorporate either system's components or the system as a whole)* and the number of **email contacts** *(blog or newsletter subscribers)* that will assist in building the brand and its good reputation.

The performance of these aspects will be measured in regular intervals after the project's end and their success will be evaluated according with the set goals presented in **6.2.1** and **6.2.2**. The assessment will be made in a time frame as presented in **figure 9.**

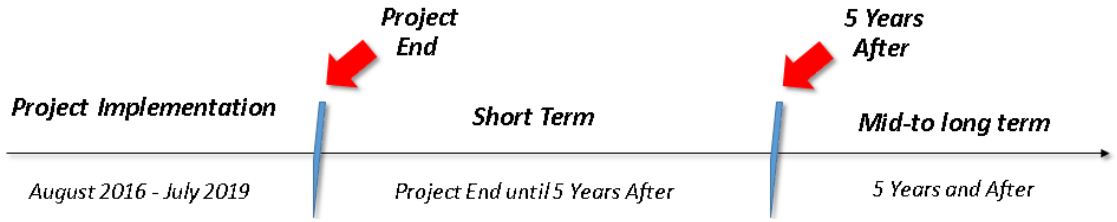


Figure 9: Time frame

Short term frame: Exploitation of FLOOD-serv results – assumptions and figures

The short-term frame is defined from the end of the project until 5 years upon its completion, when it will be important to widely communicate the FLOOD-serv final results and attract as many customers as possible to the product and/or to the service.

- We aim for the period **end of the project** until **two years after** to have as **clients 3 municipalities** yearly that will use the offered solution. Moreover, we would like to have as clients at **least one** regional authority of flood risk area. We are also targeting the agricultural holdings and the forecasting institutes. Concerning the private sector, we expect at least **one company** from the sectors-insurance, tour operators, construction and food would use one of the IAS previously presented or the components of the system.

- As mentioned above in the Individual Exploitation Plan, already:
  - The CDF will be deployed in Famalicão for Flood and non-flood related issues in 2020. The App for citizens and the integration of the Backoffice with an online portal will be used for a smart city and citizen engagement approach project. It is also expected to implement the CDF on 3 new clients, in a period of 2 years after the project conclusion. Important to underline that the basis of CDF is already deployed in several commercial projects. For the TMS the expectation is to also implementing it in Famalicão for urban area.
  - ANO currently has a few prospects in Brazil.
  - It is also important to note that the IT company which provides services to the 112 Emergency services in the Murcia Region (Spain) has already signed a contract with FLOOD-serv partner ANSWARETECH SL to adapt and sell the EMC for Public resources management in Public Administrations, like in public parks, gardens, buildings, etc. This version of the EMC is called EMC Garden.
  - Bratislava Self-governing region (BSK) and key stakeholders in the region (city district of Raca/Devin) involved in Flood-serv project have expressed big interest in having data from sensors installed in high risk flood areas transferred to authorities and consequently (if needed) creating alert accessible to citizens via webpage or SMS/message through applications. BSK is committed to promote this service and to

make it available for city districts and communities that will benefit from it.
    - Slovak city of Ilava expressed potential commercial interest in adopting Flood-serv system. Demand has been addressed to Exdwarf by city major.
- Within the first **two years** after the project's end **2,000** to **3,000 tech savvy citizens** will have already used the system *(web portal and app in total)*. They will be also considered as "evangelists" of the system and could push local administrators for adopting this system to such areas that face flood risks. Until **5 years after**, more than **12,000 citizens** will have used at least once the FLOOD-serv system.
    - We expect at least **50** to **80 downloads** of the **mobile app** per pilot city within the first two years after the end of the project *(at least 250* **downloads** *in total)*. The overall target at the **end of the short-term period** *(until 5 years after FLOOD-serv project's completion)* is **1,000 downloads** in total *(sum from all pilot cities)*.
    - We aim of at least **10,000** to **11,000 unique visitors** in total on the **web portal** until the end of short-term period.
- We aim to organize a **training program** for end users and we estimate that **200** to **300** end users will be trained per year in all pilot sites. At the end of the short-term period **1,000 end-user** will have been successfully trained on how to use the FLOOD-serv system.
- At least **one** future **EU funded project** will use, improve and further expand components of the FLOOD-serv system or the system as a whole.
- We expect that **800** to **1,000 individuals** will voluntarily provide their email account *(subscribers)* in order to receive news and updates concerning the FLOOD-serv system.

