PERIODIC PROJECT REPORT

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1.1	22/6/2017	Corrections in resource reporting after review in order to harmonise with NEF. A new section 3.1.2 has been added to detail the resource spending for Y3 only.	A.Rizzoli

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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: 30/05/2017

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. 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 been launched in the Swiss case study, and preparation work has been made for the launch in the Spanish case study.

The third year has seen the SmartH2O project being active on various fronts. On one side it has seen the finalisation of the studies on innovative pricing schemes, with the conclusion of the report on the design of dynamic scarcity pricing schemes, supported by the experimental economics testing of the pricing schemes. At the same time, the project has finalised the research on how user communities can be identified by the use of social media for raising water awareness. This result was also complemented by the release of the social gaming part of the SmartH2O platform: a hybrid gaming solution which includes a gamified version of the SmartH2O platform, integrated with the board game Drop!The Question and its online counterpart. All of this allowed the final testing of the platform in the two real world case studies, where water savings in the order of 10 to 20% have been observed for SmartH2O users.

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.

In the **third year**, WP1 performed the typical management activities related to continuous monitoring and reporting of activities. The main activities have been focussed in the preparation of the third year report (D1.4) and the final project report (D1.5).

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).

The WP finished in the second year and it was **not active in the third year**.

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).

In the **third year** this work package was not active.

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*.

In the **third year** task **T 4.2** Social Network Data Collection and Analysis and task **T 4.3**Analysis of community roles and trust and people search continued the capture and analysis of social media data and the analysis of behavioural roles and influential users. Social media content has been used to search for materials useful to enrich the tips section of the Consumer Portal and the trivia questions of the Drop! The question Trivia game. The developed social network analysis methods, focused on the analysis of Twitter behavioral roles, and the results of their application in the two case studies (Thames Water with 6,3 million tweets; Valencia metropolitan region with 5 million tweets) were extensively examined and documented. Behavioural role analysis from Twitter communities was performed for the Spanish case study (Valencia).

The results of the behavioural role analysis in the Spanish pilot confirmed the results of the first case study, thus demonstrating the validity of the developed model and method for behavioural role analysis on Twitter. The developed method has been integrated as a software component of the SmartH2O platform (the SmartH2O Social Network Crawler and Data Analyzer) with an easy-to-use user interface (the Social Dashboard). The obtained results suggest that the proposed method for analysis of behavioural roles in Twitter can identify a set of user types (and corresponding users) that can support targeted Twitter communication campaigns by identifying relevant user groups in a more varied way than existing single-mode influencer approaches.

Accordingly, the developed behavioural role analysis approach and its implementation in the SmartH2O Social Dashboard are useful for water utilities that want to set up a targeted communication campaign based on users' social media behavior. The developed approach, the underlying metrics, the dataset crawled, the technical realization and the achieved results have been documented in *D4.5 Final social network analysis trust & people search techniques.*

The implemented SmartH2O incentive system was refined and assessed by analyzing the user activity logs of the gamified portal in the Swiss and Spanish case study, and by collecting user feedback via online questionnaires (**T4.4**[1]). The engagement model was refined by including social sharing features allowing users can share their status and achievements on external social networks (Twitter, Facebook, e-mail), leveraging well-known social reinforcement mechanisms. The results were documented in D4.4 *Final social game and implicit user information techniques*. The obtained results have shown that both user feedback and user behavior confirm the appropriateness of the designed SmartH2O incentive model and its implementation. Users valued the balance that was sought between usefulness ('pragmatic quality') and fun-of-use ('hedonic quality'), and they proved to use both consumption feedback functionalities and the game elements (e.g. leaderboard, gamification status sidebar).

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, and tests them through experimental economics.

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

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[1] Note that T4.4 duration till M24 is an error in the Gantt, as T4.4 produces D4.4, so duration of T4.4 was changed to M30 to correspond with D4.4.

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 is to be reported in Y3 in deliverables **D5.3** Integrated water supply-demand modelling including dynamic pricing and **D5.4** Experimental economics-based tests of pricing policies.

