PERIODIC PROJECT REPORT

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Document History

Version	Date	Reason	Revised By
1.0	18/06/2016	First release	Andrea Rizzoli
1.1	25/07/2016	New section 3.1.1 on resource usage per partner per deliverable has been added. Revision of the workpackage description of work progress has been made in Section 3. Description of role of EMIVASA and TWUL has been detailed in Section 4.3.1.	Andrea Rizzoli
1.2	29/07/2016	EIPCM figures are corrected, reflecting the FormC update	Jasminko Novak, Andrea Rizzoli
1.3	11/8/2016	Various amendments following review by the Financial Officer	Andrea Rizzoli
1.4	21/8/2016	Amendments to reported PM by UPV and EMIVASA	Andrea Rizzoli, Manuel Pulido
1.5	23/9/2016	Further amendement to PM allocation by UPV	Andrea Rizzoli, Manuel Pulido

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Declaration by the project coordinator

I, Andrea Emilio Rizzoli, as coordinator of this project and in line with the obligations as stated in Article II.2.3 of the Grant Agreement declare that:

- The attached periodic report represents an accurate description of the work carried out in this project for this reporting period;

- The project (tick as appropriate):
  - ☐ has fully achieved its objectives and technical goals for the period;
  - ☑ has achieved most of its objectives and technical goals for the period with relatively minor deviations.
  - ☐ has failed to achieve critical objectives and/or is not at all on schedule.

- The public website, if applicable

☑ is up to date

☐ is not up to date

- To my best knowledge, the financial statements which are being submitted as part of this report are in line with the actual work carried out and are consistent with the report on the resources used for the project (section 3.4) and if applicable with the certificate on financial statement.

- All beneficiaries, in particular non-profit public bodies, secondary and higher education establishments, research organisations and SMEs, have declared to have verified their legal status. Any changes have been reported under section 3.2.3 (Project Management) in accordance with Article II.3.f of the Grant Agreement.

Name of the Project Coordinator:

Andrea Emilio Rizzoli

Date: 7/09/2016

Publishable Summary

1.1 Summary description of project context and main objectives

1.1.1 The project context

The SmartH2O project aims to provide water utilities, municipalities and citizens, with an ICT-enabled platform to design, develop and implement better water management practices and policies, leading to a reduction in water consumption, without compromising the quality of life, and to an increase in resource security.

Water consumers are people whose behavior depends on a variety of motivations and social and individual drivers and triggers. For this reason, SmartH2O develops a framework able to consider **both the technical and the social sides** of the problem, which **promotes the active engagement of the consumers** with the shared objective of saving water and energy.

The solution proposed by the SmartH2O project is to develop an ICT platform based on the integrated use of **smart meters**, **social computation**, and **dynamic water pricing** that will be able to:

- **Understand and model** the consumers' current behavior on the basis of historical and real-time water usage data;
- **Predict** how the consumer behavior can be influenced by various water demand management policies, from water savings campaigns, to **social awareness campaigns**, to **dynamic water pricing** schemes;
- **Raise the awareness** of water consumers on their current water usage habits and their lifestyle implications and to stimulate them to **reduce** water use;

The SmartH2O platform is a "virtual world" that allows water utilities to experiment various combinations of water demand management policies (e.g. incentives and water pricing, social awareness campaign) and assess their potential impact on water users. The social participation application will also enable obtaining feedback from the users to calibrate and validate users' behavior models. Traditional econometric methods will also be used to model consumer behavior and experimental economics approaches will help calibrate the econometric and agent models. The SmartH2O platform will then produce simulations of the expected impacts of the proposed policies on the users' behavior, thus allowing the water utilities to select the most effective water demand management strategy.

The social participation application is then also used to **deploy policies in the real world**. The consumers will receive signals, such as incentives to save water in specific environmental conditions, or such as dynamic price information. Once the policies are deployed, the SmartH2O platform allows **continuous monitoring** of the users' aggregate behavior, i.e. their water consumption, in order to suggest other actions if the original policy loses effectiveness.

1.1.2 The project objectives

The SmartH2O general objectives are to:

1. study, understand and modify consumer behavior in order to …
2. … achieve quantifiable water savings by **raising consumer awareness** and by …
3. … the design and implementation of **dynamic pricing schemes**
4. … thus also improving the efficiency and business operations of water companies.

The general objectives listed above are translated in a set of scientific and technological objectives. The *scientific* objectives of this project are:

- the study of **social awareness incentives** to promote water conservation behaviors;
- the development of an innovative method **to learn and develop models of user behavior** integrating quantitative data, obtained by smart sensors, and qualitative data, collected through an online social participation application;

- the study of the design of **dynamic water pricing** policies;
- the development, implementation and validation of an **agent-based simulation model**, able to reproduce the behavior of whole districts of water users based on selected user profiles;
- to **publish and disseminate** our results, in particular fostering trans-disciplinary works involving both ICT and water resources researchers.

The main *technological* objectives of this project are:

- the development of a **modular and scalable ICT platform** that integrates a series of components, in order to provide water utilities an effective tool for the design and implementation of water demand management policies to promote water usage efficiency;
- to improve the resource efficiency and business operations of water utilities thanks to the use of the SmartH2O platform;
- to promote the adoption of novel ICT solutions in water management companies;

1.2 Description of work performed since beginning of project and main results

The first project period was characterised by the overall organization of the project, proper establishment of project management procedures and standards, collection of users' requirements, setup of the Validation Scenarios, specification of the SmartH2O Platform Architecture, including its components, and the Drop! digital game and its physical counterpart. A first prototype of the Platform and of the Game has been released.

The second year has been marked by the amendment to the Description of Work in order to incorporate a new case study in the city of Valencia, with a potential number of adopters reaching 800'000 people. At the same time the UK case study has been re-oriented towards the experimentation of innovative pricing policies by means of user panels.

In the second year the focus has shifted on the implementation of the Platform and its components, in particular the advanced web portal with gamification features, the agent based simulation platform, and the final version of Drop! the digital game. In parallel the project has advanced in the analysis of the impact of social network and awareness on water consumption and which incentives are most effective in gamification contexts. The potential impact of innovative pricing schemes has also been investigated and for this a questionnaire has been sent to 70'000 users in Southern Switzerland. Finally, the SmartH2O platform has bene launched in the Swiss case study, and preparation work has been made for the launch in the Spanish case study.

The major results achieved so with respect to the objectives of each work package are described in the following paragraphs.

1.2.1 Work package 1 - Management and coordination

The objectives of this work package are to monitor progress and ensure that the project runs smoothly on track.

In the **first year**, WP1 has delivered a document describing the management structures and processes which have been set up to help project development (D1.1 Management Processes). In particular, D1.1 explains how the internal project wiki page is to be used for reporting work progress, how periodical quarterly reports are to be conducted, and how the quality assurance procedure is applied to project deliverables.

In the **second year**, WP1 has focused on the review of the description of work and a preparation of a contract amendment in order to incorporate two new partners, Universitat Politecnica di Valencia and EMIVASA, and two new third parties, WebRatio, attached to Politecnico di Milano, and Aguas de Valencia attached to EMIVASA.

1.2.2 Work package 2 - Requirements, design and specifications

WP2 has been a key work package with the aim of identifying narrative user stories, visual mockups, formal use cases and requirements, and finally the functional specifications of the SmartH2O platform. The outcomes of this work package have not only driven the software development of the SmartH2O platform, but also the research lines to be explored to achieve the overall project objectives.

In the **first year**, WP2 has iteratively developed a set of user stories and interface mockups (**T2.1**) based on the user needs elicited in focus groups and interviews, evolved such user stories into formal requirements expressed as use cases (**T2.2**) and into functional and non-functional specifications (**T2.3**, work prosecuting to Y2), from which success criteria were derived. This activity produced two deliverables: D2.1 Use cases and early requirements; D2.2 Final requirements. In order to achieve these results and identify end-user needs of water consumers, two workshop sessions have been organised with local residents in Switzerland and in the UK. Furthermore, exploratory interviews and a workshop in Reading, UK, with representatives from SES and TWUL, have been held, to elicit the requirements from the perspective of the utility personnel.

In the **second year**, WP2 has updated the requirements of the SmartH2O platform with respect to the specific needs of the Spanish case study (**T2.3**) and produced the functional specifications for the SmartH2O platform (**T2.3**). The requirements of the Spanish case study have been elicited through a workshop and follow-up interactions with EMIVASA and UPV representatives. As a result SmartH2O personas and user stories have been adapted and the impacted individual functional requirements have been updated (this has been documented in D2.3, Appendix A & B). The functional specifications give a detailed technical system specification and a unified vision on architectural models and implementation technologies (D2.3). To achieve this unified technical vision, the specifications document also builds on *D6.2 Platform architecture and design*, considering the feedback and requests for change elicited after the first release and test of the SmartH2O software (D6.3).

1.2.3 Work package 3 - User modelling

The objectives of this work package are to collect available data on past and present consumer behavior, obtained from the smart meter infrastructure and standard offline meter data, analyse the consumer behavior and classify it, develop models of the consumer elasticity to stimuli such as water prices, to incentives, awareness campaigns and social pressure. The models, built on current consumption pattern identified on the basis of the smart meter readings, allow estimating expected new behavior, under the influence of social awareness and different pricing structures. Finally the behavior models are used in an agent based simulation system to generate aggregate water consumption at the district level.

During the **first year** WP3 developed the structure of the database to store the user data (**T 3.1**), able to store both consumption related data, but also psychographic data and data related to the social relationships and the social network interactions, all elements which will be essential for the development of the user model (D3.1 Databases of user information). Another achievement of WP3 is the development of end use disaggregation algorithms (**T3.2**): these algorithms, based on the total water consumption of the user, these algorithms are able to attribute fractions of that consumption to single fixtures, such as showers, dishwashers, etc., which is instrumental to understand how the users actually use water and thus enable building the actual user models and simulations (**T3.3** and **T3.4**).

In the **second year** WP3 continued the activities launched in Year 2 with the objective of closing the work package at the end of Y2. Task 3.1 continued the collection and analysis of user data, also making the necessary adaptations to accommodate the new Spanish case study, while Task 3.2 extended the initial versions of the user profiling algorithms. The most activities were nevertheless concentrated in Task 3.3, where models of user behavior were refined and expanded in order to provide the necessary material to Task 3.4 for the development of the agent based simulation platform. The work performed is contained in

deliverables D3.3 (First prototype of ABM simulator) and D3.4 (Final user behavior models and ABM platforms).

1.2.4 Work package 4 - Saving water by social awareness

The main objectives of this work package are to understand how the awareness of consumption behavior and the social norm can influence the water user behavior. WP4 explores the effect of the gamification approach in increasing the awareness level and in creating connections among consumers in order to trigger the social norm effect.

In the **first year** the efforts have been focussed on studying the mapping of raw consumption data into a semantically understandable format for users, and on developing a visualization model of such able to stimulate users' individual and collective awareness regarding water consumption. This work (**T4.1**) has contributed to the notion of Consumer Portal, visually specified in D2.2 (Final Requirements). Secondly, T4.1 has also required a broad survey of how games have been used for improving awareness and resource usage in the past; from this study, a novel concept has emerged of a social game capable to involve users and to raise their awareness level, and in the development of the gamification approach for the SmartH2O platform. As an outcome, T4.1 has designed and implemented a board game with a digital extension, which provides the entry point to the SmartH2O concept (D4.1 First social game and implicit user information techniques). Also, a distributed cloud-enabled architecture has been design and deployed for the mass scale collection of social network data (**T4.2**), with a focus on crawling the Twitter social media site. Data collected from social networks are semantically represented in the project repository and will serve as the basis for the analysis of community roles, people influence and trust (**T4.3**). A preliminary set of metrics for the detection of influencers has been defined and applied to the dataset of users that published the tweets (**T4.3**). A minimal interface for visualising influencers, used for internal testing purposes, has also been developed (**T4.3**).

In the **second year**, focus has been placed on extending the basic Consumer Portal into an Advanced version, which would offer to the water consumers a rich set of stimuli to raise their awareness and improve their water saving behavior. Joint work between **T4.1** (Social games for water management) and **T4.4** (Design of Incentive models and algorithms) has led to the definition, design, verification and deployment of a complete set of awareness tools, including social comparison with peers, water consumption visualization, household objectives, learning resources (water saving tips and videos), and gamification instruments (leaderboards, achievements, badges, and rewards). In conjunction with WP3, an in depth study has been devoted to the rules in the gamification engine, to ensure proper engagement of consumers in the two pilots, which have very different characteristics. The cloud enabled social media architecture designed in **T4.2** and **T4.3** has been used to retrieve water related content from Twitter influential users, so to help the construction of a large base of water-related trivia questions, which have been installed in the digital extension of the water game (called *Drop!TheQuestion*). T4.1, jointly with T4.3, has also produced a design of the social extension of the Advanced Consumer Portal, which will be implemented in Y3 so to allow customers to link their experience in the Consumer Portal with their activity in the social network of choice, though such actions as publishing their achievements and inviting friends to the Portal. In **T4.4**, we conducted a survey of incentive models and theories (motivational theories, gamification models and theories). The SmartH2O behavioral change approach was refined, the SmartH2O incentive model was conceptualized, and specific incentive strategies were defined and tailored for the Spanish and the Swiss pilot (**T4.4)**. The defined incentive models and algorithms are now implemented in the SmartH2O platform, tested from different perspectives as part of **T4.4**: Simulations of the incentive models were run and a survey on user attitudes to symbolic incentives was conducted (in alignment with WP5). In addition, the implemented incentives in the first basic Consumer Portal were analysed through user feedback (questionnaire responses), and incentive response to the first gamified system was analysed through the activity logs. This work is documented in *D4.3 Incentive models and algorithms*.

Last but not least, WP4, jointly with WP2 (T2.3) has produced the designed and started the implementation of the Admin Portal, which is the view of the Utility Company on the users' consumption and behavioral data.

1.2.5 Work package 5 - Saving water by dynamic water pricing

WP5 explores the effect of water pricing on consumer behavior. In particular, it aims to evaluate the impact of dynamic water pricing, assessing its effectiveness in periods of water scarcity. It develops econometric models of user behavior, which will be implemented in the agent based modelling simulation platform developed by SmartH2O.

In the **first year** WP5 has mostly focussed in a thorough review of the state of the art and current research in the area of dynamic pricing for different type of utilities In this respect, **T5.1** has produced deliverable (D5.1 Review of pricing instruments). Activities for the experimental economics-based tests of pricing policies have also started (**T5.2**), by exploring different solutions for data collection, including a user questionnaire to assess price elasticity. These determinants will serve as the basis for the integrated water supply-demand modelling including dynamic pricing.

In the **second year** WP5 continued the activities of **T5.2** by investigating the use of econometric modelling and analysis of water price response to dynamic water supply or environmental conditions. Relevant scarcity indicators for a given a geographical context and dynamic water pricing policy were identified. The resulting output was published in deliverable **D5.2** Developing new dynamic pricing mechanisms (M16)**.** In parallel, work has started in **T 5.3** (Integrated water supply/demand modelling including dynamic pricing) on the assessment of the supply-demand water system to evaluate impacts of dynamic pricing. In this task we performed a validation of the econometric and agent-based behavioral modelling through an experimental economic workshop. This work has been reported in deliverables **D5.3** Integrated water supply-demand modelling including dynamic pricing and **D5.4** Experimental economics-based tests of pricing policies.

1.2.6 Work package 6 - Platform implementation and integration

WP6 has the objective of establishing common software engineering practices to ensure that development is conducted according to a common standard, following a Continuous Integration approach, of managing release planning and delivery, and verifying software quality. It also manages the design, set-up, tuning, and day-to-day administration of the cloud architecture where SmartH2O is deployed.