Mid-to long term frame: Exploitation of FLOOD-serv results – assumptions and figures

The mid-to long term frame is set from the period of 5 years from project's completions and after as depicted in **figure 15**, when the creation of a joint venture could be viewed as possible evolution.

- We estimate as a client base at least **30 municipalities** and/or **regional authorities** and at least **10 organizations** *(profit or non-profit)* that will use extensions of the FLOOD-serv system.
- We aim of **40,000 citizens** who will deploy the FLOOD-serv system.
    - We expect at least **35,000** to **37,000 unique visitors** on the web portal, and
    - **2,000 to 3,000 downloads** of the mobile app and its updates.
- Through the training programme that we will organize, we aim to train more than **3,000 citizens.**
- We expect that **3** future **EU funded project** will use, improve and further expand components of the FLOOD-serv system or the system as a whole.
- The increase of the email contacts will continue to be an important aspect to consider about but not a key one that would assist the FLOOD-serv consortium to communicate the system. For this reason, a moderate appraisal could an increase of **10% to 15% per year** for the blog or newsletter subscribers.

Assumptions and Figures

The Consortium assessed 3 Integrated Application Suites (IAS) to sell to municipalities, regional authorities, agricultural holdings, forecasting institutes, insurance companies, tour

operators, construction and food companies based on which we made our business plan assumption.

The assumptions took into account that we will start selling to:

- 3 municipalities in each of the 2 years, adding each of the following years 1 extra municipality per year;
- 1 regional authority in each of the 2 years, adding each of the following years 1 extra regional authority per year;
- 2 agricultural holdings in each of the first 2 years, adding in the next 2 years 1 extra agricultural holding and in the 5th year 1 more agricultural holding;
- 3 forecasting institutes in the 1st year, adding one extra institute in the next 2 years and one more institute in the 5th year;
- for each category of clients-insurance companies, tour operators, construction companies and food companies, 1 extra company is added yearly.

The budget includes the components maintenance costs, the server maintenance costs (where needed), the hosting costs, the marketing costs with promoting the solutions, the consultancy costs in case the pilots support is needed, travel costs and training costs.

The marketing activities will be done by the Consortium partners either using different dissemination events where they participate or by direct selling actions.

Option 1

FLOOD-serv markets the whole system: the portal integrating the WIKI, EMC, CDF and TMS components

INCOME (€) from:	TOTAL	2020	2021	2022	2023	2024
Licenses sold to Municipalities	5,950,080	764,640	807,840	1,134,720	1,454,400	1,788,480
Licenses sold to Regional Authority	3,156,480	254,880	269,280	567,360	872,640	1,192,320
Licenses sold to Agricultural Holdings	3,964,320	509,760	538,560	851,040	872,640	1,192,320
Licenses sold to Forecasting Institutes	6,503,040	764,640	1,077,120	14,18,400	1,454,400	1,788,480
Licenses sold to Insurance Companies	4,298,400	254,880	538,560	851,040	1,163,520	1,490,400
Licenses sold to Tour Operators	4,298,400	254,880	538,560	851,040	1,163,520	1,490,400
Licenses sold to Construction Companies	4,298,400	254,880	538,560	851,040	1,163,520	1,490,400
Licenses sold to Food Companies	4,298,400	254,880	538,560	851,040	1,163,520	1,490,400
Total income from licenses sold	**36,767,520**	**3,313,440**	**4,847,040**	**7,375,680**	**9,308,160**	**11,923,200**

COSTS (€):	TOTAL	2020	2021	2022	2023	2024
Component & equipment maintenance	666,000	133,200	133,200	133,200	133,200	133,200
Training	619,200	62,400	86,400	124,800	153,600	192,000
Marketing	402,000	60,000	72,000	84,000	90,000	96,000
Travel	80,000	12,000	14,000	16,000	18,000	20,000
Consultancy (pilots/externals)	96,000	192,00	19,200	19,200	19,200	19,200
Total Costs for 1 licence	**1,863,200**	**286,800**	**324,800**	**377,200**	**414,000**	**460,400**
Risks	3,676,752	331,344	484,704	737,568	93,0816	1,192,320
Net Cash Flow	**31,227,568**	**2,695,296**	**4,037,536**	**6,260,912**	**7,963,344**	**10,270,480**