In the **third year** WP5 finished the activities on tasks **T5.2** by revising deliverable **D5.2** Developing new dynamic pricing mechanisms (M16). Activities have then focused on tasks **T5.3** and **T5.4**. Each task exactly corresponds to one deliverable, **D5.3** and **D5.4** respectively. In **T5.3**, work on scarcity indicator has enabled to identify a universal economic indicator of water scarcity, the marginal resource opportunity cost (MROC). This indicator has then been related to scarcity pricing, to propose a working definition of what marginal prices a dynamic water tariff should propose to residential users as the scarcity situation evolves in a river basin. This working definition was then applied to two project case-studies, both relevant for their acute present (Valencia) or future (London) scarcity problems. The case-studies were contrasted so as to ensure they would explore different aspects of scarcity pricing. In Valencia, current pressures on water availability in a basin dominated by agricultural use, and current implementation of increasing block tariffs IBT, led to study how this IBT could be made dynamic depending on reservoir levels, with a focus on revenue sufficiency during droughts for the Valencia utility. In London, scarcity is expected to increase due to climate change, but mostly due to population growth. A forward-looking study of what residential water prices should be to reflect shifting scarcity levels has been implemented. Owing to the large uncertainties, it is an exploratory works focusing on a range of parameters, to determine in which condition can protect valuable environmental flows in the Thames basin. In **T5.4**, the work on experimental testing of tariffs has been continued despite the utilities' reluctance, justified by public relations and image issues, to engage with trials of dynamic tariffs. The aims of these experimental activities were to test whether price changes could have a discernible effect on consumption, and whether this effect was only due to the price, or also to the change (increase) in price. In addition, we were interested in learning whether the response could be magnified by associating price increases with other demand management strategies (e.g. drought awareness campaigns). To that end, in that task, 1) the questionnaire, already rolled out in Ticino, was also rolled out in Valencia, and the results analysed, and 2) an online experiment was designed and rolled out, where respondents had to answer experimental (i.e. paid depending on response) questions on shower time, besides responding questions similar to that of the questionnaire (to provide material for analysing results). Results were then analysed to address the questions identified as central in the task.

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 were active**. T6.1** had the main role of monitoring the compliance to the overall delivery plan. 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. (**T6.66**). 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.

In the **third year**, **T6.3** (Implementation of the SmartH2O platform) released the Final prototype of the SmartH2O platform and deployed it following an evolutionary scenario in the Swiss case study (Locarno, Switzerland) and in the Spanish case study (Valencia, Spain).

D6.2 (Platform architecture and design) as the outcome of **T6.2** (Architectural design of the SmartH2O platform) has been continuously observed as a living document while providing the most suited architecture design for SmartH2O component integration to the water companies IT platforms already in place. **T6.5** (Platform management and data distribution) performed the activities for providing and deploying SmartH2O platform for cloud.

As specified in the DoW and detailed in **T6.1** (Delivery management plan and testing specification) the final release of the SmartH2O platform developed within T6.5 (Platform Implementation and Integration - Final prototype) provided the water utilities an Administrative portal to evaluate the impact of policy changes and examine historical data on the performance of the consumers while the end users have been provided with a Customer portal as an effective complement to the SmartH2O solution including the gamification features.

During the process of SmartH2O platform implementation, software quality metrics have been put into practice to monitor and assess the quality of the software developments. D6.6 (SW Quality assessment report) as the outcome of **T6.4** (Testing and quality assessment) summarizes the quality aspects of the developed software, the findings of the code verification and application testing procedures which have been used during the development of the platform, the metrics used to assess the overall quality, usability and reliability of the platform.

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.

In **Year 1** this WP was not planned to be active, but expected to start in year 2. Yet, 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**.

In **Year 2** The validation methodology released in year 1 (*D7.1 Validation plan*) has been refined (**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*.

In **Year 3** the pilot trial of the SmartH2O was continued in the Swiss case study (**T7.2**) and started and concluded in the Spanish case (**T7.3**).

The small-scale Swiss study that was set up to iteratively develop and test the application and the measurement infrastructure continued to run. For the evaluation data were collected on water consumption, portal usage, user feedback and water consumption awareness. Results demonstrated a 9.92% consumption decrease, compared to a 5.83% decrease for users in the same area who did not use the SmartH2O portal. Consistently with earlier deliverables (e.g. D7.2, D4.4), user feedback was positive, while the log analyses revealed much higher activity of the gamified version than of the basic portal, providing indications for the effectiveness of the gamified incentive model. The detailed results have been documented in *D7.3 Final overall validation and impact report*. This small-scale trial primarily served as a real-world test of the portal before the large roll-out in the Spanish pilot, thus the major focus of activities in this work package in Y3 was on the deployment and evaluation of the larger scale Spanish pilot (**T7.3**, **T7.4**).