In the initial part of the **first year**, WP6 has defined the plan for the management of the period deliveries of the continuously updated SmartH2O platform (**T6.1**, producing D6.1 Delivery management plan and testing specification). Then, WP6 has defined the overall platform architecture and design (**T6.2**, producing D6.2 Platform architecture and design); it has also produced (in **T6.3**) the initial prototype of the SmartH2O platform, which collects live data generated from the Swiss case study smart meters, thanks to the Smart Meter Data Management Component; it has also implemented the initial prototype of the Gamified Consumer Portal, where the different gamification elements identified by WP4 have been put into action. The abovementioned software realizations are the constituents of the deliverable (D6.3 Platform integration and integration – initial prototype), which have been tested and assessed using the continuous integration approach (**T6.4**).

In the **second year** all tasks, apart from T6.1 which ended in Y1 were active. In **T6.2**, the architectural design was completed adding the design elements corresponding to the final functional specifications released in D2.3. Task **T6.3** (implementation of the SmartH2O platform) continued the development activities implementing the gamified interface for the user awareness platform. Code quality and testing procedures have started being defined in the first version of the Software Quality Assessment Plan (SQAP) according to the DoW. (**T6.4**). At the same time activities are in progress in **T6.5** (Platform management and data distribution) in order to enable administrators to manage the cloud infrastructure of the SmartH2O platform. Deliverable D6.4 Platform implementation and integration – second prototype has been issued at month 24, according to plan.

1.2.7 Work package 7 - SmartH2O Validation

The objectives of this work package are to demonstrate and validate the use and impact of the SmartH2O platform in the Swiss and Spanish case studies and provide quantifiable evidence on the impact of SmartH2O on water consumption reduction. This WP was planned to start in year 2, but some activities of **T7.2** have been anticipated in the Swiss Case study were 400 smart meters have been installed before the start of the validation tests. The WP has also produced a plan to validate the SmartH2O platform in the two case studies (D7.1 Validation methodology), produced in **T7.1**.

The validation methodology released in year 1 (*D7.1 Validation plan*) has been refined in year 2 (**T7.1**). Baseline water consumption data has been collected for both pilots (**T7.2**, **T7.3**). As the Swiss pilot has been running for approximately half a year, the impact of the basic portal on water consumption has been preliminarily assessed (**T7.4**), showing promising consumption reduction (a publication including these first results has been submitted to the IEMSs conference; see WP9).

Apart from water consumption data, to assess the project KPI's, instruments for assessing water consumption awareness and technology acceptance among pilot users through questionnaires, have been developed (grounded in behavioral psychology and technology acceptance literature). To this end, a study design has been developed involving different treatments. (e.g. basic vs. gamified system; control group) for the two case studies: a baseline questionnaire new users fill out at sign-up, a questionnaire for the evaluation of the basic portal,, and a questionnaire users fill out while upgrading from the basic portal to the advanced gamified portal were developed (documented in D7.2). Somewhat different versions for the Swiss (T7.2) and for the Spanish case study (T7.3) had to be implemented, in order to account for the operational differences between the two settings (in the Spanish case study, the SmartH2O gamified system version is integrated on top of EMIVASA's existing Virtual Office basic system for customers). Collaboration and alignment with WP5 questionnaires on user attitudes was performed to minimize overlap and reduce required time for users. Pre-tests were run to test and improve the questionnaires to their final version In T7.2, both baseline and treatment questionnaires were submitted to the users in the Swiss case study. In addition, user activity and interactions with the system were also analyzed from system logs, to better understand the usage dynamics and possible effects of different system versions on user behavior and obtained consumption reductions. The first promising results obtained from the questionnaires, the consumption data and the user activity analysis have been reported in *D7.2 Validation report*.

1.2.8 Work package 8 - Business Development

The objectives of this work package are to observe how trends in ICT usage and the market potential in the water management sector emerge, to study how market regulation instruments evolve in the EU, and to start-up the SmartH2O Business Ecosystem, including all activities for training and technology transfer to early adopters.

In the **first year**, this WP has made an initial assessment of the exploitation possibilities, which are open to SmartH2O, by identifying a number of project assets such as: the Gamified online water bill, the Drop! board game and its digital extensions, the smart meter data management component, tools for customer behavior analysis and demand planning, the integrated SmartH2O platform (D8.1 Early Exploitation Plan). WP8 has also set up a Water Utility, Market and Regulation watch (as part of **T8.1** and **T8.2**) to keep a broad overview on the development of a new and dynamic market and its regulation (producing deliverable D8.2 Technology watch report) and in the first year it has also produced a report on the most relevant standards for smart water systems, including open data initiatives (producing deliverable D8.3 Standards and open data report). Informal activities in the creation of the business ecosystem have also started, to prepare the ground for T8.3.

Tasks set up during the first year have been continued during the **second year**: this is the case for **T8.1** ("Technology and market watch") and **T8.2** ("Regulation watch"). Likewise, this WP has built up on the initial assessment of the exploitation possibilities, of the assets identified in

D8.1: Gamified online water bill, the Drop! board game and its digital extensions, the smart meter data management component, tools for customer behavior analysis and demand planning, the integrated SmartH2O platform. Some of these assets have been grouped together for business development as the prospects for their exploitation became clearer in Y2. This evolution has been apparent in deliverable D8.4 “Intermediate exploitation plan”, delivered on month 18, and in deliverable D8.5, the “Business ecosystem report”. Further, the latter deliverable reports on activities performed in tasks **T8.3** (“Utility business implications and new business models”) and **T8.4** (“Business technology ecosystems”).

1.2.9 Work package 9 - Communication and dissemination

The objectives of WP9 are to define the communication strategy for the project, to disseminate the project outputs at local level, strengthening user participation, to disseminate at national level, increasing knowledge on ICT-supported water resource management, to disseminate at the local, national and international level, through scientific and business networks of the project partners, and to organise the major dissemination events of the project.

In the **first year**, WP9 has mainly set up the Dissemination & Communication strategy (**T9.1**), supported by a number of dissemination channels (**T9.2**), ranging from the official project website, to the Twitter feed, the LinkedIn community and it has also provided templates and standards to provide a coherent visual identity (D9.1 Dissemination tools and materials).

In the **second year** of activity, WP9 further developed the coordinated image concept introduced in D9.1 by producing new leaflets to disseminate the project concept and the project assets (e.g., the platform, the game, and the mobile app) and by creating a number of roll ups which were exhibited at EXPO 2015 in Milan, the ICT4Water open day in Lisbon, and the European Utility Week in Vienna.

Secondly, communication channels presented in D9.2 and D9.3 (First and Second Dissemination report) were empowered and constantly kept updated: The project has been particularly active on Twitter reaching more than 500 followers and producing more than 1000 tweets in Year 2. At the same time, the SmartH2O Innovation Community on LinkedIn, has been expanded to more than 200 members. In addition, a separate Twitter aggregator page that collects tweets in the areas of water research and water business has been implemented for the SmartH2O website. This produces a topical dynamic overview in these two areas on the SmartH2O website under Twitter water news (serving target groups that may not be using Twitter).

WP9 has also been active in traditional communication channels, ranging from radio and newspapers interviews, as well as in scientific dissemination, including 9 international conferences attended by members of the consortium in order to disseminate the first project results. Three scientific papers on peer-reviewed journals have been published. A special mention needs to be made to the participation of the SmartH2O project at the international world fair EXPO 2015, where SmartH2O was presented at the Swiss Pavillion.

The SmartH2O project also organized contents and logistics for the Summer School which will be held in Ascona, Switzerland, in August 2016.

The strategy for the next year of the project will be to exploit the communication infrastructure which has been set up so far in order to reach a larger number of users, also taking advantage of the expected large impact of the Valencia case study, where more than 400’000 users will be exposed to the SmartH2O project ideas.

1.3 Expected final results and potential impact and use

The expected final result of the SmartH2O project an **ICT platform** able to:

Understand and model the consumers’ current behavior, based on historical and real-time water usage data

Predict how the consumer behavior can be influenced by various water demand management policies: water savings campaigns, social awareness campaigns, to dynamic water pricing schemes

Raise the awareness of water consumers on their current water usage habits and their lifestyle implications and to stimulate them to reduce water use

The SmartH2O ICT infrastructure will enable water managers to close the loop between actual water consumption levels and desired targets, using information about how the consumers adapt their behavior to new situations: new regulations, new water prices, appeals to water savings. This feedback will allow to aptly revise the water demand management policies, enabling to maximise the water and energy saving goals.

1.4 Project public website

The project public website is available at http://www.smarth2o-fp7.eu

1.5 The project consortium

The SmartH2O project consortium is composed by:

Research and Academia

Name	Cty	Background / expertise / skills	Role
SUPSI	CH	The Dalle Molle istitute for artificial intelligence studies is a world leading research institution, making advances in the fields of machine learning, data mining, modelling and simulation	Project Coordinator, lead of WP1 and WP3. IDSIA will also be involved in other WPs.
POLIMI	IT	Politecnico di Milano brings expertise in Water Resources Management and hydroinformatics. ICT research in the fields of Systems and Control, Computer Science and Engineering. Water Economics	Scientific Coordinator, lead of WP4. POLIMI will also be involved in other WPs.
UoM	UK	The University of Manchester has a strong research track on water resources and spatial economics.	Lead WP5. Active contribution in most work packages.
UPV	ES	Universitat Politecnica de Valencia is a leader in the studies on urban hydraulics and the management and efficient use of water in the urban environment.	Contributes to WP5, WP3 and supports EMIVASA in WP7.

Utilities

Name	Cty	Background / expertise / skills	Role
TWUL	UK	Thames Water Limited is the largest UK water company	Former Lead of WP8. Major activities in validation,

Name	Cty	Background / expertise / skills	Role
			requirements, and business development
SES	CH	Società Elettrica Sopracenerina is a Swiss multiutility	Lead WP7. Major activities in validation, requirements, and business development
EMIVASA	ES	A leading Spanish water utility. A world leader in the deployment and use of smart water meter.	Lead WP8. Major activities in validation.

Organisations representing users:

Name	Cty	Background / expertise / skills	Role
EIPCM	DE	The European Institute for Participatory Media is an organization dedicated to the promotion, research and development of next-generation media ecosystems enabling organizations, industry and society at large to take advantage of new participatory forms of content and media creation, delivery and utilization.	Lead WP2. Major involvement in WP4. Active contribution in most work packages.

SMEs dedicated to innovation:

Name	Cty	Background / expertise / skills	Role
SETMOB	RO	SMOB is specialized in real time solutions for business based on office and system integration. Its strength resides in its knowledge base regarding mobile technologies, cloud computing and processing, as well as in its Research and Development team.	Lead WP6. Actively Involved in WP 4 and 5.
MOONSUB	UK	MoonSubmarine is a newco started up in 2012 to capitalize on the 20+ years' experience of its founders in mobile application development and game design. The company has the aggressive objective of becoming a strategic innovation partner for companies wishing to target mobile users, in the B2B and B2B2C markets.	Lead T4.2 Data Harvesting, involved in WP2, WP11, WP12 and WP13

2. Project objectives for the period

The project objectives, as defined in Annex I of the contract, are reported in the following sections. In Section 2.10 we also report the recommendations from the reviewers after the first year review.

2.1 Work package 1 - Management and coordination

The objectives of WP1 in the second year of the project were unchanged from the previous year:

- To monitor progress and ensure that the project objectives are achieved
- To manage financial and administrative issues
- To monitor and manage the project and ensure it is delivered on time and to budget
- To report to the European Commission

2.2 Work package 2 - Requirements, design and specifications

The objectives of WP2 in the second year of the project were:

- Analyse and update the requirements of the SmartH2O platform for the Spanish pilot
- Formalise the functional specification achieving a unified vision on architectural models and implementation technologies.

2.3 Work package 3 - User modelling

The objectives of WP3 in the second year of the project were:

- Analyse the consumer behavior and to classify it.
- Develop models of the consumer elasticity to water prices, to incentives, to awareness campaigns and to social pressure.
- Implement the consumer models in an agent-based modelling platform and validate the model

2.4 Work package 4 - Saving water by social awareness

The objectives of WP4 in the second year of the project were:

- Apply the paradigm of social games to the definition of individual or collective games for pursuing smart water management objectives.
- Analyse traces of human activity (e.g., Twitter data) to extract behavioral information applicable in urban water demand management.
- Model user's profile and context data, and social graphs based on real world and web extracted knowledge
- Exploit social network analysis for optimizing crowd sourced tasks

2.5 Work package 5 - Saving water by dynamic water pricing

The objectives of WP5 in the second year of the project were unchanged from the previous year:

- Identify and evaluate water pricing instruments being applied or considered in EU states, including an in depth analysis of water pricing in the UK.
- Econometric modelling of urban and industrial price response without social media intervention of a dynamic link to water supply or environmental conditions

2.6 Work package 6 - Platform implementation and integration

The objectives of WP6 in the second year of the project were:

- Implement, set-up, tune and day-to-day administration of the cloud architecture where SmartH2O will be deployed. A hybrid cloud-storage infrastructure will be set-up. The WP will also manage the provisioning and verification of the platform infrastructure needed for distribution and scaling of SmartH2O data and services.
- Test and monitor the reliability and performance of the implementation. Take adequate countermeasures if needed in order to guarantee the expected level of service.

2.7 Work package 7 - SmartH2O Validation

The objectives of WP7 for year 2 were:

- Demonstrate and validate the use and impact of the SmartH2O social awareness app.
- Demonstrate and validate the use of the SmartH2O policy design and monitoring modules, based on social awareness and dynamic pricing.
- Provide quantifiable evidence on the impact of SmartH2O on water consumption reduction

2.8 Work package 8 - Business Development

The objectives of this work package are:

- Monitor trends in ICT usage and the market potential in the water management sector
- Monitor of how market regulation instruments evolve in the EU
- The creation and start-up of the SmartH2O Business Ecosystem, including all activities for training and technology transfer to early adopters.

2.9 Work package 9 - Communication and dissemination

The objectives of this work package are:

- Manage the communication strategy for the project.
- Disseminate the project outputs at local level, including strengthening user participation, expanding to other local and regional water authorities and businesses.
- Disseminate at national level, including increasing of knowledge on ICT-supported water resource management.
- Disseminate at the international level, exploiting the various scientific and business networks of the project partners.

2.10 Recommendations from the first review

The first reporting period of the SmartH2O project spans the 1st of April 2014 until the 31st of March 2015. On the 19th of March 2015 a preliminary review was held in Brussels, which was based only on partial results of the project, as D2.2, D5.1, D6.3, D7.1, D8.2, D8.3, D9.2, and the first year report were not yet available, because they were due on month 12.

The reviewers have nevertheless managed to issue a preliminary consensus report which provides useful suggestions for the project management and its continuation.

In the meantime, all deliverables had been finalised by the 31st of May, so the reviewers were able to continue offline in their review of the project and on the 12th of June the Reviewers, the

Project officer and the Project Coordinator met for a remote review meeting. During this meeting the Project Coordinator explained how the SmartH2O consortium addressed the recommendations of the preliminary consensus report.

In the following we briefly review the recommendations expressed after the remote review in the Technical Review Report

2.10.1 Recommendations concerning the period under review

> *"The resources employed by the moment are, in general, in accordance with the work done. Comments about new corrective actions are broadly mentioned in b and c paragraphs for each WP and for each deliverable. The conditionally approved deliverables, D3.1 and D8.3 have to be resubmitted till the second review. "*

The Deliverables D3.1 and D8.3 have been resubmitted on 31/7/2015 and are available for review. They are accompanied by specific replies to the reviewer comments and by an introductory note, which have been made available to the reviewers.

2.10.2 Recommendations concerning future work

> *"Although most of the deliverable applies the scientific procedure correctly, those more related to innovation activities should improve their scientific component."*

We underline that the scientific innovation of the project is not in the integration work done to assemble the platform, but in the novelty of the social awareness methods for change behavior and in the holistic user modeling for delivering demand prediction and targeted recommendations. The effort devoted to these research challenges will be greatly increased after the deployment of the first prototype, and the consortium will document and disseminate the scientific results achieve in the most detailed and methodologically sound manner.