Table 9: FLOOD-serv as a whole

Option 2

FLOOD-serv markets the portal integrating the WIKI and EMC components

INCOME (€) from:	TOTAL	2020	2021	2022	2023	2024
Licenses sold to Municipalities	4,680,000	583,200	626,400	892,800	1,152,000	1425,600
Licenses sold to Regional Authority	2,491,200	194,400	208,800	446,400	691,200	950,400
Licenses sold to Agricultural Holdings	3,117,600	388,800	417,600	669,600	691,200	950,400
Licenses sold to Forecasting Institutes	5,112,000	583,200	835,200	1,116,000	115,2000	14,256,00
Licenses sold to Insurance Companies	3,391,200	194,400	417,600	669,600	921,600	1,188,000
Licenses sold to Tour Operators	3,391,200	194,400	417,600	669,600	921,600	1,188,000
Licenses sold to Construction Companies	3,391,200	194,400	417,600	669,600	921,600	1,188,000
Licenses sold to Food Companies	33,91,200	194,400	417,600	669,600	921,600	1,188,000
Total income from licenses sold	**28,965,600**	**2,527,200**	**3,758,400**	**5,803,200**	**7,372,800**	**9,504,000**

COSTS (€):	TOTAL	2020	2021	2022	2023	2024
Component & equipment maintenance	414,000	82,800	82,800	82,800	82,800	82,800
Training	309,600	31,200	43,200	62,400	76,800	96,000
Marketing	402,000	60,000	72,000	84,000	90,000	96,000
Travel	80,000	12,000	14,000	16,000	18,000	20,000
Consultancy (pilots/externals)	96,000	19,200	19,200	19,200	19,200	19,200
Total Costs for 1 licence	**1,301,600**	**205,200**	**231,200**	**264,400**	**286,800**	**314,000**
Risks	2,896,560	252,720	375,840	580,320	737,280	9504,00
Net Cash Flow	**2,4767,440**	**2,069,280**	**31,51,360**	**4,958,480**	**6,348,720**	**8,239,600**

Table 10: WIKI and EMC components

Option 3

FLOOD-serv markets the portal integrating the WIKI, CDF and TMS components

INCOME (€) from:	TOTAL	2020	2021	2022	2023	2024
Licenses sold to Municipalities	4,952,160	622,080	665,280	944,640	1,216,800	1,503,360
Licenses sold to Regional authority	2,633,760	207,360	221,760	472,320	730,080	1,002,240
Licenses sold to Agricultural Holdings	3,299,040	414,720	443,520	708,480	730,080	1,002,240
Licenses sold to Forecasting Institutes	5,410,080	622,080	887,040	1,180,800	1,216,800	1,503,360
Licenses sold to Insurance Companies	3,585,600	207,360	443,520	708,480	973,440	125,2800
Licenses sold to Tour Operators	3,585,600	207,360	443,520	708,480	973,440	125,2800
Licenses sold to Construction Companies	3,585,600	207,360	443,520	708,480	973,440	1,252,800
Licenses sold to Food Companies	3,585,600	207,360	443,520	708,480	973,440	1,252,800
Total income from licenses sold	**7,585,920**	**829,440**	**887,040**	**1,416,960**	**1,946,880**	**2,505,600**

COSTS (€):	TOTAL	2020	2021	2022	2023	2024
Component & equipment maintenance	468,000	93,600	93,600	93,600	93,600	93,600
Training	464,400	46,800	64,800	93,600	115,200	14,4000
Marketing	402,000	60,000	72,000	84,000	90,000	96,000
Travel	80,000	12,000	14,000	16,000	18,000	20,000
Consultancy (pilots/externals)	96,000	19,200	19,200	19,200	19,200	19,200
Total Costs for 1 licence	**1,510,400**	**231,600**	**263,600**	**306,400**	**336,000**	**372,800**
Risks	758,592	829,44	88,704	141,696	194,688	250,560
Net Cash Flow	**5,316,928**	**514,896**	**534,736**	**968,864**	**1,416,192**	**1,882,240**

Table 11: WIKI, CDF and TMS components

Conclusions

In the current deliverable we collected the consortium's input concerning their perspective on how they believe the FLOOD-serv system will be rendered financially viable. Based on the collected input we created the Business Model analysed in this document. This process helped us to establish common understanding among the consortium and prepare the ground for the creation of the Business Plan which will be clearly market-oriented.