The SmartH2O portal was successfully deployed in the Spanish pilot (**T7.3**). Thanks to the performed promotion campaigns, this pilot achieved 508 registered users and was performed in line with the validation methodology described in D7.1, employing a mixed repeated measures (baseline vs. observation) and between-subjects (control group vs. SmartH2O group) design. Data were collected on water consumption, portal usage, user feedback and water consumption awareness. Achieved results revealed a 21% decrease in consumption for SmartH2O users relative to the control group. User feedback and awareness measures were also very positive on the technology acceptance measures and water consumption awareness measures assessed. The results have also explicitly confirmed the suitability of the system design, showing that the main system functionalities (consumption chart and overview, the tips, self-setting goals, and the water consumption alerts) increased user motivation to save water and think about water consumption (for 75% of respondents). The log analysis demonstrated substantially higher activity levels when compared to the usage of the pre-existing EMIVASA customer portal. SmartH2O users logged close to five times a month for SmartH2O, while 97% of the users of the standard EMIVASA Virtual Office logged in less than once a month. More specifically: 43% of SmartH2O users log in every month or more, while 11% even uses the system on a weekly basis. Additionally, the mobile app further sparked the use of the most important features, sometimes doubling the frequency with which they were used. Also, significant correlations of the use of all main SmartH2O functions with the decrease in consumption were found for both the use of water-related features (e.g. water consumption chart and pipe overview) and the gamification features (e.g. the leaderboard views). This further confirmed the suitability of the SmartH2O system design, demonstrating that the portal not only yields positive customer responses, but actually induces a change in behaviour.

The detailed results for both the Spanish case study and the Swiss case study were documented in *D7.3 Final overall validation and impact report*, including an assessment of the overall project KPI's The detailed results were documented in *D7.3 Final overall validation and impact 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").

In the **third year, T8.1** (Technology and market watch) continued to observe the water technology market, as well as the industry regulations detailed by **T8.2** (Regulation watch). Updates on evolving standards for new embedded modules capable of transmitting water consumption information have been recorded within **T8.5** (Open Data and standards).

The main focus of WP8 in the final year of the project was the business development (**T8.4** Business Technology Ecosystem). This materialized into the consolidation of the final exploitation plans of each business developing partner, presented in *D8.6 Final exploitation plans* as well as in a series of concrete business actions performed by the interested partners. In the final year of WP8, the most important outcome of the business development action was the agreement between SETMOB and WEBRATIO to form a joint venture for selling SmartH2O platform and Smart Meter Data Manager software component. D8.6 lists some of the business opportunities that are being pursued with potential adopters of the SmartH2O platform both by means of joint actions of some of the partners as well as with targeted individual approaches.

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.

In the **third year** of activity, WP9 continued performing several dissemination activities targeting different audiences through the communication channels set up in the previous years (D9.4 Final Dissemination Report). WP9 made a large use of social media, complementing the standard website communications with Twitter, LinkedIn, and Slideshare: the SmartH2O twitter account has more than 700 followers and produced more than 1500 tweets; the SmartH2O Innovation Community involves 279 members; the SmartH2O Slideshare account counts 21 presentations and almost 48,000 views. At the same time, WP9 was active in the scientific dissemination of the project results, including 10 journal papers published during the project lifetime, along with more than 30 contributions to international conferences and workshops.

During the **third year** of activity, WP9 also organized the SmartH2O Summer School on “Smart Systems for Water Management – Modelling, Simulation, Analytics and ICT for Behavioral Change”, held on August 22-25, 2016 at Monte Verità (Switzerland), which involved several international speakers and participants. The topics discussed during the school are expected to contribute to the associated Thematic Issue on Urban Water Demand Management hosted by Environmental Modelling & Software journal. In addition, the final dissemination event of the

SmartH2O project took place in March 2017 during the WaterWise Annual Water Efficiency, the premier event for showcasing water efficiency in the UK where all the major players in the UK water sector are present, including the private water utilities but also regulatory agencies tackling with water and environmental issues.

1.3 Expected final results and potential impact and use

The expected final result of the SmartH2O project is 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 enables 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, maximising 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.	Scientific Coordinator, lead of WP4. POLIMI will also be involved in other

Name	Cty	Background / expertise / skills	Role
		Water Economics	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, 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	Lead WP2. Major involvement in WP4. Active contribution in

Name	Cty	Background / expertise / skills	Role
		ecosystems enabling organizations, industry and society at large to take advantage of new participatory forms of content and media creation, delivery and utilization.	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.