> *"The SOTA remains being a bit disseminated among different deliverables. The grouping of relevant references in the technology watch report has solved, to some extent, this previous observation. "*

Different deliverables tackled different aspects under examination in SmartH2O: from user modelling to serious games, from innovative pricing schemes to agent-based modelling. It is therefore unavoidable that each deliverable provides a review of the state of the art that is related to the specific topic. As the reviewers have observed, we have attempted to bring together the most important references in the technology watch report.

> *"The expected impact might require an accurate assessment by means of specific techniques. The procedure has been exposed and it is already time to apply it (benchmarks, evaluation procedures, dissemination impact, etc.)."*

In the second year of the project we have been able to gather some initial results from the Swiss case study, which are presented in D7.2. These results are preliminary, in the sense that the small number of participant cannot be used to make strong inferences. At the same time we have started a much larger deployment in Valencia, which will enable to substantiate the impact of the SmartH2O platform. The impact of dissemination is reported in D9.3.

> *"Copy of the financial form C has to be provided for the next annual report as it was provided for the first year review."*

We have duly filled in the Form C for both Year 1 and Year 2.

> *"The consortium has to improve the collaboration with the projects grouped in the ICT4Water cluster. Some of the achievements of these projects (especially in the on-line monitoring) might be used in SmartH2O project."*

We have been attending all cluster events and we are collaborating with them: in particular we have started a collaboration with Waternomics for a limited deployment of the SmartH2O

project in one of their test sites, and we have an ongoing collaboration with Daiad on the use of smart devices for consumption monitoring.

3. Work progress and achievements during the period

3.1 Overview

The SmartH2O project is organised in 8 work packages, plus the management WP. The work package organisation is shown in Figure 1, which describes the PERT diagram highlighting the dependencies across work packages. In general, we have Research and Development work packages (WP2 Requirements, WP3 User Modelling, WP4 Saving water by social awareness, WP5 Saving water by dynamic water pricing), Integration and Validation work packages (WP6 Platform integration, WP7 Validation) and Impact and dissemination WPs (WP8 Business development, WP9 Communication and Dissemination).

The detailed achievement and the work performed in each individual work package during the second year are described in the sections from 3.2 to 3.9, while here we anticipate in a compact way the major outcomes.

In WP2 we updated the requirements of the SmartH2O platform for the Spanish case study and produced functional specifications of the SmartH2O platform. The requirements for Spanish case study were based on a workshop and interactions with EMIVASA and UPV and described in the form of adapted personas, user stories and updated functional requirements. The work in WP2 was concluded by formalizing the specifications of architectural models and implementation technologies in the form of the functional specifications document.

In WP3 we updated and further developed the classification model of user behavior, which is able to identify the main drivers of water consumption and return an estimate of consumption based on those features. At the same time we continued the refinement of the disaggregation algorithms which, on the basis of medium to high frequency data, attribute consumption to the different fixtures. An agent based model of water use has been implemented on the basis of the user behavior classification of WP3, of the social behavior model described in WP4, and the economic behavioral model provided by WP5.

In WP4 the incentive model and algorithms for the SmartH2O platform have been theoretically grounded, designed, modelled, implemented and tested. A second prototype of the Consumer Portal (*Advanced Consumer Portal*) has been deployed in the two pilots (CH and ES) The board game with a second version of its digital extension has been realised (*Drop!* and *Drop!TheQuestion*) and integrated with the SmartH2O platform as part of the incentive model of the Advanced Consumer Portal. An extended literature review was conducted regarding community detection and community role models, which informed the design of a method for modelling behavioral roles in social media (with a focus on Twitter), based on patterns of user activity. A method was developed that models Twitter user behavior with respect to the defined behavioral properties; a user segmentation based on such method was applied to Twitter data. The method application allows most relevant behavior roles and users to be identified, for supporting multi-faceted, targeted communication initiatives on social media (e.g. for supporting campaigns for sustainable water consumption).

In WP5 the analysis of of water price response to dynamic water supply or environmental conditions was studied, and work has begun on the assessment of the supply-demand water system to evaluate impacts of dynamic pricing. The validation of the econometric and agent-based behavioral model of WP3 was conducted through an experimental economic workshop.

In WP6 we released the second prototype of the SmartH2O platform that includes the social awareness components in the SmartH2O platform. The SmartH2O platform was also deployed, in its test version, in the Spanish case study.

In WP7 the Swiss case study has been publicly launched and the new Spanish case study has been set up and prepared for launch (which happened in Month 25, the first month of the third year)

WP8 the initial exploitation plan, outlined in year 1, was further expanded and made more concrete into the intermediate exploitation plan, which defines exploitation strategies for all project assets.

WP9 continued the dissemination activities. Most notably, we attended the European Utility Week in Vienna, we participated to the ICT day in Lisbon. WP9 has also been busy promoting the Summer School.

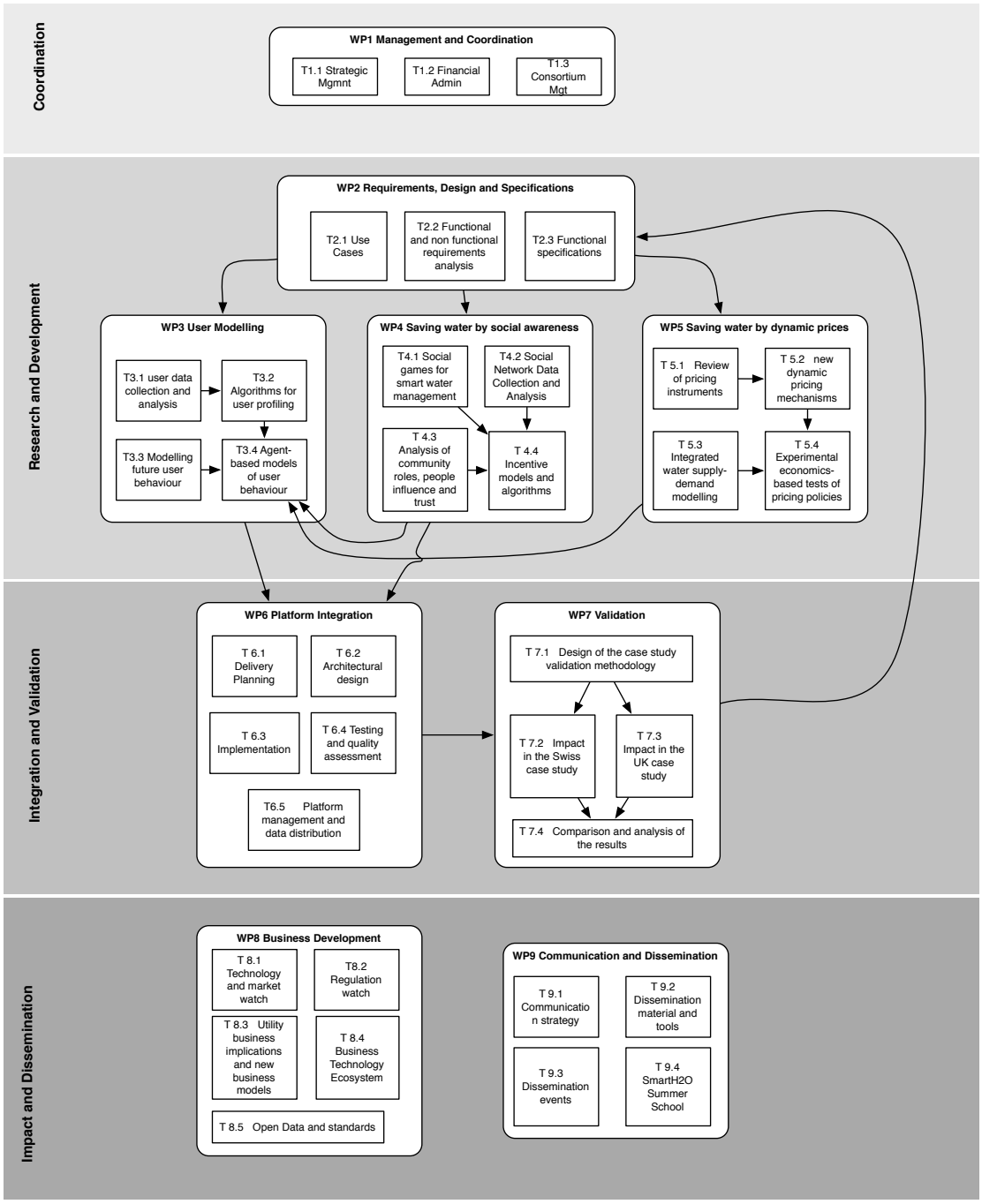

Figure 1. The PERT diagram of the SmartH2O workpackages.

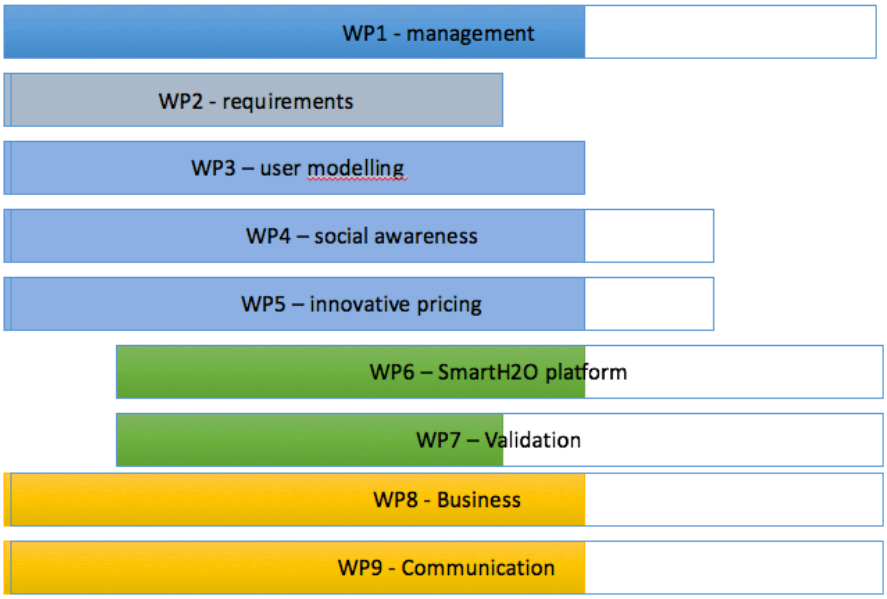

Figure 2. Visual progress status after 2nd year.

Table 1. Overview of resource usage.

	Year 1		Year 2		Total		
	Allocated	*Used*	*Allocated*	*Used*	*Allocated*	*Used*	*% used*
SUPSI	25.00	24.75	21.25	**19.61**	64.00	44.36	69%
POLIMI with 3rd part WebRatio	33.50	33.45	33.50	**38.27** (POLIMI) **2.10** (WebRatio)	100.00	73.82	74%
UoM	13.25	13.25	15.50	**12.30**	46.00	25.55	56%
SETMOB	28.75	16.00	22.05	**29.87**	66.50	45.87	69%
EIPCM	21.75	16.74	20.45	**22.20**	50.00	37.54	75%
TWUL	12.25	5.33	1.85	**0.00**	12.50	5.33	43%
SES	4.50	6.41	6.20	**5.20**	18.00	11.61	65%
MOONSUB	10.25	11.50	10.50	**11.25**	29.00	22.75	78%
EMIVASA with 3rd party AdV	-	-	7.75	**6.18** (EMIVASA) **1.57** (AdV)	14.25	7.75	54%
UPV	-	-	5.75	**3.29**	11.25	3.29	29%
Total	149.25	126.03	144.80	**151.84**	411.50	277.87	68%

Resource usage is well distributed and in line with the focus of work of the individual partners in different work packages which have different (non-linear) time dynamics over the course of the project.

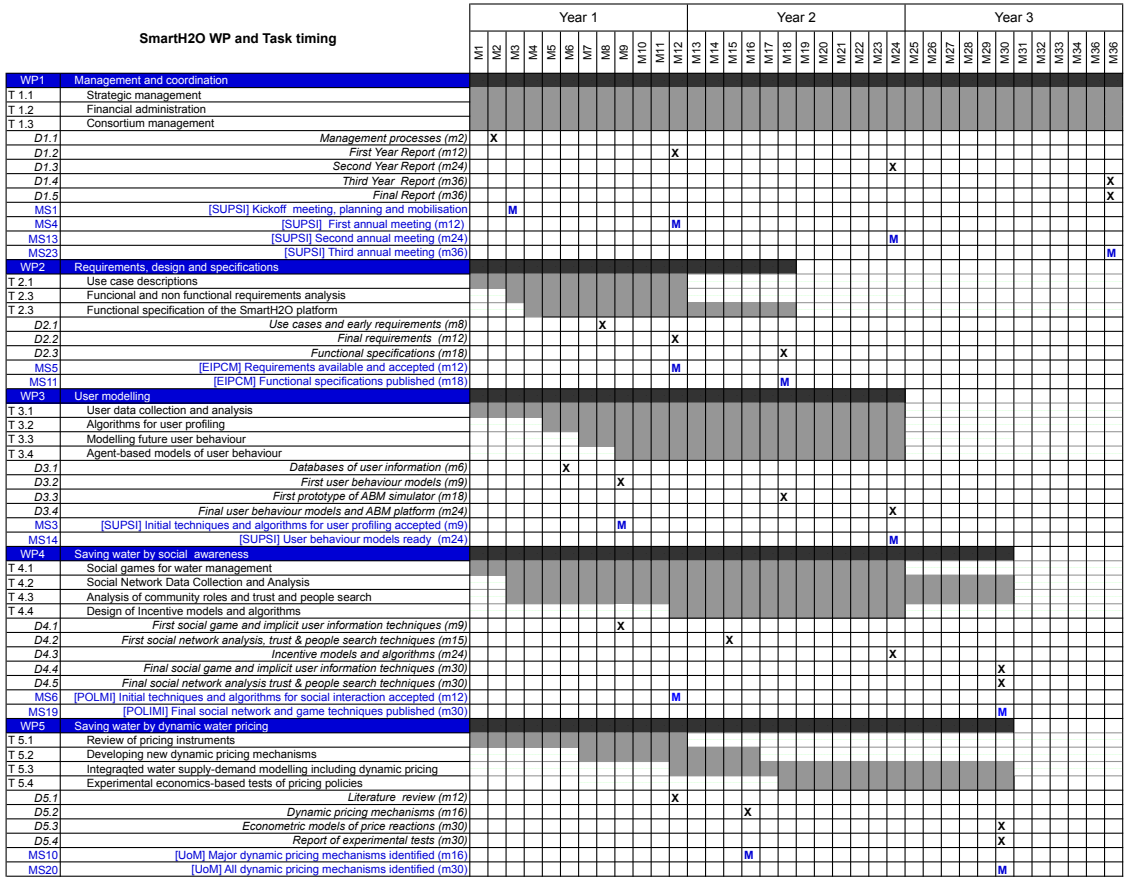

Figure 3. Gantt diagram for WP 1 to 5.