What could be extracted from the analysis made herein is the paramount importance of identifying the customers that would be approached as well as the need of creating a sales network that would give a boost in the turnover. It was clearly mentioned that we do not expect any income generation from the citizens *(end-users)* of the pilot sites who will deploy the FLOOD-serv system. The system will be available to them free of charge. Nevertheless, this fact does not exclude the possibility of receiving funds from the municipalities of pilot sites only for sustaining the project's offer once we have scaled our FLOOD-serv solution to full-scale production and towards the commercialization stage we will aim towards a saleable product which could bring further financial sustainability through the sources as stated in the Revenue Streams section.

References

[1] Conceptualising Business Models: Definitions, Framework and Classifications

[2] Alan Smith, Alexander Osterwalder, Gregory Bernarda, Trish Papadakos, and Yves Pigneur, eds.' *Value Proposition Design: How to Create Products and Services Customers Want*', 2014.

[3] Floods and health

Appendix I - TRLs

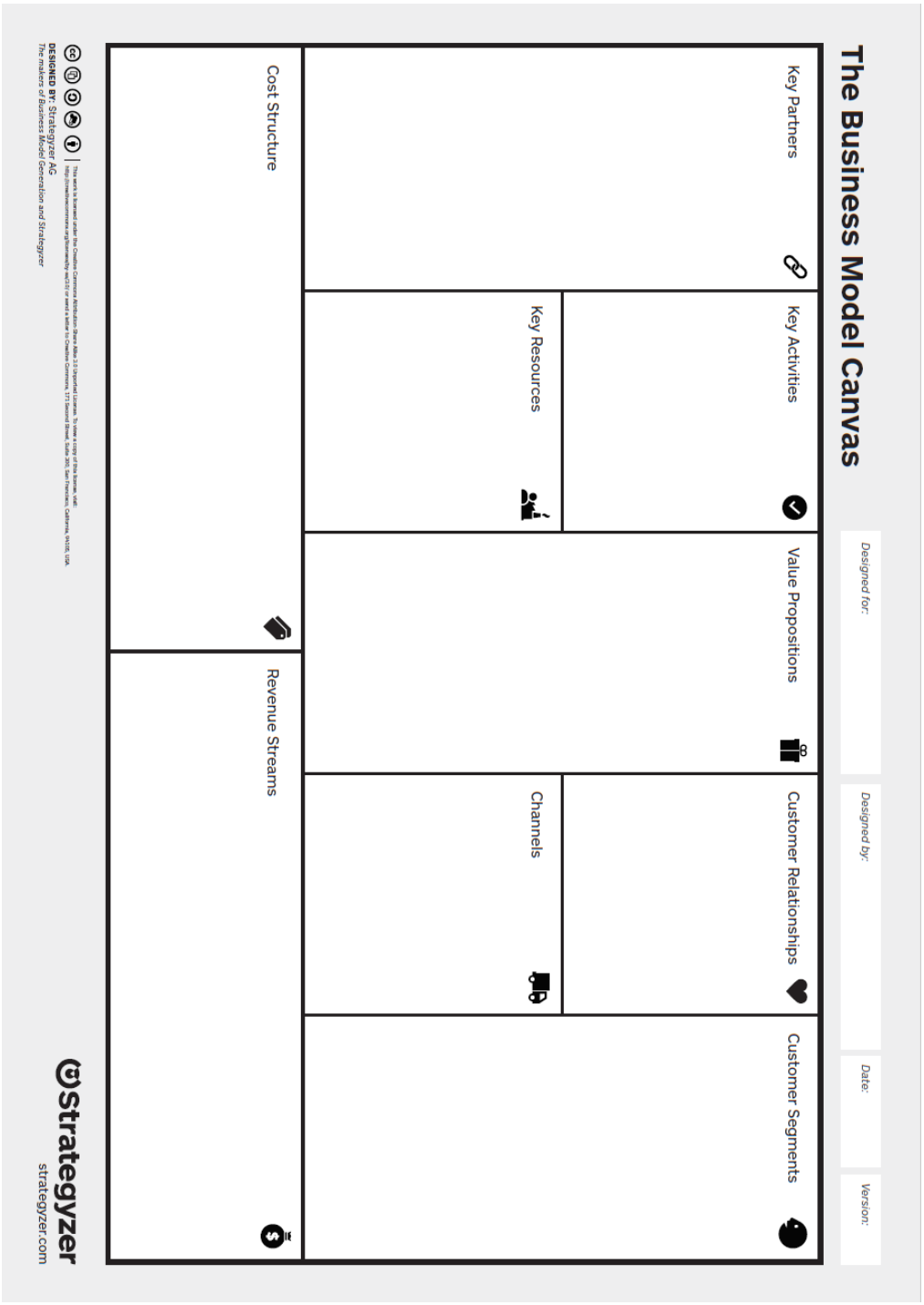
Cluster	*TRL*	*H2020 terminology*	*EARTO reading*	*EARTO definition and description*
Invention	TRL1	Basic Principles observed	Basic principles observed	Scientific research is translated into potential new basic principle that can be used in new technologies
	TRL2	Technology concept formulated	Technology concept formulated	Potential application of the basic (technological) principles are identified including their technological concept. Also the first manufacturing principles are explored, as well as possible markets identified. A small research team is established to facilitate assessment of technological feasibility.
Concept validation	TRL3	Experimental proof of concept	First assessment of feasibility of the concept and technologies	Based on preliminary study, now actual research is conducted to assess technical and market feasibility of the concept. This includes active R&D on a laboratory scale and first discussions with potentials clients. The research team is further expanded and early market feasibility assessed.
	TRL4	Technological validity in a lab	Validation of integrated prototype in a laboratory	Basic technological components are integrated to assess early feasibility by testing in a laboratory environment. Manufacturing is actively researched,