2.1 Work package 1 - Management and coordination

The objectives of WP1 in the third 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 work package was not active in the third year.

2.3 Work package 3 - User modelling

- The work package was not active in the third year.

2.4 Work package 4 - Saving water by social awareness

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

- perform an analysis of the data collected through the SmartH2O social game and assessment of the adopted incentive system;
- deliver the final implementation of the user experience provided by the social games, as resulting from the feedback collected during usage;
- present the final results of the analysis of the social networks and user's behaviour, describing the methods and tools developed/adopted in SmartH2O to identify, analyse, and model the social network of water consumers, based on the experience and data of the two case studies. It describes the user community with the identified structure of relationship and roles.
- presents the lessons learnt and recommendations providing a comparative analysis of the two water user communities and identification of the most effective leverage to stimulate water use change.

2.5 Work package 5 - Saving water by dynamic water pricing

The objectives of WP5 in the third year of the project were:

- integrate water supply-demand modelling including dynamic pricing, using water scarcity indicators;

- analyse how water scarcity indicators they can trigger different pricing schemes;
- make a comparative analysis of the water demand estimated by running the econometric water demand models against the baseline;
- report on the assessment of pricing schemes evaluation exercise: analysis of the data and feedback collected during the experiment and final assessment of the water pricing schemes

2.6 Work package 6 - Platform implementation and integration

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

- Release the final prototype of the SmartH2O platform;
- Release the API for the web services of the SmartH2O platform;
- Publish the Software Development Kit required to developand expand the platform, thus allowing the installation of the public software artefacts by third parties;
- Issue the Software Quality assessment report, which provides metrics to assess the overall quality, usability and reliability of the platform

2.7 Work package 7 - SmartH2O Validation

The objectives of WP7 for year three were:

- make a final validation of the impact of the SmartH2O platform in the case studies;
- analyse the different KPIs over the whole validation period and make a critical assessment of the impact achieved by the SmartH2O platform,
- identify strengths and weaknesses, threats and opportunities, in the view of its exploitation in future applications

2.8 Work package 8 - Business Development

The objectives of this work package for the third year was to set up and deliver the final exploitation plan consolidating the plans for exploitation of each partner.

2.9 Work package 9 - Communication and dissemination

The objectives of this work package in the final year were:

- Set up a plan for the communication strategy for the project after its end, in order to preserve and value the investment.
- 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.
- Organise the SmartH2O project final event;

2.10 Recommendations from the second review

During the second review meeting, which was held in June 2016 in Jerez de la Frontera, Spain, the experts evaluated the work performed requested the Consortium to resubmit the rejected deliverable D3.4 (Final user behaviour models and ABM platform). The reviewers' comments was:

> "The delay in the work already done is likely due to the late joining of EMIVASA to the consortium, however, as the testing and validation of the behaviour of EMIVASA consumers will be done in the beginning of third year an update of D3.4 is required because results collected may influence the outcomes of this deliverable (e.g. Section 4 and 5). It is not sufficient to present these in the future WP7 deliverables. Current progress of the corresponding work is estimated at the level of 70%".

The reviewers also asked to resubmit the preliminary approved deliverables D1.3, D5.2, D6.3.1 and D6.4, D7.2 and D8.4.

Finally, the reviewers asked to providing missing information, in particular:

- detailed use of resources (per partner, per work package),
- explain the role of TWUL and new partners added to the consortium,
- more detailed comments on the validation results achieved so far and their consequences to the whole project, in particular issues with water consumption disaggregation and surprisingly low daily consumption rates reported in Swiss pilot.

The consortium has addressed all comments in a detailed document which accompanied the resubmission of the preliminary accepted deliverables on the 28th of July 2016. The document is reported Appendix 1 and it is also available at this link: https://docs.google.com/document/d/1HlukFRRJFCJArGTx0-ncagH_2l7rd06sSBa6hRPU7-k/edit?usp=sharing

Deliverable D3.4 has been resubmitted end of November 2016, according to the agreement with the Project officer, and it includes the validation data for the Spanish case study.

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.