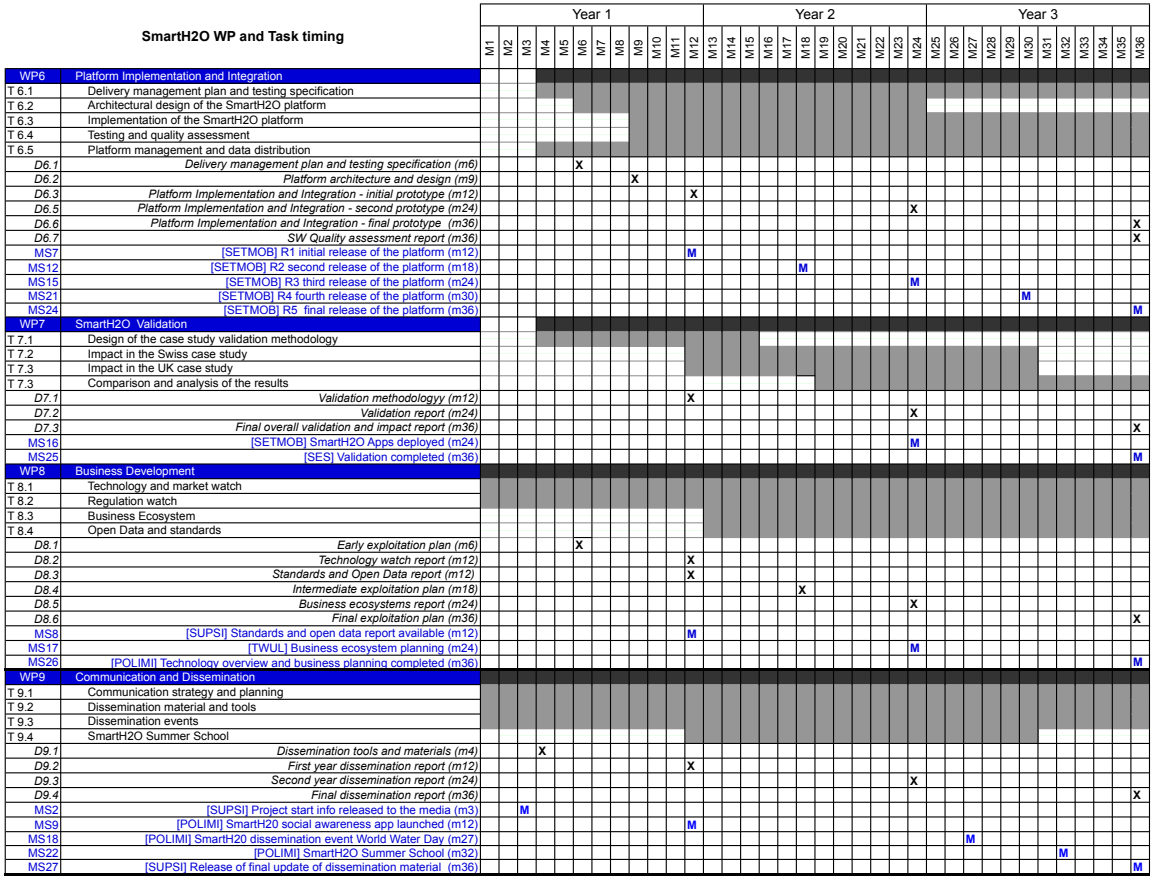

Figure 4. Gantt diagram for WPs from 6 to 9.

3.1.1 Resource usage per partner per work package per deliverable – period 1 and period 2

In the following tables we report, for each work package, the amount of resources used by each partner during the first two years of the project, as allocated to each deliverable. Deliverables planned for Year 3 are in light grey. Deliverables issued in Year 2 are in bold. The PMs of 3rd parties (WEBRATIO for POLIMI, and AdV for EMIVASA) is included in the PMs of the leading partner.

Table 2. Resource usage per partner per deliverable for WP1.

WP1	Deliverable	Lead	SUPSI	POLIMI	UoM	SETM OB	EIPCM	TWUL	SES	MOON SUB	UPV	EMIVA SA	Total	Allocat ed	Delta (All-Tot)
D1.1	Management processes	SUPSI	1,00	0,77	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,77	1,75	-0,02
D1.2	First year project report	SUPSI	2,50	0,26	0,25	0,25	0,23	0,25	0,21	0,25	0,00	0,00	4,22	4,20	0,00
D1.3	**Second year project report**	**SUPSI**	**2,50**	**0,20**	**0,25**	**0,25**	**0,23**	**0,00**	**0,25**	**0,25**	**0,25**	**0,25**	**4,43**	**4,50**	**0,07**
D1.4	Third year project report	SUPSI	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	4,75	4,75
D1.5	Final project report	SUPSI	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	8,30	8,30
			6,00	**1,23**	**0,50**	**0,50**	**0,46**	**0,25**	**0,46**	**0,50**	**0,25**	**0,25**	**10,40**	**23,50**	**13,10**

Table 3. Resource usage per partner per deliverable for WP2.

WP2	Deliverable	Lead	SUPSI	POLIMI	UoM	SET MOB	EIPCM	TWUL	SES	MOON SUB	UPV	EMIVAS A	Total	Alloca ted	Delta
D2.1	Requirements early version	EIPCM	1,50	1,50	2,00	0,00	3.67	1,02	0,85	0,00	0,00	0,00	10,54	10,85	0.31
D2.2	Requirements final	EIPCM	0,75	1,00	0,00	0,50	3.66	0,00	0,00	1,00	0,00	0,00	6.91	7,25	0.34
D2.3	**Functional specifications**	**SETMOB**	**2,25**	**0,00**	**0,00**	**5,99**	**2,19**	**0,00**	**0,00**	**1,00**	**0,00**	**0,50**	**11,93**	**11,40**	**-0,53**
			4,50	**2,50**	**2,00**	**6,49**	**9,52**	**1,02**	**0,85**	**2,00**	**0,00**	**0,50**	**29,38**	**29,50**	**0,12**

Table 4. Resource usage per partner per deliverable for WP3.

WP 3	Deliverable	Lead	SUPSI	POLIMI	UoM	SETM OB	EIPCM	TWUL	SES	MOONS UB	UPV	EMIV ASA	Total	Alloca ted	Delta
D3.1	Databases of user information	POLIMI	5,00	5,00	0,00	0,00	0,00	1,56	0,85	0,00	0,00	0,00	12,41	11,50	-0,91
D3.2	First user behaviour models	SUPSI	5,00	5,00	0,00	0,00	0,37	0,00	0,00	0,00	0,00	0,00	10,37	10,40	0,03
D3.3	**First prototype of ABM simulator**	**SUPSI**	**5,26**	**4.76**	**1,75**	**0,00**	**0,10**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**11,87**	**12,10**	**0,23**
D3.4	**Final user behaviour models and ABM simulator**	**SUPSI**	**3,00**	**5,23**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**8,23**	**13,00**	**4,77**
			18,26	**19,99**	**1,75**	**0,00**	**0,47**	**1,56**	**0,85**	**0,00**	**0,00**	**0,00**	**42,88**	**47,00**	**4,12**

Table 5. Resource usage per partner per deliverable for WP4.

WP4	Deliverable	Lead	SUPSI	POLIMI	UoM	SET MOB	EIPCM	TWUL	SES	MOON SUB	UPV	EMIV ASA	Total	Alloca ted	Delta
D4.1	First social game and implicit user information techniques	MOON SUB	1,00	2,35	0,00	0,50	0.92	0,00	0,00	5,00	0,00	0,00	9,77	8,85	-0.92
D4.2	**First social network analysis, trust & people search techniques**	**POLIMI**	**0,10**	**3,70**	**0,00**	**1,00**	**2,88**	**0,00**	**0,50**	**1,00**	**0,00**	**0,00**	**9,18**	**10,50**	**1,32**
D4.3	**Incentive models and algorithms**	**POLIMI**	**0,00**	**4,29**	**0,00**	**0,00**	**4,80**	**0,00**	**0,00**	**1,00**	**0,00**	**0,00**	**10,09**	**10,00**	**-0,09**
D4.4	Final social game and implicit user information techniques	POLIMI	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	12,00	12,00

D4.5	Final social network analysis trust & people search techniques	POLIMI	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	11,65	11,65
			1,10	**10,34**	**0,00**	**1,50**	**8,68**	**0,00**	**0,50**	**7,00**	**0,00**	**0,00**	**29,04**	**53,00**	**23,96**

Table 6. Resource usage per partner per deliverable for WP5.

WP5	Deliverable	Lead	SUPSI	POLIMI	UoM	SETMOB	EIPCM	TWUL	SES	MOONSUB	UPV	EMIVASA	Total	Allocated	Delta
D5.1	Review of pricing instruments	UoM	0,00	2,57	6,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	8,57	8,55	-0,02
D5.2	**Developing new dynamic pricing mechanisms**	**UoM**	**2,00**	**4,82**	**5,30**	**0,00**	**0,96**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**13,08**	**15,00**	**1,92**
D5.3	Integrated water supply-demand modelling including dynamic pricing	UoM	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	13,00	13,00
D5.4	Experimental economics-based tests of pricing policies	UoM	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	15,45	15,45
			2,00	**7,39**	**11,30**	**0,00**	**0,96**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**21,65**	**52,00**	**30,35**

Table 7. Resource usage per partner per deliverable for WP6.

WP6	Deliverable	Lead	SUPSI	POLIMI	UoM	SET MOB	EIPCM	TWUL	SES	MOON SUB	UPV	EMIV ASA	Total	Allocated	Delta
D6.1	Delivery management plan and testing specification	SETMOB	0,00	0,00	0,00	4,00	0,00	0,00	0,00	0,00	0,00	0,00	4,00	4,00	0,00
D6.2	Platform architecture and design	POLIMI	0,00	2,97	0,00	5,05	0,00	0,00	0,00	0,00	0,00	0,00	8,02	8,00	-0,02
D6.3	Platform Implementation and Integration - initial prototype	SETMOB	3,00	0,00	0,00	3,50	0,00	0,58	0,45	2,00	0,00	0,00	9,53	9,45	-0,08
D6.4	**Platform Implementation and Integration - second prototype**	**SETMOB**	**0,00**	**1,60**	**0,00**	**14,80**	**2,17**	**0,00**	**0,50**	**2,00**	**0,00**	**1,00**	**22,07**	**14,05**	**-8,02**
D6.5	Platform Implementation and Integration - final prototype	SETMOB	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	13,50	**13,50**
D6.6	SW Quality assessment report	POLIMI	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10,00	**10,00**
			3,00	**4,57**	**0,00**	**27,35**	**2,17**	**0,58**	**0,95**	**4,00**	**0,00**	**1,00**	**43,62**	**59,00**	**15,38**

Table 8. Resource usage per partner per deliverable for WP7.

WP7	Deliverable	Lead	SUPSI	POLIMI	UoM	SET MOB	EIPCM	TWUL	SES	MOO NSUB	UPV	EMIV ASA	Total	Alloca ted	Delta
D7.1	Validation methodology	TWUL	1,00	2,39	1,00	0,00	0,91	1,00	3,00	0,00	0,00	0,00	9,30	10,40	1,10
D7.2	**Validation report**	**SES**	**2,00**	**6,50**	**1,50**	**2,40**	**2,19**	**0,00**	**3,00**	**3,00**	**1,00**	**4,50**	**26,39**	**22,95**	**-3,44**
D7.3	Final overall validation and impact report	POLIMI	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	34,85	**34,85**
			3,00	**8,89**	**2,50**	**2,40**	**3,19**	**1,00**	**6,00**	**3,00**	**1,00**	**4,50**	**35,69**	**68,50**	**32,51**

Table 9. Resource usage per partner per deliverable for WP8.

WP8	Deliverable	Lead	SUP SI	POLIMI	UoM	SET MOB	EIPCM	TWUL	SES	MOO NSUB	UPV	EMIV ASA	Total	Alloca ted	Delta
D8.1	Early exploitation plan	POLIMI	1,00	0,25	0,50	1,20	0,20	0,26	0,15	0,00	0,00	0,00	3,56	3,55	0,01
D8.2	Technology watch report	POLIMI	0,00	3,31	0,00	0,00	0,00	0,50	0,55	1,00	0,00	0,00	5,36	5,35	-0,01
D8.3	Standards and Open Data report	SUPSI	1,00	2,08	1,00	0,00	1,47	0,05	0,00	0,00	0,00	0,00	5,60	5,25	-0,35
D8.4	**Intermediate exploitation plan**	**SETMOB**	**1,00**	**5,33**	**0,25**	**1,96**	**1,35**	**0,00**	**0,20**	**1,25**	**0,00**	**0,00**	**11,34**	**8,90**	**-2,44**
D8.5	**Business Ecosystems report**	**EMIVASA**	**0,50**	**0,20**	**2,50**	**2,62**	**1,35**	**0,00**	**0,50**	**1,50**	**1,04**	**1,00**	**11,17**	**11,19**	**0.02**
D8.6	Final exploitation plan	SETMOB	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	10,30	**10,30**
			3,50	**11,17**	**4,25**	**5,78**	**4,50**	**0,81**	**1,40**	**3,75**	**1,04**	**1,00**	**37,01**	**44,50**	**7,53**

Table 10. Resource usage per partner per deliverable for WP9.

WP9	Deliverable	Lead	SUPSI	POLIMI	UoM	SETM OB	EIPCM	TWUL	SES	MOO NSUB	UPV	EMIV ASA	Total	Alloca ted	Delta
D9.1	Dissemination tools and materials	POLIMI	0,50	3,50	0,50	0,50	1,33	0,11	0,20	1,25	0,00	0,00	7,89	8,00	**0,11**
D9.2	First dissemination report	SUPSI	1,50	0,50	2,00	0,50	2,60	0,00	0,15	0,00	0,00	0,00	7,25	7,50	**0,25**
D9.3	**Second dissemination report**	**SUPSI**	**1,00**	**1,64**	**0,75**	**0,85**	**3,98**	**0,00**	**0,25**	**0,25**	**1,00**	**0,50**	**10,22**	**9,21**	**-0,75**
D9.4	Final dissemination report	SUPSI	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	8,55	**8,55**
			3,00	**5,64**	**3,25**	**1,85**	**8,27**	**0,11**	**0,60**	**1,50**	**1,00**	**0,50**	**25,36**	**33,26**	**8,16**

3.1.2 Resource usage per partner per work package per deliverable – only period 2

In the following tables we report, for each work package, the amount of resources used by each partner only during the second year of the project, as allocated to each deliverable. The PMs of 3rd parties (WEBRATIO for POLIMI, and AdV for EMIVASA) is included in the PMs of the leading partner.

Table 11. Resource usage per partner per deliverable for WP1.

WP1	Deliverable	Lead	SUPSI	POLIMI	UoM	SETM OB	EIPCM	TWUL	SES	MOON SUB	UPV	EMIVA SA	Total	Allocat ed	Delta (All-Tot)
D1.3	Second year project report	SUPSI	2,50	0,20	0,25	0,25	0,23	0,00	0,25	0,25	0,25	0,25	4,43	4,50	0,07
			2.50	**0.27**	**0.25**	**0.25**	**0.23**	**0.00**	**0.25**	**0.25**	**0.25**	**0.25**	**4.43**	**4.50**	**0.07**

Table 12. Resource usage per partner per deliverable for WP2.

WP2	Deliverable	Lead	SUPSI	POLIMI	UoM	SET MOB	EIPCM	TWUL	SES	MOON SUB	UPV	EMIVAS A	Total	Alloca ted	Delta
D2.3	Functional specifications	SETMOB	2,25	0,00	0,00	5,99	2,19	0,00	0,00	1,00	0,00	0,50	11,93	11,40	-0,53
			2.25	**0.00**	**0.00**	**5.99**	**2.19**	**0.00**	**0.00**	**1.00**	**0.00**	**0.50**	**11.93**	**11.40**	**-0.53**

Table 13. Resource usage per partner per deliverable for WP3.

WP 3	Deliverable	Lead	SUPSI	POLIMI	UoM	SETM OB	EIPCM	TWUL	SES	MOONS UB	UPV	EMIV ASA	Total	Alloca ted	Delta
D3.3	First prototype of ABM simulator	SUPSI	5,26	4,76	1,75	0,00	0,10	0,00	0,00	0,00	0,00	0,00	11,87	12,10	0,23
D3.4	Final user behaviour models and ABM simulator	SUPSI	3,00	5,23	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	8,23	13,00	4,77
			8.26	**9,99**	**1.75**	**0.00**	**0.10**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**20,10**	**25.10**	**5,00**

Table 14. Resource usage per partner per deliverable for WP4.

WP4	Deliverable	Lead	SUPSI	POLIMI	UoM	SET MOB	EIPCM	TWUL	SES	MOON SUB	UPV	EMIV ASA	Total	Allocated	Delta
D4.2	First social network analysis, trust & people search techniques	POLIMI	0,10	3,70	0,00	1,00	2,88	0,00	0,50	1,00	0,00	0,00	9,18	10,50	1,32
D4.3	Incentive models and algorithms	POLIMI	0,00	4,29	0,00	0,00	4,80	0,00	0,00	1,00	0,00	0,00	10,09	10,00	-0,09
			0.10	**7,99**	**0.00**	**1.00**	**7.68**	**0.00**	**0.50**	**2.00**	**0.00**	**0.00**	**19,27**	**20.50**	1,23

Table 15. Resource usage per partner per deliverable for WP5.