				identifying the main production principles. Manufacturing is actively researched, identifying the main production principles. Lead markets are engaged to ensure connection with demand. Organisation is prepared to enter into scale up, possible services prepared and a full market analysis conducted.
Prototyping and incubation	TRL5	Technology validated in relevant environment (industrial relevant environment in the case of KETs)	Testing of the prototype in a user environment.	The system is tested in a user environment, connected to the broader technological infrastructure. Actual use is tested and validated. Manufacturing is prepared and tested in a laboratory environment and lead markets can test pre-production products. First activities within the organization are established to further scale up to pilot production and marketing
Pilot production and demonstration	TRL6	Technology demonstrated un relevant environment (industrially relevant environment in the case of KETs)	Pre-production of the product, including testing in a user environment	Product and manufacturing technologies are now fully integrated in a pilot line or pilot plant (low rate manufacturing). The interaction between the product and manufacturing technologies are assessed and fine-tuned, manufacturing process and the organisation of production is made operation (including marketing, logistics, production and others).

	TRL7	System prototype demonstration in an operational environment.	Low scale pilot production demonstrated	Manufacturing of the product is now fully operational at low rate, producing actual commercial products. Lead markets test these final products and organisational implementation is finalized *(full marketing established, as well as all other production activities fully organized).* The product is formally launched into first early adopter markets.
Initial market introduction	TRL8	System completed and qualified	Manufacturing fully tested, validated and qualified	Manufacturing of the product, as well as the product final version is now fully established, as well as the organisation of production and marketing. Full launch of the product is no established in national and general early majority markets.
Market expansion	TRL9	Actual system proven in operational environment *(competitive manufacturing in the case of KETs; or in space)*	Production and product fully operational and competitive	Full production is sustained, product expanded to larger markets and incremental changes in the product create new versions. Manufacturing and overall production is optimized by continuous incremental innovations to the process. Early majority markets are fully addressed.