WP5	Deliverable	Lead	SUPSI	POLIMI	UoM	SETMOB	EIPCM	TWUL	SES	MOON SUB	UPV	EMIVASA	Total	Allocated	Delta
D5.2	Developing new dynamic pricing mechanisms	UoM	2,00	4,82	5,30	0,00	0,96	0,00	0,00	0,00	0,00	0,00	13,08	15,00	1,92
			2.00	**4,82**	**5.30**	**0.00**	**0.96**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**13.08**	**15.00**	**1,92**

Table 16. Resource usage per partner per deliverable for WP6.

WP6	Deliverable	Lead	SUPSI	POLIMI	UoM	SET MOB	EIPCM	TWUL	SES	MOON SUB	UPV	EMIV ASA	Total	Allocated	Delta
D6.4	Platform Implementation and Integration - second prototype	SETMOB	0,00	1,60	0,00	14,80	2,17	0,00	0,50	2,00	0,00	1,00	22,07	14,05	-8,02
			0.00	**1.60**	**0.00**	**14.80**	**2.17**	**0.00**	**0.50**	**2.00**	**0.00**	**1.00**	**22.07**	**14.05**	**-8.02**

Table 17. Resource usage per partner per deliverable for WP7.

WP7	Deliverable	Lead	SUPSI	POLIMI	UoM	SETMOB	EIPCM	TWUL	SES	MOONSUB	UPV	EMIVASA	Total	Allocated	Delta
D7.2	Validation report	SES	2,00	6,50	1,50	2,40	2,19	0,00	3,00	3,00	1.00	4,50	26,39	22,95	-3,44
			2.00	**6.50**	**1.50**	**2.40**	**2.19**	**0.00**	**3.00**	**3.00**	**1.00**	**4.50**	**26.39**	**22.95**	**-3.44**

Table 18. Resource usage per partner per deliverable for WP8.

WP8	Deliverable	Lead	SUPSI	POLIMI	UoM	SETMOB	EIPCM	TWUL	SES	MOONSUB	UPV	EMIVASA	Total	Allocated	Delta
D8.4	Intermediate exploitation plan	SETMOB	1,00	5,33	0,25	1,96	1,35	0,00	0,20	1,25	0,00	0,00	11,34	8,90	-2,44
D8.5	Business Ecosystems report	EMIVASA	0,50	0,20	2,50	2,62	1,35	0,00	0,50	1,50	1,04	1,00	11,17	11,19	0,02
			1.50	**5.53**	**2.75**	**4.58**	**2.70**	**0.00**	**0.70**	**2.75**	**1.04**	**1.00**	**22,51**	**20.09**	**-2,42**

Table 19. Resource usage per partner per deliverable for WP9.

WP9	Deliverable	Lead	SUPSI	POLIMI	UoM	SETMOB	EIPCM	TWUL	SES	MOONSUB	UPV	EMIVASA	Total	Allocated	Delta
D9.3	Second dissemination report	SUPSI	1,00	1,64	0,75	0,85	3,98	0,00	0,25	0,25	1,00	0,50	10,22	9.21	-0,75
			1.00	**1.64**	**0.75**	**0.85**	**3.98**	**0.00**	**0.25**	**0.25**	**1.00**	**0.50**	**10,22**	**9.21**	**-0,75**

3.2 WP2 Requirements, design and specifications

3.2.1 Progress towards objectives

Task 2.1 Use cases descriptions

Task completed.

Task 2.2 Functional and non functional requirements analysis

Task completed.

Task 2.3 Functional specification of the SmartH2O platform

In Task 2.3, the architectural models and implementation technologies have been specified and formalized in *D2.3 Functional specifications* according to international best practices in software design, i.e. by applying the IEEE 1016 standard and using the most appropriate UML diagrams. In the functional specifications, all functionalities and services necessary to meet the identified user requirements and expectations have been described clearly and accurately. The specifications document was produced as an evolution of *D6.2 Platform architecture and design*, considering the feedback and requests for change elicited after the first release and test of the SmartH2O software (D6.3 Platform Implementation and Integration - initial prototype). Also, it formalizes the specifications for achieving a unified vision on architectural models and implementation technologies.

In addition, following the work performed in Year 1 in T2.1 and T2.2, the requirements of the Spanish case study have been elicited through a workshop and other interactions with EMIVASA and UPV representatives. The updated requirements of the Spanish case study have then been specified as adapted personas, user stories and updated functional requirements in D2.3 (Appendix A & B).

3.2.2 Main achievements

- Adapted requirements for the Spanish case study ensuring alignment of SmartH2O platform with the needs of the new case study introduced in the project
- Functional specifications of the SmartH2O platform and unified vision on architectural models and implementation technologies

The following deliverable was completed in the reported period:

- **D2.3 Functional specifications (m18): delivered**

Milestone 11 has been successfully achieved as the functional specifications have been made available to all partners:

- **MS11: Functional specifications published (m18): achieved**

3.2.3 Use of resources

WP2	Deliverable	m13-m16	m17-m20	m21-m24	Allocated	Remaining
D2.3	Functional specifications (m18)	7,79	4,14	0,00	11,40	-0,53

3.3 WP3 User modelling

3.3.1 Progress towards objectives

Task 3.1: User data collection and analysis

This task continues from the previous year, where its main focus was the definition of a data model and the creation of a database for the collection of user data.

In year two we continued the data collection activity thanks to the data collection infrastructure now in place in the Swiss case study, and also thanks to the addition of the new Spanish partner, Emivasa, which could provide water use data, at hourly rates, for 400'000 customers for one year.

Collected data has been used to train and validate the end-use disaggregation algorithms which were developed in year 1 and described in D3.2. The first algorithm is based on sparse optimization techniques and the second one is based on a combination of Factorial Hidden Markov Models and iterative Dynamic Time Warping. Both algorithms are demonstrated to outperform state-of-the-art disaggregation algorithms on power consumption data and to perform satisfactorily also on high resolution water consumption data as reported in Section 2 of D3.4.

Task 3.2: Algorithms for user profiling

The main activity in this task has been the development of consumer profiles, based on their typical water consumption behavior, and on their psychographic characteristics. In this task we developed the algorithms for modelling single-user consumption behaviors and classifying them into **users' profiles**. These algorithms combine advanced data analytics and machine learning techniques with a twofold goal: first, to describe observed consumption and identify consumption profiles trough a hierarchical clustering procedure; second, to identify the most relevant determinants of the observed consumption from a set of candidate variables, including households' characteristics and psychographic features of the users, through feature extraction and feature selection methods. The outcome of this task is reported in Section 3 of D3.4.

Task 3.3: Modelling future user behavior

The main activities in this task have been related to the development of a multivariate analysis for the identification of water consumption models. This task has developed the **social interaction model** and the **response to external stimuli model**, which is based on the Bass/SIRS technological diffusion model coupled with a Young opinion diffusion model. The output of this task is presented in Section 4 of D3.4.

Task 3.4: Agent-based models of user behavior

The main activity of this task has been the development of an agent based simulation platform to where the models developed in the previous tasks T3.2 and T3.3 in order to predict the future aggregate behavior of the water users. The ABM has been calibrated and validated the data of the Swiss case study. The result of this task is described in D3.3, where a review of the state of the art and the software implementation are presented and in Sections 4 and 5 of D3.4.

3.3.2 Main achievements

The main achievements of WP3 in Year 2 were:

- The testing the two novel disaggregation algorithms described in deliverable D3.2 on water and energy data at different resolutions.
- The development of algorithms for modelling single-user consumption behaviors and their application in the Swiss pilot.

- The development and implementation of a multi-agent model for predicting household water consumption which extends the simulator of deliverable D3.3, and applies it to the Swiss pilot.

The following deliverables were produced.

- D3.3 - ABM Simulator for Water Consumption – a First Prototype (m18) **delivered**
- D3.4 - Final user behavior models and ABM platform (m24) **delivered**

Milestone 14 has been reached at the end of Month 24, as deliverable D3.4, containing the documentation of the user behavior models, and the implementation in the agent based simulation platform, has been delivered.

- MS14: User behavior models ready (m24) **achieved**

3.3.3 Deviation from plan

As the UK case study has been replaced by the Spanish case study, all models have been developed, calibrated and validated on the basis of data collected in the Swiss case study only. The project partners active in WP3 are keenly interested in applying the same methods to the data provided by the Spanish case study in Year 3.

3.3.4 Use of resources

WP3	Deliverable	m13-m16	m17-m20	m21-m24	Allocated	Remaining
D3.3	ABM Simulator for Water Consumption – a First Prototype (m18)	4.77	7.10	-	12.10	0.23
D3.4	Final user behavior models and ABM platform (m24)	0.53	4.00	3.70	13.00	4.77

Resource usage in D3.4 has been below the expectations mostly because of the re-planning introduced by the Spanish case study. As data for validation will be collected in Y3, some WP3 activities will have to continue in Y3.

3.4 WP4 Saving water by social awareness

3.4.1 Progress towards objectives

Task 4.1: Social games for water demand management

The task progressed from the result of Y1 by enhancing the Basic Consumer Portal concept, which previously managed only data visualization and peer comparison (using the geographical neighborhood). The novel version (Advanced Consumer Portal) features a full-fledged set of behavior stimuli, specified in WP2 and implemented, assessed, and refined in WP4, based on a theoretically sound design of incentive models and algorithms, defined in T4.4. The designed stimuli and incentive mechanisms include:

- **Automatic and self-defined goals**: consumers can set weekly/monthly water saving objectives or pursue system-proposed ones.
- **Visualization metaphors**: the portal shows consumption and saving volumes as consumed swimming pools and saved bath tubes.
- **Water saving tips and educational videos**: localized and context based resources are published based on the specific pilot (e.g., specific infographics for the Spanish pilot).
- **Serious gaming**: a digital extension of the Drop! card game has been deployed in the Google Play! Store, localized in 4 languages (English, Spanish, Italian and Portuguese), with 400 water related questions rated by difficulty level.
- **Gamification**: all the actions that the user can perform in the Portal and in the digital game are logged and converted into scores. Two different gamified scenarios have been designed, one per pilot, to take into account the different real-world characteristics of the two deployment scenarios.
- **Reward program:** scores can entitle the user to rewards, which are both virtual (badges) and real (smart water tools, electronic equipment). Two different reward programs have been designed, one per pilot, to take into account the different characteristics of the two deployment scenarios.

The mix of stimuli and incentive mechanism has been pre-validated prior to deployment, with the help of simulation (conducted with the help of WP3) and theoretically supported with the results of T4.4.

The Advanced Consumer Portal has been deployed in a new pilot (EMIVASA, Spain), which addresses the entire customer base of Aguas de Valencia (800.000 users).

Task 4.2 Social Network Data Collection and Analysis

The Twitter data collector implemented in Y1 has been applied to extract and assess micro-posts related to water sustainability topics. An expert crowdsourcing interface has been implemented and deployed to let experts identify automatically extracted tweets as relevant. The expert crowdsourcing interface has been used to help find educational resources and fill the tips section of the Advanced Consumer Portal and the water trivia questions of the Drop!TheQuestion game.

Next, the task, aiming at gathering knowledge from social networks to study the user behavior, has implemented a second pipeline to fetch user data from Twitter, to be analysed further. In particular, Twitter data from users who follow the Twitter account of a partner utility were extracted and collected in a database for subsequent analysis. With the help of such dataset, important properties, able to provide useful knowledge regarding the users, were identified. Furthermore, a set of metrics and behavioral dimensions were defined, to measure and model the user's behavior in Twitter. This work is preparatory for the future deployment of the social feature of the Advanced Consumer Portal, planned for Y3, whereby users of the portal will link

their internal account to their external social account and mix their acidity in the portal with their activity in their social network(s) of choice.

Task 4.3 Analysis of community roles and trust and people search

An extended literature review was conducted regarding community detection and community role models. The Twitter user behavior was modeled with respect to the defined behavioral properties (Task 4.2) and a user segmentation based on behavioral attributes was applied on an experimental dataset of Twitter data in the water domain (6,3 Mio crawled tweets). A model of behavioral roles emerged from clustering users by the defined behavioral metrics and attributes. The resulting model was then applied to identify most relevant behavior roles and users that could be targeted to support the propagation of communication campaigns on Twitter (e.g. campaigns promoting sustainable water consumption). The identified roles in the sample dataset identified a larger portion of active users than in usual influencer approaches (44% users in active roles vs. 9% for influencers only; see publication). The resulting procedure was consolidated in a method for identifying and characterizing different types of behavioral roles of Twitter users that can be used for supporting communication campaigns on Twitter in targeted way. It enables the identification of active behavioral roles and user types (likely to propagate Twitter campaign messages to other users) and steering of campaign messages in a way that is likely to stimulate such users to further propagate the campaign content on Twitter.

Task 4.4 Incentive models and algorithms

In T4.4, a literature review of psychological theories of motivation in relation to games, and a review of gamification models and theories was performed and summarized in D4.3. The SmartH2O behavioral change approach was further refined and described in detail in D4.3. The gamification and incentive model in the Swiss case study was theoretically based on the refined behavioral change approach and formalized accordingly, including the definition of points, badges and rewards. The goal setting mechanisms for water consumption goals were defined by differentiating system goals and self-set goals and embedding the mechanisms into the visualization model.

The gamification and incentive model was then adapted to the Spanish case study, including the refinement of points, badges and reward system to adapt them to the much bigger scale of such scenario (up to 800.000 customers). The latter has been adapted in such a way that most rewards are given to winners of weekly and overall competitions rather than through a basic market place as in the Swiss case study.

The incentive models and algorithms were tested from different perspectives. In cooperation with WP3, a simulation of the incentive model was planned and executed, using different parameters and incentive model configurations to be able to fine tune specific aspects. Responses to the pricing survey, which was carried out by WP3 and WP5, were analysed as part of T4.4 with respect to participants' response to symbolic incentives. Also, initial user response to incentive elements in the basic portal in the Swiss case study was collected via questionnaires and analysed accordingly. Finally, the initial user activity logs of the gamified portal in the Swiss case study were analysed in terms of incentive response. Both the description of literature review and of the incentive model have been described in *D4.3 Incentive models and algorithms.*

3.4.2 Main achievements

- Design of the SmartH2O incentive model and algorithms in a theoretically-grounded and practically implementable way.
- In-depth study, design and application of a methodology for tailoring water consumers' incentives to different deployment scenarios. The literature about incentives for sustainable water consumption is extremely scarce and there is very little guidance on the definition of an appropriate mix of incentive stimuli tailored to a specific customer base and sustainability campaign.
- Implementation of the designed incentive framework into the Gamification Engine and Advanced Consumer Portal, which can be used to deliver a very broad set of stimuli, in a technically and communication-wise coherent manner. We have described the

design rationale of such incentive systems and of the rewarding rules embedded into it.
- Development and application of a simulation model and methods for incentive model dynamics testing.
- Preliminary analysis of incentive response of portal users in Swiss case study.
- Application of the social media data collection pipeline developed in Y1 to Twitter, in order to acquire water-relevant microblogging posts and evaluate metrics on their authors.
- Definition of metrics and method for capturing, measuring and analyzing user behavior on social media (focusing on Twitter) for identifying behavioral roles that support multi-faceted, targeted communication campaigns on Twitter (e.g. for promoting sustainable water consumption practices).

The following deliverables were completed in the reported period:

- **D4.2 First social network analysis, trust & people search techniques (m15): delivered**
- **D4.3 Incentive models and algorithms (m24): delivered**

3.4.3 Use of resources

WP4	Deliverable	m13-m16	m17-m20	m21-m24	Allocated	Remaining
D4.2	First social game and implicit user information techniques (m9)	8,48	0,70	0,00	10,50	1,32
D4.3	Incentive models and algorithms (m24)	1,75	3,63	7,22	10,00	-0,09

The increased use of resources in D4.3 is largely due to the need to design and test two separate (but aligned) incentive models for the two different case studies due to the specific real-world requirements of the large-scale Spanish case study (see D4.3 for details).

3.5 WP5 Saving water by dynamic water pricing

3.5.1 Progress towards objectives

Task 5.1: Review of pricing instruments and their effectiveness

Task 5.1 produced deliverable D5.1 at the end of Y1 (M12). It was therefore not active in Y2.

Task 5.2: Developing new dynamic pricing schemes

Task 5.2 has the objective to develop new dynamic pricing schemes that also take into account short and long-term water scarcity as a determinant in the pricing structures. Two promising tariff types were identified: time-of-day pricing (or peak pricing) which aims at shifting demand from peak to off-peak hours, which has potential to translate into financial savings; and scarcity pricing, which would adjust residential water prices to scarcity conditions in the basin, and therefore send a signal aimed at a temporarily reducing users' consumption. Both are made possible by the capacity of smart metering to record consumption at regular time intervals.

This task also presents the analysis and evaluation of the most effective ways to publish pricing schemes and integrate them into the communication with consumers. We report below the activities conducted for T5.2 over the first year of the project. Specifically, these include:

- Use of meta-analysis to obtain the statistics of price elasticity, and how it varies on the basis of:
    - Exogenous variables (e.g. geography, weather).
    - Pricing regulation (e.g. increasing or decreasing block rates, uniform pricing, dynamic pricing, etc.).
    - The econometric methodology adopted in the study.
    - Environmental awareness/concerns.
    - Regulatory framework and other institutional factors.
    - Level of water scarcity.
- Econometric model built in STATA to determine price elasticity based on the above analysis.
- Definition of two dynamic pricing schemes: a time-of-day tariff and of a scarcity tariff.

Task 5.3: Integrated water supply/demand modelling including dynamic pricing

This task will produce Deliverable 5.3, due on September 30, 2016 (M30). Nevertheless, some activities have been performed in Y2 in advance of that deadline. They include:

- Integration of the third case study (Valencia, Spain) into Task 5.3.
- Comparison of the basin contexts for the three case-studies.
- Derivation of the microeconomic relationship between time-of-day pricing and shifts in daily demand patterns.
- Derivation of the microeconomic relationship between scarcity pricing and demand reductions.

Task 5.4: Experimental economics-based tests of pricing policies

This task consists mainly in designing ways to engage residential customers with potential dynamic tariffs. Water utilities' reluctance to be linked with tariff changes, even hypothetical, is driving WP5 partners to find innovative ways of carrying out the task. The outcome from Task 5.4 will be reflected in deliverable D5.4 Experimental economics-based tests of pricing policies (to be released in month 30). For this task, the performed activities include the preparation and administration of an online surveys, and the consideration of innovative ways of experimentally testing pricing policies.

Activities related to the online surveys include:

- Preparation of an online survey to explore customers' responses to rewards and prices. The main idea behind the survey is based on asking water users if and how they are willing to undertake specific water saving actions under a range of diverse

incentives (economic reward/voucher or penalties, symbolic reward/badge). The survey's expected outputs include:
    - Users' statements about their preferences and users' reactions to the incentive schemes
    - Changes in user reactions based on the user characteristics, environmental attitude, type of incentive adopted
- Questionnaire translated in Italian and German in order to be administered to Ticino users.
- Coordination with SUPSI, and SES about the users' sample and process to deliver the survey online, in the Ticino case.
- Analysis of survey results from the Ticino case.
- Questionnaire translated in Spanish (and adapted to reflect differences between the Ticino and Valencia contexts) in order to be administered to Valencia users.
- The questionnaire for Valencia include not only questions about scarcity pricing, but also question on the effect of pricing for reducing peak demands during the day.
- Coordination with EIPCM to integrate the "pricing questionnaire" and the questionnaire proposed to users who sign in the platform.

Activities related to supplementary experiments include:

- Preliminary exploration of the ways in which online experiments could offer an innovative way to perform such experiments.
- WP5 partners contacted and met with an expert in experimental economics in the power sector (Giovanna d'Adda, Politecnico di Milano) to get advice on experimental design.

3.5.2 Main achievements

The main achievements of WP5 include:

- Review of traditional water pricing schemes and their limitations.
- Meta-analysis of the determinants of price elasticity of demand.
- Estimate of price elasticity of demand for residential water consumption.
- Application of the model to the two case studies (London and Ticino).
- Identification of two major dynamic tariffs: time-of-day pricing and scarcity pricing.
- Evaluation of the potential benefits of time-of-day and scarcity pricing in the London case.
- Preparation of an online survey (English, Italian, German and Spanish) to explore customers' responses to rewards and prices.
- Administration of the survey in the Ticino and Valencia case studies.
- Analysis of survey results for the Ticino case.

The following deliverables were produced:

- **D5.2 Developing new dynamic pricing mechanisms (m16)**: **delivered**

Milestones:

- MS10: Major dynamic pricing mechanisms identified (m16): **achieved**

3.5.3 Use of resources

WP5	Deliverable	m13-m16	m17-m20	m21-m24	Allocated	Remaining
D5.2	Developing new dynamic pricing mechanisms (m16)	8,66	2.10	2.32	15	1,92

The use of resources is generally in line with the planning. There are still some resources left which can be used in the further adaptation of the dynamic pricing mechanisms in the forthcoming deliverables D5.3 and D5.4.

3.6 WP6 Platform implementation and integration

3.6.1 Progress towards objectives

Task 6.1 Delivery Planning

Task 6.1 corresponded to deliverable D6.1, which was delivered at the half of Y1 (M6). It was therefore not active in Y2.

Task 6.2 Architectural design of the SmartH2O platform

In Task 6.2 a detailed architectural design of the SmartH2O platform describing all platform modules communication protocols, and underlying information and data models has been produced. The task has also specified the integration model, based on a component approach, based on a Service Oriented Architecture, that enables various platform modules to interact between each other. According to the design, the main components of the SmartH2O platform are: the Water Utility Customer Portal, the Gamification Engine, the Games Platform, the Enterprise Service Bus, the Smart Meter Data Manager, the Portal Data Exchange Manager, the Water Utility Admin Portal, the Authentication Gateway, the Pricing Engine, the Agent Based Modelling platform and the Models of User Behaviour.

This task finished at the end of Year 2 and it produced Deliverable D6.2 platform architecture and designed, which was delivered in Year 1.

T 6.3 Implementation of the SmartH2O platform

This task started in the middle of Year 1 and it will be active until the end of the project as it delivers the sequence of prototype implementations of the SmartH2O platform. The implementation of the prototype conforms to the evolutionary prototyping, which means that it is following several iterations as result of the incremental refinements of the functional specification (Task 2.3) and architecture design (Task 6.2). In the course of year 2 the second *release* of the SmartH2O platform has been issued at month 18, and the second *prototype* has been released at month 24. For ensuring a smooth concurrent validation of the SmartH2O platform (WP7), all prototype modules are being continuously updated, compiled, installed, configured, and deployed. The constant feedback on the platform's usability, coming from the validation case studies, has been considered to further improve the prototype's capabilities.

T 6.4 Testing and quality assessment

This task runs in parallel to T6.4 and it produced an initial set of quality metrics that can be applied to monitor and assess the quality of SmartH2O software. This task has defined:

- Software Quality Assessment Plan (SQAP) to provide a common model for testing and quality assessment. It follows the fulfillment of indicators such as: conformity to the project objectives, complexity of algorithms, cost for running the software as well as the balance among these indicators.
- Software Quality Report (SQR) to summarise observations discovered during the software quality assessment process, as for example after each major project release, and will provide recommendations for corrective action.

T 6.5 Platform management and data distribution

This task also spans the three years of the project. In Year 2 the main effort of this task was to complete the deployment of the SmartH2O platform in the Swiss case study, and to initiate the deployment in the new Spanish case, which requested a considerable effort in the integration with the existing software infrastructure of EMIVASA.

3.6.2 Main achievements

The main achievements in the period are:

- Parts of the architectural design of the SmartH2O platform have been updated as resulted from the functional specification D2.3 ended M18 – as D6.2 Architectural

design of the SmartH2O platform is maintained by the Consortium as an open document. (T6.2)

- Following the requirement to integrate SmartH2O platform to Emivasa Virtual Office, the document Emivasa-SmartH2O Integration Solution Architecture has been elaborated. (T6.2)
- The deployment of the SmartH2O platform prototype for Valencia demo case. The deployment has gone through all the developing, testing and production rollout phases, as required by the common project planning performed by SETMOB, POLIMI and EMIVASA. (T6.3)
- The evolution of the platform deployment for SES (Switzerland) demo case. It included upgrades of the Smart Meter Data Management (SMDM) component for adding new data aggregation levels, upgrading of the Customer Portal - Basic version and Advanced version, the rollout of the DROP! mobile game, implementation of the initial version of the Water Utility Admin Portal for water utilities, implementation of the initial version of the social awareness app for the users(T6.3)
- The evolution of the components of the SmartH2O platform: backend integration services, Enterprise Service Bus (central integration component), Gateway Authentication (central authentication component) (T6.3)
- The water consumption visualization (overview mode with dynamic visual alerts of consumption performance) including the metaphorical simulation widget showing expected consumption impact over 1 year based on current consumption has been iteratively refined and finalized. The basic and gamified SmartH2O portal UI designs have also been iteratively refined. Additional UI elements, including the communication tool, the sign-up page, the upgrade process for basic portal users wanting to switch to the advanced portal, or the rules page in the Spanish case study have been conceptualized and designed. In the survey tool used in WP7 for the online questionnaire, a script has been implemented that connects to the gamification engine to automatically assign gamification points to users filling out the questionnaire (T6.3)
- Code quality and testing procedures have started being defined in the first version of the Software Quality Assessment Plan (SQAP) according to the DoW. (T6.4)
- The document presents procedures to test a single component as well as the three stage integration tests (internal, alpha and beta). (T6.4)
- References to the agile model used for performing quality assurance, various model walk-through (a software developer reviewed the code written by other) and the scripts implemented to perform load testing (Apache Bench) are included. (T6.4)
- Final overview visualization model with dynamic alerts and consumption impact visualization (T6.5)
- Final visual user interfaces and gamified SmartH2O portal pages(T6.5)

The following deliverables have been produced:

- **D6.4 Platform implementation and integration – second prototype** (m24): **delivered**

The following milestones have been achieved

- MS12 R2 second release of the platform (m18): **achieved**
- MS15 R3 second release of the platform (m24): **achieved**

3.6.3 Use of resources

WP6	Deliverable	m13-m16	m17-m20	m21-m24	Allocated	Remaining
D6.4	Platform Implementation and Integration - second prototype (m24)	7,54	4,18	10,35	14,05	-8,02

The use of resources is in line with the planning for Y1 and Y2 cumulated, even if there is a degree of overspending. In Y2 the spending of resources for WP6 has compensated the justified under spending from Y1 (due to the delay in the completion of the smart meters deployment in the UK demo case) by an increased workload for EMIVASA (Spain) demo case.

3.7 WP7 SmartH2O Validation (SUPSI)

3.7.1 Progress towards objectives

Task 7.1 Design of the case study validation methodology

In this task the validation methodology that was released in Y1 (D7.1 Validation plan), was further elaborated to meet the specific needs of the two pilot studies, in particular with respect to the (new) Spanish case study. Instruments were developed to collect user awareness and technology acceptance data, based on a literature survey in environmental (water) psychology. Procedures were defined for the collection of water consumption data, in line with D7.1. Particular effort was invested in exploiting the scientific opportunities of the large-scale Spanish pilot by putting in place an experimental vs. control group design, which allows for a more robust attribution of effects to the SmartH2O portal.

Task 7.2 Impact in the Swiss case study

In the Swiss case study, both baseline and first trial water consumption data were collected, allowing for a preliminary assessment of the impact of the basic portal on water consumption. This involved the basic and the gamified version of the SmartH2O portal. The analysis of the results demonstrated promising initial results (D7.2), even though more robust analyses can only be done once a complete year of consumption data is available.

Following the methodology in T7.1, questionnaires have been designed to assess water consumption awareness and technology acceptance. One questionnaire elicited baseline water consumption awareness after new users have signed up. The questionnaire is prompted right after filling out the sign-up form. A second questionnaire was designed for users who upgrade the basic portal to the advanced gamified portal.

Basic portal results on water consumption, technology acceptance, and water consumption awareness were collected through aforementioned questionnaires and subsequently analysed. Additionally, activity logs of gamified portal users were collected and analysed. Finally, the first (promising) results were reported in *D7.2 Validation report.*

Task 7.3 Impact in the Spanish case study

In the Spanish case study, much effort has been invested in the preparations for the large-scale launch of the portal, both in terms of user recruitment, and in terms of validation preparations. This includes a design of a recruitment e-mail for virtual office users (e.g. the current customer portal). Furthermore, two types of banners were designed for recruitment and communication purposes: web-optimized banners for virtual office and e-mail communication and CMYK banner for printed invoice.

In the large scale Spanish case study, a gamified portal was compared against a control group. To assess the project KPI's, in addition to water consumption data, questionnaire-based instruments for assessing water consumption awareness and technology acceptance have been developed (grounded in behavioral psychology and technology acceptance literature). Baseline water consumption awareness questionnaires were designed for recruited SmartH2O users, and for the control group. (To avoid straining users with multiple questionnaires in alignment with WP5 an integrated questionnaire for the treatment group was produced, covering the needs of both work packages for specific user data). The control group questionnaire was designed as a phone questionnaire, for which several pre-tests have been run to optimize e.g. comprehension. To stimulate response rates for the questionnaires, questionnaire incentives were designed (awards, prizes).

In addition to this work and launch preparations, baseline water consumption data has also been collected, and preliminarily assessed. The developed instruments and the refined methodology were reported in *D7.2 Validation report.*

3.7.2 Deviations from work plan

None, apart from the change of test site.

3.7.3 Main achievements

- Water consumption baseline in both case studies
- Refined user-centred evaluation methodology
- Validation and awareness measurement instruments for both case studies
- Preliminary water consumption impact measurements
- Water consumption awareness baseline of users in Swiss case study
- Preliminary technology acceptance assessment of basic portal users in Swiss case study
- Preliminary log analysis of gamified portal users in Swiss case study

The following deliverable has been produced:

- **D7.2 Validation report** (m24): **delivered**

Milestones:

- MS16 SmartH2O Platform Delivered (m24): **achieved**

3.7.4 Use of resources

WP7	Deliverable	m13-m16	m17-m20	m21-m24	Allocated	Remaining
D7.2	Validation report (m24)	4,30	8,39	13,40	22,95	-3,44

The increased use of resources in D7.2 is largely due to the need to design two different (but aligned) separate validation instruments for the two different case studies due to the specific real-world requirements of the large-scale Spanish case study (see D7.2 for details).

3.8 WP8 Business Development (UoM)

3.8.1 Progress towards objectives

Task 8.1 Technology and market watch

Task 8.1 has the objective to set up an observatory on current trends in the water sector as a whole with a particular focus on technological developments regarding the use of ICT in water management and on the market application of such progresses. The outcome of this task was formalized in deliverables D8.1 Early Exploitation Plan – Bringing SH2O to the market and D8.2 Technology Watch Report - Exploring the market dimensions. Both were delivered in Y1.

A short update can be found in Y2 in D8.5 Business Ecosystems Report, focusing on updates in the very active field of gamification for resource conservation. The same deliverable also studies successful startups that propose smart technologies in the water and energy conservation sectors, in order to:

- Identify the reasons to their success and understand whether and how SmartH2O can replicate them;
- Point out to areas in which the SmartH2O platform and related assets can bring new value.

T8.2 Regulation watch

Task 8.2 has the objective to analyse the European and national regulatory frameworks and provide information concerning the European countries according to their openness / adaptability towards smart water saving policies. The outcome of this task was formalized in Y1 deliverables D8.1 Early Exploitation Plan– Bringing SH2O to the market and D8.2 Technology Watch Report - Exploring the market dimensions. A short update can be found in D8.5 Business Ecosystems Report.