Table 12 : Technology Readiness Levels (TRLs)

Appendix II – Business Model Canvas



Appendix III – Partners Input

Q1: Value proposition
The system gives access to emergency and awareness information and data for decision makers, the platform enabling a two-way communication for municipalities to citizens and/or stakeholders. This can be done especially due to the CDF (Citizen Direct Feedback) component, which takes the citizen feedback reported through the platform, analyses it and provides a resolution which can be seen by the citizen reporting the respective issue. Public Authorities need more and more feedback from citizens for an input driven government. Citizens need feedback from those authorities for more feedback driven citizenship and a sense of being heard. With this solution PA can access important data and make more sound decisions based on inputs from its systems and more importantly from its citizens. PA will then have a high value tool that allows for a more transparent interaction. Therefore, the Emergency Management Console (EMC) integrated in the FLOOD-serv portal lets Authorities and people involved in flood management (facilitators, flood experts and emergency responders) have centralized all available information regarding flood risk as well as coordinate among them to carry out flood prevention and mitigation tasks. If we take into account that in most of the cases floods refer to a certain area, then the TMS (Territory Monitoring System) integrated in the platform will be in charge with reporting the risk of appearing such an event, serving as a useful tool for preparing the authorities and the stakeholders involved to better react and to propose the actions to fight against it. The terminology related to flood and the related legislation in the 5 countries involved in the piloting phases are provided through the portal by the SW (Semantic Wiki) component. As a whole, the system offers the possibility to get informed in real time on a flood emergency situation via a portal and a mobile application. It allows not only public institutions to inform citizens about floods but also private companies to be aware of potential risks that flood can represent on their business.

Table 13: Q1 – Partners' input

Q2: Customer segments
Institutions with emergency (or crisis) management departments, research organisations, festival organizers and festival goers and events/happening with large amounts of people involved.
For instance, EMC is aimed to be used by all the Authorities and experts in the field of flood risk management. The EMC provides a personalized public service easy to be used and focused on flexible and personalised interactions

among public administrations. Given the availability of data, the EMC's users are provided with a more pro-active, higher quality and valuable service based on the collaboration.
Public Organizations with responsibilities in the areas of Civil Protection and City Management
An important customer segment is represented by the local public authorities which can raise the citizens awareness on flood risks and can enable the collective risk mitigation solutions and response actions. Other potential customers come from the private sector, more exactly companies which can be affected by such emergency situations in their day to day activity (e.g. companies having warehouses in areas with a potential risk-construction companies, agricultural associations whose harvest may be affected, insurance companies). At present the public authorities target group raises at around 200 people. In future it is forecast to exceed 1000 people. In terms of private companies, 2 private companies showed their interest. We estimate that once the project closes, their number will increase, especially because the application can prevent them from jeopardizing their business in terms of money loss.
Car manufactures incorporating the signalling/alerting system in its software, news and media providers, petroleum industry, search and retrieval operators such as marketers; Livestock farming companies; Food and goods storage;

Table 14: Q2 – Partners' input

Q3: Solutions
Actions of dissemination through direct and indirect marketing methods will be done, presenting the solution directly to public authorities, participating in speciality conferences and online marketing via dedicated content. The application consists in a platform integrating 5 components. Emergency Management Console (EMC) analyses the situation of the crisis and proposes the appropriate response measures to fight it against based on the data received. The collected data are related mainly to the following data associated to the different pilot cities: • Points of Interest (PoIs) and population data • Daily measured weather (temperature, rain, wind and water level of target rivers) • Daily weather forecast for tomorrow (temperature, rain, wind and water level of target rivers) • Daily flood situation (flood risk, water level in target rivers, etc.) • Historical data associated to every emergency situation. Social Media Component (SMC) consists of multichannel social media sourcing, two-way communication and related analysis. Territory Monitoring System (TMS) identifies flood risks within an extensive geographic area, through the analysis of provided images of the territory. Citizen Direct Feedback (CDF) provides a direct communication channel from the citizens to the respective local authorities and inform them about any flood related information, in terms of risks or prevention. Semantic Wiki Component (SW) is a multi-lingual component to accompany the educational and the emergency management's facilities of the FLOOD-serv system.

Table 15: Q3 Partner's Input

Q4: Benefits
The solution offers precise information in real time on a flood situation in a particular area either by accessing a web portal or using a mobile application. The benefits can be either of saving human lives or of saving material resources. Consumer needs: By linking citizens and institutional stakeholders, enabling collaboration Benefits: 1. Platform availability as Web and App, 2. Knowledge (flood, legislation, processes), 3. Six available language versions, 4. International dissemination and popularity of project 5. Capability of generating emergency data 6. Ability to connect and process sensor data Authorities support: Possibility of estimating and preventing flood risk one day in advance - More official data centralized on the same platform - Display on the map for faster decision making - Possibility of recovering historical data for each emergency - Possibility of using the tool in simulation model for user training - More effective coordination between authorities and emergency responders.

Table 16 : Q4 – Partners' input

Q4a: Benefits
Once the application is largely used, lives and material losses may be prevented. Not all the components may be used only in flood situations. For instance, the EMC is a tool which can be used to any resource management such as: public gardens, maintenance of public or private facilities, coordination for cleaning companies, notification of incidents by citizens, etc.

Table 17 : Q4a – Partners' input

Q5: Channels
If we consider that the potential customers are governmental and business organizations, the most appropriate means of communication is face-to-face meetings and live demonstrations of the system. Of course, recommendations about the FLOOD-serv system from prestigious customers such as municipalities and other relevant public institutions that have already used the system could be provided either as recommendation letters or as a newsletter or a press release published on their website. In addition, project and beneficiary's social media, Project homepage, project newsletter, Scientific conferences, Expert forums such as EIP water, project hotline, publications, promotional materials, newsletters, organizations websites and social media may also represent important channels for promoting the solution. We should not forget about the direct sale to the objective market. The digital channels can be also used.

Table 18 : Q5 – Partners' input

Q6: Customer Relationships
Demos of the system are the most appropriate because of 2 main reasons: on one hand they give the provider the opportunity to be in direct contact with the potential client and meets his requirements and needs and on the other hand they offer a proof of how the system can help in such emergency situations. Such demos will be supported by a technical support team that would help with the queries of customers and end users. The companies who have a special application related to the customers relationship (e.g. SIVECO, ANSWARE) can use CRM (Customer Relationship Management) system which allows them to be in direct contact with their clients and communicate the last news and improvements made in the marketed solution.

Table 19 : Q6 – Partners' input

Q7: Key Activities
Once the project finishes, it is important to develop a detailed marketing plan to sell the solution as well as produce all the promotional material required for disseminate purpose and to take into account several steps: identify the potential customers, to contact them, settle meetings and organize demos to promote the whole platform and its components in case there are customers interested in some components depending on their activity and needs. After the demos are done, a follow-up meeting should take place, in which some questions which didn't appear in the demos, should be addressed, as clarifications which may support in taking decisions in buying the system or some of its components. The direct and close contact with the potential customer is crucial to get assured that they understood the system usefulness and its importance in their day-to-day activity. In brief, marketing & sales activities together with training program should make the objective of a serious promotion plan of the solution. As the solution is the result of a partnership between representatives of the public and private sector, the definition of IPR is also very important to consider.

Table 20 : Q7 – Partners' input

Q7a: Future Research
*Similar systems can be created for other emergency situations (e.g. earthquakes) *Emergency research (non-flood), other flood-regions than current pilots *Research the possibilities and benefits of including the Augmented Reality for the simulation of floods as an extra training functionality of the EMC. *Future research for managing emergency situations

Table 21 : Q7a – Partners' input

Q8: Key Resources
There is a wide range of resources from human resources (the key ones) to material and financial resources. It's a needed triangle, otherwise the proposition won't reach its goal of reaching the clients. Without people being involved in producing and promoting the system, without money spent on making the system being a viable solution for such emergency situations, without equipment used for supporting the system and its functioning, the proposition can't stand as a viable solution for any client. More precisely, there should exist a dedicated team in charge with promoting the solution composed of developers, trainers, sales personnel, using material resources (hardware for the components' function -servers, sensors, drones, etc) and financial resources. There may also exist a central technical support person, office and/or hotline.