T 8.3 Utility business implications and new business models

This task identifies the challenges and opportunities of smart metering for utilities. It builds on the experience from the three case-studies (Ticino, Valencia and London), and one of its main objectives is to build a utility financial model of smart metering. Output from this task can be found in D8.5 Business Ecosystems Report. Main activities include:

- Analysis of the experience from the three utilities involved in this project: SES, TWUL and EMIVASA. This comparative study is to continue in Y3 to be at the core of D8.6.
- Development of a general methodology to compute the return on investment from smart metering.
- Analysis of a utility's early experience (EMIVASA) in integrating the SmartH2O platform. Exploration of the possible financial implications for utilities.
- Analysis of the possible financial implications from dynamic pricing.
- Proposal of a methodology for integrating demand-side management tools such as the integration of the SmatH2O platform, or dynamic pricing, into the return on investment analysis of smart metering.
- Application of the methodology to the Greater London under various scenarios of population growth.

T 8.4 Business Technology Ecosystem

This task has a dual objective:

1) It builds on the above tasks to refine the vision of the opportunities to transform the project into a stable service.
2) It also identifies actors involved in the water management sector in relation with the project

Outputs from part 1) of this task can be found in D8.4 Intermediate Exploitation Plan under the form of business models, refined in D8.5 Business Ecosystems Report to provide a first outline of business plans. Outputs from part 2) can be found in D8.5 Business Ecosystems Report**.**

Performed activities in 1) include:

- Design of joint and individual exploitation strategies for individual SmartH2O assets:
  - Asset description
  - Market description
  - Product / Service definition
  - Competition analysis
  - SWOT analysis
  - PEST analysis
  - Marketing strategy.
- Reduction of the number of commercially exploitable assets to focus on the three following assets (other assets, such as the gamified bill and dashboard for customer behavior analysis and demand planning, are to be exploited jointly with the SmartH2O platform):
  - SmartH2O platform
  - Drop! The Game (Board game + online app)
  - Smart Data Management Component (SMDC)
- For the three above assets, business plan outline involving a provisional financial analysis.
- Identification of a relevant SaaS (Software as a Service) business model canvas to direct the further business development of the online assets of the SmartH2O project.

Performed activities in 2) include contacts taken by all project partners in relation with project-related activities. The number and nature of contacts vary among partners depending on their role in the project. Full lists of business ecosystem contacts can be found in deliverable D8.5.

T 8.5 Open Data and standards

Task 8.5 (Open data and standards), which has as main objectives the use of appropriate standards in the design of the SmartH2O platform and also the publication of data generated by the project as Open Data sets. This task delivered D8.3 at the end of year 1, but it remains still active in order to be able to monitor the evolution of relevant standards in the ICT for water sector.

3.8.2 Main achievements

The main achievements in the period are:

- **Refined joint and individual exploitation strategies** based on a better understanding of which of the project assets identified during Y1 are commercially exploitable as standalone assets, and which assets should be taken to the market first as components to the SmartH2O platform.
- **Refined business plans for three key SmartH2O assets**: The identification of business models and the outline of provisional business plans, so as to guide work on the implementation and exploitation strategy during the final year of the project.
- **Extended list of business contacts** across all stakeholders in the water domain
- A **return on investment analysis** of smart metering which demonstrates in the London case that demand management strategies explored in this project (through the integration of the SmartH2O platform, and / or through dynamic pricing) can make a real difference towards making smart metering cost beneficial for utilities.

The following deliverables have been produced:

- D8.4 Intermediate exploitation plan (m18): **delivered**
- D8.5 Business ecosystem report (m24): **delivered**

The following milestones have been achieved

- MS17 Business ecosystem planning (m24): **achieved**

3.8.3 Use of resources

WP8	Deliverable	m13-m16	m17-m20	m21-m24	Allocated	Remaining
D8.4	Intermediate exploitation plan (m18)	6,09	5,25	-	8,90	-2,44
D8.5	Business ecosystem report (m24)	0,35	2,34	8,52	11,19	0,02

There is a limited amount of underspending in this work package, mostly due to the fact that Thames Water (TWUL) did not claim any effort spent in this work package, despite some punctual contributions which were provide in due time.

3.9 WP9 Communication and dissemination

3.9.1 Progress towards objectives

T 9.1 Communication strategy and planning

A clear and structured communication and dissemination strategy for the project has been developed already during Year 1. The following actions have also been performed as part of the communication planning phase:

- Set up of a communication team composed of SmartH2O partners' representatives;
- Definition of specific targets (KPIs) to regularly assess and monitor the effectiveness of communication actions.
- As part of the communication activities, and in collaboration with WP8, specific liaisons with related initiatives and EU projects have been defined and established to further promote the SmartH2O project through their activities: e.g. SmartH2O is an active participant in the ICT4water cluster, ensuring connection with 10 projects on ICT and Water Management and liaisons with EU projects CUbRIK, iWidget, Waternomics, DAIAD, Proactive, and POWER project, which involves SmartH2O partner EIPCM. These links will contribute to the establishment of a florid business and technical ecosystem, one of the objectives of the project.

T 9.2 Dissemination material and tools

Task T9.2 aims at producing promotional material for the project dissemination by delivering a progressively enriched information pack reflecting the brand and objectives and expected results. Activities for implementing the communication plan have been performed during Year 2, bringing to the development of a mix of internet and traditional communication channels/tools (see T9.2). The use of social media channels was greatly expanded and intensified in year 2, including a broader range of topics related to the project and increasing the dissemination of project results and activities on an on-going basis (as they became available). Topics from which content and news were disseminated include water saving technologies, approaches and best practices, water management, dynamic pricing, social awareness in resource management (water & energy), visualization, environmental games and related news, also from the area of water and sustainability in general. The Twitter strategy also aimed at identifying well established accounts (Twitter "influencers"), and accounts with a broad reach in their existing social networks, in order to exploit network effects. This was reflected in the editorial choice of content published, as well as in the establishment of references and direct interactions with existing Twitter multipliers in the area of water management and related sustainability areas. This strategy was effectively pursued and led to a major increase in the number of followers out the SmartH2O Twitter account. More than four times more tweets were produced than in year 1, that resulted in more than quadrupling the number of followers. This shows the effectiveness of the developed Twitter communication strategy and the performed intensive efforts in its implementation.

In addition, a separate Twitter aggregator page that collects tweets in the areas of water research and water business has been implemented. This page automatically collects tweets on two precompiled lists of influencing Twitter accounts in both areas, and displays them in an overview form on the SmartH2O website under Twitter water news. In this way, a collective repository of social activity and news from water-related topics has been also made available on the project website (serving target groups that may not be using Twitter). Similarly, the compilation of relevant accounts to follow by the project's Twitter account itself has been expanded to 685 relevant Twitter accounts, most interesting of which have been categorized into 27 lists, providing easy access to most important information for the editorial team and for the project partners.

The SmartH2O website: This is the main point of reference where static and permanent information is being published. This includes copies of the scientific papers, of the

public deliverables, and a general description of the project objectives and the case studies. It is online since April 2014.

The SmartH2O Twitter account: Dynamic information, newsflashes, links to other interesting news taking place in the general area of "Smart water" are being published using our Twitter feed, including water saving technologies, approaches and best practices, water management, dynamic pricing, social awareness in resource management (water & energy), visualization, environmental games and related news, also from the area of water and sustainability in general. During Year 2, four times more tweets were produced than in year 1, that resulted in more than quadrupling the number of followers. In addition, a separate Twitter aggregator page that collects tweets in the areas of water research and water business has been implemented. This page automatically collects tweets on two precompiled lists of influencing Twitter accounts in both areas, and displays them in an overview form on the SmartH2O website under Twitter water news. In this way, a collective repository of social activity and news from water-related topics has been also made available on the project website (serving target groups that may not be using Twitter).

The SmartH2O LinkedIn innovation community: This channel is aimed at professionals in fields related to SmartH2O, and a wider community of water consumers and innovators. The innovation community organises discussions on specific topics and project outcomes, enabling interaction among the community members in an open innovation manner.

The SmartH2O newsletter: It is a traditional means of communication that is used to summarise a number of events and news, which happened over a specific time period. It provides a channel to redirect the readers to the three above communication channels.

Traditional media: Newspapers, radio and TV are also used to reach out to the wider public. Access to this media is more limited, and it is reserved to major SmartH2O events.

Scientific papers and conferences: this is the traditional communication channel for scientists. It is essential to provide the necessary credibility to support all other communication channels, even if the number of reachable individuals is much smaller in theory.

SmartH2O events: SmartH2O also organises specific events to maximise its impact. Such event includes the presence of active members of the project consortium with dissemination materials and demos at conferences, the organisation of a Summer School, and the organisation of a special dissemination event in occasion of the World Water Week.

The creation of content for the different channels has been performed in concert with the progress of work in different workpackages, and, especially in the development phase, with WP2 (Requirements and specifications).

T 9.3 Dissemination events

SmartH2O participated in several dissemination activities at different scales (see D9.3 for further details):

- **Dissemination at the local level:** Dissemination at the local level has been performed mostly using traditional media. This type of dissemination has been mostly used in Switzerland, to raise the awareness on the ongoing deployment of the smart meters in Tegna.
- **Dissemination at the national level:** has not been in the focus of the second year dissemination activity. The national-wide news release to the media is currently carefully being planned for year 3 to maximise the impact of the results of the SmartH2O project.

- **Dissemination at the international level** has taken place mostly through the online channels, including the SmartH2O website, newsletter, Twitter, LinkedIn and Slideshare accounts, through the publication of scientific papers and the attendance of international conferences by members of the project. Also, meetings with representatives from academia and industry/companies have been exploited to present the SmartH2O project in Europe, Mediterranean Area, and USA. Finally, the SmartH2O has been pitched as selected finalist at the EIP Water's Got Talent session during the EIP Water Conference.
- **Major dissemination events:** SmartH2O has attended a number of major dissemination event, both at the local (Tre Terre d'Autunno in Tegna) and the international level (European Utility week, ICT 2015 Lisbon, Swiss Pavillion at EXPO 2015).

T 9.4 SmartH2O Summer School

The SmartH2O Summer School on **Smart Systems for Urban Water Demand Management** has been organized and will be held on August 21-25 at Monte Verità, Switzerland. The school will focus on managing household water demand using **ICT and smart economics**: from monitoring consumption with innovative smart meters, to profiling users' behavior, to understanding how different stimuli can nudge behavioral change, and, finally, how integrated ICT solutions can be adopted by water utilities.

Besides the SmartH2O project members, the program includes lectures by several water experts from industry and academia in Europe and US. The complete program of the Summer School, with the list of speaker and detailed information are posted on the website http://www.smarth2o.ch/smartwater/.

3.9.2 Main achievements

The WP has set the foundations for an effective dissemination and visibility of the project results, achieving the following main results:

- 2 publications in scientific journals with a third one under review.
- Very successful expansion of communication on the Social Channels (540 followers on Twitter, 226 members of LinkedIn SmartH2O Innovation Community).
- Wide uptake of project communication on Social Channels by major actors and influencers in the field (e.g. MIT Water, IUCN Water Programme).
- Presentation of first project results at 9 scientific conferences and workshops.
- Production and successful distribution of the 2nd SmartH2O Newsletter.
- Orchestration with the ICT4Water Cluster and dissemination of first project results in two ICT4Water Newsletters.
- All dissemination targets reached (see D9.3 for further details):

Website	Reached > 500 visitors (59.6% new visitors)	
Newsletter	2 issues which reached **> 2000** recipients	
Conferences and workshops	**9** presentations	
Publications	**3** conference papers published, 2 workshop papers **2** journal papers published 1 journal paper under review	
Twitter	**1174** tweets **540** followers	Y2 target: 150 followers✔

LinkedIn	**226** members	Y2 target: 70 members✔
Slideshare	**13** presentations **41312** views	Y2 target: 10 presentations✔
Screencasts	**2** screencast published	
Radio interviews and Press releases	**21 (14** after EMIVASA's addition to the project)	

The following deliverables has been produced:

D9.3 – Second dissemination report (delivered at month 24)

3.9.3 Use of resources

WP9	Deliverable	m13-m16	m17-m20	m21-m24	Allocated	Remaining
D9.3	Second dissemination report (m24)	2,88	2,29	5,05	9,21	-0,75

The use of resources is in line with the expectations.

4. Project management during the period

4.1 Consortium management

During the second year the management processes described in Deliverable D1.1 (management processes) were put into practice and this allowed to manage the challenges posed by the rejection of a few deliverables, and the major stress imposed by the preparation of a contract amendment to add two new partners and two new third parties. Thus, consortium management in the second year has mostly focussed on the following activities:

- Preparation of the contract amendment.
- Follow up and implementation of reviewers' recommendations.
- Organisation of periodic project meetings.
- Organisation of specific work package meeting, in physical presence and/or virtual.
- Internal periodic resource usage reporting, to monitor advancement and spent resources.
- Co-ordination in the preparation of project deliverables, organising time plans, and deliverable description plans.
- Quality control of deliverables.

4.2 Problems and solutions

During the second year of the project no new problems have been identified. This does not mean that the project didn't have to face problems: the lack of metering data from the originally planned UK case study still affected the course of the second year, as the consortium was expanded to include a new case study, for the Spanish city of Valencia. This change of plan requested a major effort in WP6 (Platform Development) in order to integrate the SmartH2O Platform in the "Virtual Office" application which EMIVASA already offered to their customers. The integration has been fully achieved and SmartH2O has been successfully launched in Valencia (month 25 in Year 3).

4.3 Changes in the consortium

Two new **partners** have the consortium: **Emivasa** and **Universitat Politecnica de Valencia**. Two new **third parties** have also accessed the consortium: **WebRatio**, associated with Politecnico di Milano and **Aguas de Valencia**, associated with EMIVASA.

4.3.1 The new role of TWUL and the role of EMIVASA in the SmartH2O project

As mentioned, the entry of the new partner EMIVASA, and the associated third party Aguas de Valencia, was motivated by the problems encountered in the UK case study. It became apparent that the existing case studies of Thames Water in Swindon and Reading for a total of 4000 meters that were to be used for the SmartH2O work could not be made available to the project as the meters and communication system installed suffered a very high failure rate. As a result Thames Water have made considerable effort to re-develop all the metering processes, IT systems, meter installation contractors and have procured new meter technology and a fixed network communication system which has led to a 2 year delay in starting the smart metering installations.

Because of this delay the SmartH2O consortium was in need of a new case study to provide a meaningful test bed for the SmartH2O platform. EMIVASA was the solution as they had already installed 400'000 smart meters in the urban area of Valencia, In Spain.

While EMIVASA could potentially replace as a whole Thames Water as a project partner, the Consortium preferred to keep Thames Water in the partnership given its great potential for future exploitation and also for the contribution on innovative pricing schemes and in the

consolidation of the exploitation strategy in D8.5, coordinating the efforts of the various partners.

In conclusion, the project can now rely on a much larger experimental setting (400'000 smart-metered households, versus the originally planned 4'000 of the UK case study), and at the same time it can continue to collaborate on the design of innovative pricing schemes which is topic of high interest to Thames Water.

In the following sections we introduce the new partners, where we can also list Universitat Politecnica di Valencia, which will support EMIVASA and its third party Aguas de Valencia in the new Spanish Case study. We also introduce WebRatio, a SME which contributes to the development of the SmartH2O software platform.

4.3.2 Universitat Politecnica de Valencia

The Universitat Politècnica de València (UPV) is a public, dynamic and innovative institution dedicated to researching and teaching, with strong bonds with its social environment and a strong presence abroad. The University offers modern, flexible degrees and official postgraduate program designed to meet the demands of society, attracting currently more than 36,000 students. One of the pillars of the social recognition of UPV has been and will continue to be its research capacity. With over 52 million in R&D activities, its departments (41), research centers and institutes (40) are participating in applied many research activities jointly with national and international bodies and companies, with more than 4,000 people directly involved in research. The relevance of UPV's research outputs underpins the strong international presence of the institution, which has close collaborative links with the best universities in the world. UPV is an innovative and entrepreneurial University, with effective mechanisms for the dissemination of scientific and technological results, and which excels in the training of researchers and in the creation of technology-based companies.