Table 22 : Q8 – Partners' input

Q9: Key Partners
There are 2 main key categories of partners: the public institutions (municipalities, prefectures, different associations, etc) and the private actors (companies of different kinds-from facility providers to companies offering different products and services). Additionally: • First flood reporters (end-users who report in social media network flood events); • Technical partners of the FLOOD-serv project; • Social media networks; • Flood experts (regarding EMC) who can indicate the rules to be implemented in the decision support system (DSS). These rules indicate when it should trigger different alerts based on the thresholds of the water level in the target rivers and the rain level in target areas. To obtain these thresholds, it is required to have been monitoring the different situations in the past by experts in the field of flood management. In terms of IPR, Exdwarf can recommend specialist with track of records in the IPR an H2020 projects: Viera Petrášová Attorney-at-law 5, Tallerova St., 811 02 Bratislava, Slovakia Tel: +421 915 536 941 e-mail: petrasova@legalassociates.sk www.legalassociates.sk

Table 23 : Q9 – Partners' input

Q9a: Key Application Areas
1. Other types of emergencies (non-flood); 2. Emergency-management research; 3. Smart cities; 4. Flood risk management; 5. Civil protection; 6. Disaster Management; 7. Public gardens; 8. Maintenance of public or private facilities; 9. Notification of incidents by citizens

Table 24 : Q9a – Partners' input

Q9b: Key Competitors
There hasn't been identified a competitor offering a complex solution, integrating 5 components used in flood emergency situations in any of the participating countries. In Romania and Slovakia, there has been identified a necessity of preventing losses caused by small rivers which are not in the attention of governments because of their low impact at nation level. Still such small rivers produce consistent losses at region level. Therefore, no competition was identified for the cases of these small rivers. At national level (Spain), the main commercial competitor of the EMC applicable to the gardens management is the Arbomap system: https://www.tecnigral.es/arbomap/ The main difference is that the EMC integrates many more data sources than Arbomap, among them the social networks.

***Table 25*: Q9b – Partners' Input**

Q9c: Revenue Streams
Subscription

***Table 26*: Q9c – Partners' Input**

Q9d: Revenue Streams
*Fees for implementation, tech-support, training, consulting, development of additional functionalities, data, scientific dissemination etc. *The citizens are paying nothing directly, but the taxes and fees they pay to the public institutions will constitute the system cost. *Extensions/customization of the components and/or of the FLOOD-serv system could be offered to the private sector and generate income.

Table 27*: *Q9d – Partner's Input

Q10: Cost Structure
*team for support and continuous improvement; * IT infrastructure to support it; *travel and personal for implementation *maintenance costs of the platform; *marketing and sales costs

Table 28: Q10 – Partners' Input

Risk Management Plan
Any change happens in the data sources integrated in the EMC will impact the system. To avoid this, several sensors measuring a same parameter (water level in a river or rain level in a specific area) should be integrated in the EMC. Thus, if a sensor changes, we can use the data coming from the rest of sensors with the same nature.

Table 29: Risk Management Plan – Partners' Input

IPR
The IPR of all the components belong to each partner developing them.

Table 30: IPR

Quantitative Questions - A
3 companies/municipalities/NGOs etc.

Table 31: Quantitative Questions (A) – Partners' input

Quantitative Questions - B
More than 4 times per year

Table 32 : Quantitative Questions (B) – Partners' input

Quantitative Questions - C
The costs depend on the number of users, on the needed maintenance to the system and on the servers. For instance, the EMC acquisition has a

variable cost depending on the number of people using the tool. For a customer with less than 200 potential users of the EMC, the EMC cost is 15.000 euros + 20% maintenance + 50 euros/month for the server price. For more than 200 users, the price is 25.000 euros + 20% maintenance + 50 euros/month for the server price.

Table 33 : Quantitative Questions (C) – Partners' input

Potential Competitors
Main competitor in Slovakia is www.odkazprestarostu.sk, smartphone app and portal for report issues to mayors. The I-REACT EU project provides similar services as FLOOD-serv, but I-REACT does not integrate any local official data sources, and in I-REACT the forecast models based on satellite images have a very important role. I-REACT has finised in June 2019. Another EU similar project is FLOODIS which finished in November 2015. Additional potential competition: • **F**IWARE https://www.fiware.org/ • SCOREwater https://www.scorewater.eu/ • HEGS https://cordis.europa.eu/project/rcn/221972/factsheet/en • FOReSEE https://www.tecnalia.com/en/ • PROCESS https://www.process-project.eu/ • HydroSocialExtremes https://cordis.europa.eu/project/rcn/214680/factsheet/en • ARCADIA http://www.arcadia-framework.eu/ • ANYWHERE http://anywhere-h2020.eu/

Table 34 : Potential Competitors