The research group of UPV participating in the project will consist of members of IIAMA and ITA. The Research Institute of Water and Environmental Engineering (IIAMA) is formed by around 100 employees, including more than 20 full and associate professors and several post-doc researchers, offering an ample scientific-technical baggage consolidated in the last 20 years covering most fields related to the water cycle and the environment. IIAMA participates in a significant number of national and international networks and projects of mobility and cooperation (e.g. as member in two EIP-Water Action Groups, and in many European programmes) and has a wide experience in technology transfer and cooperation with private companies and governmental agencies. The staff of the ITA research group (UPV) has been working for around thirty years on matters connected with urban hydraulics and the management and efficient use of water in the urban environment, with long trajectory on research, consultancy, training and software development in urban water engineering.

4.3.3 EMIVASA

The Empresa Mixta Valenciana de Aguas, known as EMIVASA, is the main affiliate company of the Grupo Aguas de Valencia. It was created by the Valencia City Council and Aguas de Valencia S.A. to manage the public service of water supply in the city of Valencia. It is a mixed company: Aguas de Valencia put forward 80% of the capital and the City Council the other 20%. Aguas de Valencia SA (AVSA) was set up in 1890 under the original name of Sociedad de Aguas Potables y Mejoras de Valencia, changing its name to the current one in June 1988.

The Group focuses its activity managing the Integral Cycle of Water, developing several complementary lines of business creating the suitable synergies to optimise water resources. We are dedicated to managing, exploiting and operating the services of: supplying drinking water to municipalities; sewage management and treatment of wastewater; supplying water for agricultural use; carrying out, maintaining and conserving works and constructions necessary for the completion of our services, even for third parties, whether they are public, private or for individuals.

Grupo Aguas de Valencia provides services to an overall population of 2 million end users in around 230 municipalities in Spain. EMIVASA operates, among others, two large Drinking

Water Treatment Plants in Valencia (La Presa and The Realon) taking water from rivers Júcar and Turia, with a total production capacity of 8.8 m3/s. These plants supply potable water to the whole system of the metropolitan area of Valencia.

In recent years, EMIVASA, like the whole group, has focused in developing R&D policies aiming at improving the efficiency of the different processes managed by the company and at providing a better service to customers. These activities include, among others: the adoption and development of innovative water treatment technologies; the development of tools for an efficient management of the Water Distribution Network (WDN); the deployment of smart metering in the WDNs for a better monitoring of consumption; the development of a platform capable of integrating data from different smart meter vendors.

Moreover, EMIVASA was the first company in the Valencian region to be certified by the UNE 166.002 Spanish standard for management of R&D&I, as well as being certified by ISO 9001, ISO 14001 and OHSAS 18001.

4.3.4 Aguas de Valencia (AVSA)

AVSA and EMIVASA operate under the umbrella of the Aguas de Valencia Group (AVSA group). EMIVASA is the main company of the group, as it is the water utility responsible of managing water supply in the main city operated by the Group (Valencia). The AVSA Group is not a legal entitry and therefore it cannot take part in a European Project, it is simply an organizational structure. Yet, under the AVSA Group umbrella there are various companies offering services and facilities, and AVSA is such a company providing ICT solutions and R&D services for EMIVASA. In particular AVSA possess specific knowledge in the area of smart metering and big data management. While EMIVASA operates the water distribution infrastructure and manages customer relationships, essential for the success of the deployment of the SmartH2O platform in Valencia, AVSA delivers the technical solutions for the integration of the SmartH2O platform in the ICT infrastructure of EMIVASA.

4.3.5 WebRatio

WebRatio has participated as third party of Politecnico di Milano in the CUBRIK FP7 project, where it has developed the gamification engine, one of the resulting assets of the Project. The gamification engine is a software framework capable of transforming streams of generic users' actions into rewards and achievements, according to a customizable set of gamification business rules. The usage rights of the gamification engine has been granted by WebRatio to the SmartH2O Consortium, with a memorandum of understanding signed on 1/7/2014 among the CEO of WebRatio (Dr. Stefano Butti) and the Project directors of the CUbRIK Project (Dr. Vincenzo Croce) and SmartH2O Project (Dr. Andrea Rizzoli).

The SmartH2O Consortium has made use of the gamification engine for accelerating the development of the SmartH2O platform and has interacted positively with WebRatio. The Consortium considers the expertise of WebRatio in the multi-utility market a very relevant contribution to the validation of the project results, both in their technical aspects and in the deployment within the pilot test sites, and to the development of a strong business plan for post-project exploitation.

POLIMI plans to delegate some specific software engineering and development activities to WebRatio, especially in the light of the large scale deployment of the SmartH2O platform which is expected in the Valencia case study.

4.4 Project meetings

A general meeting is a meeting where all partners attend, with at least one representative. A technical meeting is a meeting where a subset of partners meet to discuss task specific issue or cross-issues, involving tasks from different workpackages. Finally two workshop type meetings were held.

The minutes of all meetings are archived on the project wiki.

4.4.1 General meetings

- Remote General Assembly (Online, 27 July 2015). This GA was held to approve the budget changes required to prepare the Contract Amendment.
- Third General Assembly and Meeting (Milan, 7-9 October). In this GA the various Work Packages updated their status and the plan for the new Spanish Case study was outlined.
- Fourth General Assembly and Meeting (Berlin, 27-29 January). Update of progress and final revision of the deployment plan for the SmartH2O platform in Valencia.

4.4.2 Technical meetings

A detailed description of the following technical meeting is available on the SmartH2O project wiki, where all minutes are available.

- Sign-up procedure (Online, 16 April 2015).
- Integrating EMIVASA on SmartH2O platform (Online, 27 April 2015).
- WP3: end-use trace synthetic generator and general progress (Como, 15 May 2015).
- Alpha and Beta test Meeting (Online, 05 June 2015).
- EMIVASA Meeting (Valencia, 7th and 8th of May).
- WP3: collaboration with UPV (Online and in Como, 09 June 2015).
- Integrating EMIVASA, the gamification engine (Online, 06 July 2015).
- WP4: gamification meeting (Online, 08 July 2015).
- Integrating EMIVASA, the gamification engine, part 2 (Online, 17 July 2015).
- WP3-5 Meeting (Valencia, 31 August - 1 September 2015).
- WP7 Validation Planning (Skype, 3 September 2015).
- Integrating EMIVASA, the user questionnaires and user involvement (Online, 11 September 2015).
- Integrating EMIVASA, technical integration meeting (Online, 14 September 2015)
- WP3-5 Meeting at SUPSI (Manno, 10 February 2016).

4.5 Project planning and status

Overall, the Project Planning as described in the DoW was appropriate for the second period.

4.6 Impact of possible deviations

The possible deviations caused by the addition of the Spanish case study have been absorbed into the revised workplan of the Description of Work attached to the Contract Amendment. It is expected that some WP3 related activities will continue in Year 3, in striuct collaboration with WP7.

4.7 Clustering activities

SmartH2O is an active member of the ICT4Water Cluster (http://ict4water.eu). As such we have taken part in the following Cluster Events during Year 2:

- ICT Water Cluster meeting In Barcelona (September 2015);
- ICT 2015 conference in Lisbon, attended by more than 6000 visitors. In cooperation with the other cluster projects, SmartH2O showcased a demo version of the platform together with the Drop board game.
- 3rd EIP Water Conference in Leeuwarden, where SmartH2O was shortlisted as one of the three finalists in the EIP Water's got Talent competition.

5. Deliverables and milestones tables

In the following two sections 5.1 and 5.2 we summarize the deliverables and the milestones for Year 2, which cumulate with the deliverables already delivered in Year 1.

Note: in the following table the delivery dates for some Year 1 deliverables differ from the contractual delivery date as the deliverables were rejected and resubmitted at a later date.

All deliverables of Year 2 have been submitted on time, apart from D5.2 which was submitted with 3 days of delay.

During the second year review, which was held in Jerez de la Frontera, Spain, on the 16th of June 2016, the following deliverables were conditionally approved and they have been resubmitted on the 29th of July: D1.3, D5.2, D6.4, D7.2, D8.4 and D8.5. Deliverable D3.4 was rejected and the consortium has been asked to resubmit a revised version by mid December 2016.

5.1 Deliverables

Del. no.	Deliverable name	Version	WP no.	Lead beneficiary	Nature	Dissemination level 1	Delivery date from Annex I	Actual delivery date	Status
D1.1	Management processes	1.0	1	SUPSI	R	PU	30.05.2014	28.05.2014	Accepted
D2.1	Use cases and early requirements	1.1	2	EIPCM	R	PU	30.11.2014	05.12.2014	Accepted
D2.2	Final requirements	2.0	2	EIPCM	R	PU	31.03.2015	31.03.2015	Accepted
D3.1	Databases of user information	3.1	3	POLIMI	R	CO	30.09.2014	31.05.2015	Resubmitted
D3.2	First user behavior models	2.1	3	SUPSI	R	PU	31.12.2014	02.06.2015	Accepted
D4.1	First social game and implicit user information techniques	1.7	4	MOONSUB	R +O	PU	31.12.2014	12.12.2014	Accepted
D5.1	Review of pricing instruments	2.4	5	UoM	R	PU	31.03.2015	31.03.2015	Accepted

1 Please indicate the dissemination level using one of the following codes:
PU = Public
PP = Restricted to other programme participants (including the Commission Services).
RE = Restricted to a group specified by the consortium (including the Commission Services).
CO = Confidential, only for members of the consortium (including the Commission Services).

D6.1	Delivery management plan and testing specification	1.7	6	SETMOB	R	PU	30.09.2014	30.09.2014	Accepted
D6.2	Platform architecture - initial architecture design	3.2	6	POLIMI	R	PU	31.12.2014	02.06.2015	Accepted
D6.3	Platform Implementation and Integration - initial prototype	2.2	6	SETMOB	O	PU	31.03.2015	30.03.2015	Accepted
D7.1	Validation methodology	1.1	7	TWUL	R	PU	31.03.2015	31.03.2015	Accepted
D8.1	Early exploitation plan	9.1	8	POLIMI	R	RE	30.09.2014	02.06.2015	Accepted
D8.2	Technology watch report	1.1	8	POLIMI	R	RE	31.03.2015	31.03.2015	Accepted
D8.3	Standards and open data report	1.1	8	SUPSI	R	PU	31.03.2015	31.05.2015	Resubmitted
D9.1	Dissemination tools and materials	1.0	9	POLIMI	R	PU	31.08.2014	05.09.2014	Accepted
D9.2	First dissemination report	1.1	9	SUPSI	R	PU	31.03.2015	31.03.2015	Accepted
D1.3	Second year report	1.0	1	SUPSI	R	RE	31.03.2016	29.07.2016	Submitted
D2.3	Functional specifications	1.2	2	SETMOB	R	PU	30.09.2015	30.09.2015	Accepted
D3.3	First prototype of ABM simulator	1.0	3	SUPSI	O	PU	30.09.2015	30.09.2015	Accepted
D3.4	Final user behavior models and ABM platform	1.0	3	SUPSI	R	PU	31.03.2016	31.03.2016	Rejected

D4.2	First social network analysis trust and people search techniques	1.1	4	POLIMI	R	PU	30.06.2015	30.06.2015	Accepted
D4.3	Incentive models and algorithms	1.2	4	POLIMI	R	PU	31.03.2016	31.03.2016	Accepted
D5.2	Developing new dynamic pricing mechanisms	1.7	5	UoM	R	RE	31.07.2015	29.07.2016	Submitted
D6.4	Platform Implementation and integration – second prototype	2.0	6	SETMOB	O	PU	31.03.2016	29.07.2016	Submitted
D7.2	Validation Report	1.0	7	SES	R	PU	31.03.2016	29.07.2016	Submitted
D8.4	Intermediate Exploitation Plan	3.0	8	POLIMI	R	RE	30.09.2015	29.07.2015	Submitted
D8.5	Business Ecosystems Report	1.0	8	TWUL	R	PU	31.03.2016	29.07.2016	Submitted
D9.3	Second Dissemination Report	1.0	9	SUPSI	R	PU	31.03.2016	31.03.2016	Accepted

5.2 Milestones

Milestone number	Milestone name	Work package no	Lead beneficiary	Delivery date from Annex I	Achieved Yes/No	Actual /Forecasted achievement date	Comments
MS1	Kickoff meeting, planning and mobilisation	1	SUPSI	30.06.2014	Yes	22.05.2014	Meeting has taken place
MS2	Project start info released to the media	9	SUPSI	30.06.2014	Yes	22.05.2014	Various press releases have been published
MS3	Initial techniques and algorithms for user profiling accepted	3	SUPSI	31.12.2014	Yes	31.12.2014	D3.2 finalised and shared with the partners
MS4	First annual meeting	1	SUPSI	31.03.2015	Yes	27.10.2014	The general first meeting is held in Reading (UK)
MS5	Requirements available and accepted	2	EIPCM	31.03.2015	Yes	31.03.2015	D2.2 finalised and shared with the partners
MS6	Initial techniques and algorithms for social interaction accepted	4	POLIMI	31.03.2015	Yes	31.03.2015	D4.1 finalised and shared with the partners
MS7	R1 initial release of the platform	6	SETMOB	31.03.2015	Yes	18.03.2015	A first prototype, connected to live data, is shared with the partners.
MS8	Standards and open data report available	8	SUPSI	31.03.2015	Yes	31.03.2015	D8.3 published
MS9	SmartH2O social	9	POLIMI	31.03.2015	Yes	31.05.2015	The app was ready, but its launch was

	awareness app launched						postponed to the time when the test sites will be activated (May 15)
MS10	Major dynamic pricing mechanisms identified	5	UoM	31.05.205	Yes	31.05.2015	D5.1 is released internally and submitted to the Commission.
MS11	Functional specifications published	2	EIPCM	30.09.2015	Yes	30.09.2015	D2.3 is released internally and submitted to the Commission.
MS12	R2 second release of the platform	6	SETMOB	30.09.2015	Yes	30.09.2015	A prototype of the platform has been released (documented in D6.3.1)
MS13	Second annual meeting	1	SUPSI	31.03.2016	Yes	14.06.2016	The meeting was held in Jerez, Spain, before the review.
MS14	User behaviour models ready	3	SUPSI	31.03.2016	Yes	31.03.2016	D3.4 is released internally and submitted to the Commission
MS15	R3 third release of the platform	6	SETMOB	31.03.2016	Yes	31.03.2016	A tested version of the platform is made available deployment. The third release corresponds to the 2nd prototype.
MS16	SmartH2O Apps deployed	7	SETMOB	31.03.2016	Yes	01.05.2016	The advanced version of the SmartH2O portal is

							deployed in both the Swiss and Spanish case studies
MS17	Business ecosystem planning	8	TWUL	31.03.2016	Yes	31.03.2016	Deliverable D8.5 is released

6. Explanation of the use of resources and financial statements

The financial statements have to be provided within the Forms C for each beneficiary (if Special Clause 10 applies to your Grant Agreement, a separate financial statement is provided for each third party as well) together with a summary financial report which consolidates the claimed Community contribution of all the beneficiaries in an aggregate form, based on the information provided in Form C (Annex VI of the Grant Agreement) by each beneficiary.

The "Explanation of use of resources" requested in the Grant Agreement for personnel costs, subcontracting, any major costs (ex: purchase of important equipment, travel costs, large consumable items) and indirect costs, have now to be done within the Forms (user guides are accessible within the Participant Portal)10.

When applicable, certificates on financial statements shall be submitted by the concerned beneficiaries according to Article II.4.4 of the Grant Agreement.

Besides the electronic submission, Forms C as well as certificates (if applicable), have to be signed and sent in parallel by post.