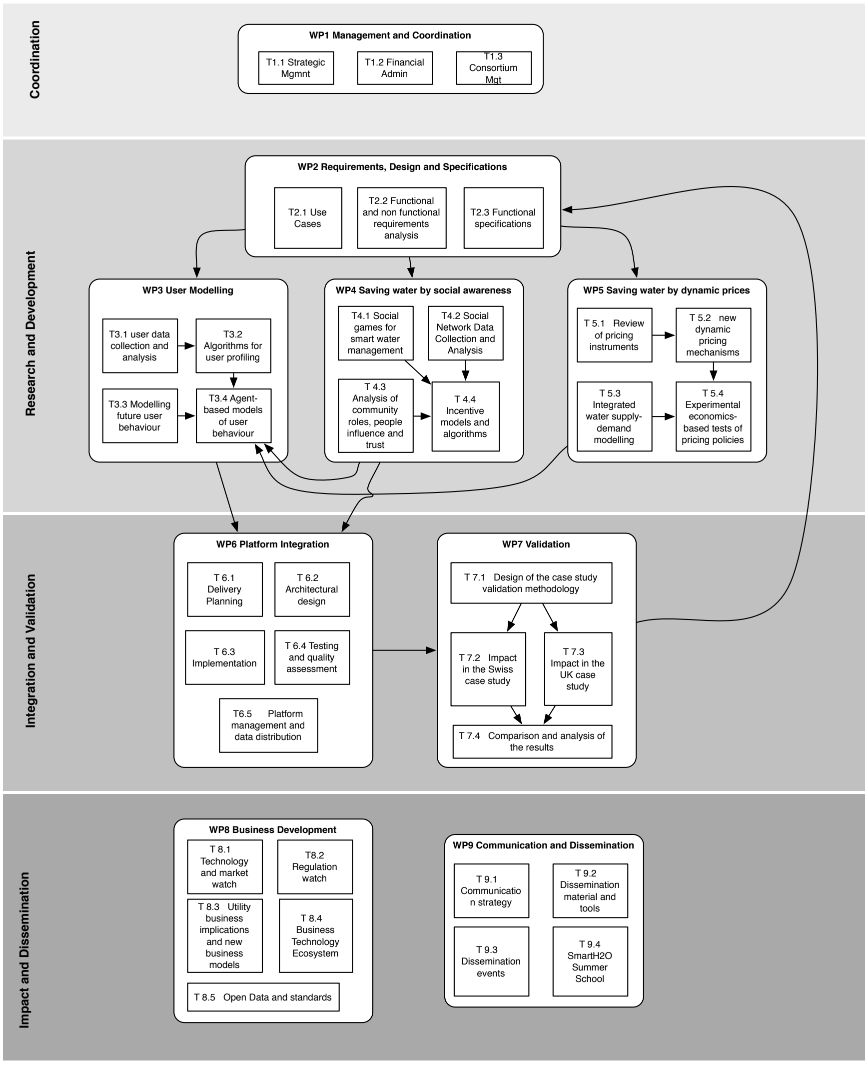

Figure 1. The PERT diagram of the SmartH2O workpackages.

Table 1. Overview of resource usage.

	Year 1		Year 2		Year3		Total		
	Allocated	**Used**	**Allocated**	**Used**	**Allocated**	**Used**	**Allocated**	**Used**	**% used**
SUPSI	25.00	24.75	21.25	19.61	18.50	25.34	64.00	69.70	109%
POLIMI	33.50	33.45	33.50	40.37	33.05	48.46	100.00	122.28	122%
UoM	13.25	13.25	15.50	12.30	17.25	21.70	46.00	47.25	103%
SETMOB	28.75	16.00	22.05	29.87	27.50	32.08	66.50	77.95	117%
EIPCM	21.75	15.34	20.45	22.20	12.80	16.11	50.00	53.65	107%
TWUL	12.25	5.33	1.85	0.00	5.50	0.00	12.50	5.33	43%
SES	4.50	6.41	6.20	5.20	6.25	6.25	18.00	17.86	99%
MOONSUB	10.25	11.50	10.50	11.25	8.75	7.00	29.00	29.75	103%
EMIVASA	0.00	0	7.75	7.75	7.00	7.30	14.25	15.05	106%
UPV	0.00	0	5.75	3.29	5.00	10.72	10.75	14.01	130%
Total	149.25	126.03	144.80	151.84	141.60	174.96	411.0	452.83	110%

Resource usage was 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. No single partner has deviated for more than 20% from its planned resource allocation, apart from TWUL, who was unable to take part in the second and the third year of the project. TWUL has still dedicated some resources to the project in this period, but these efforts have not been officially documented and no financial claim has been raised.

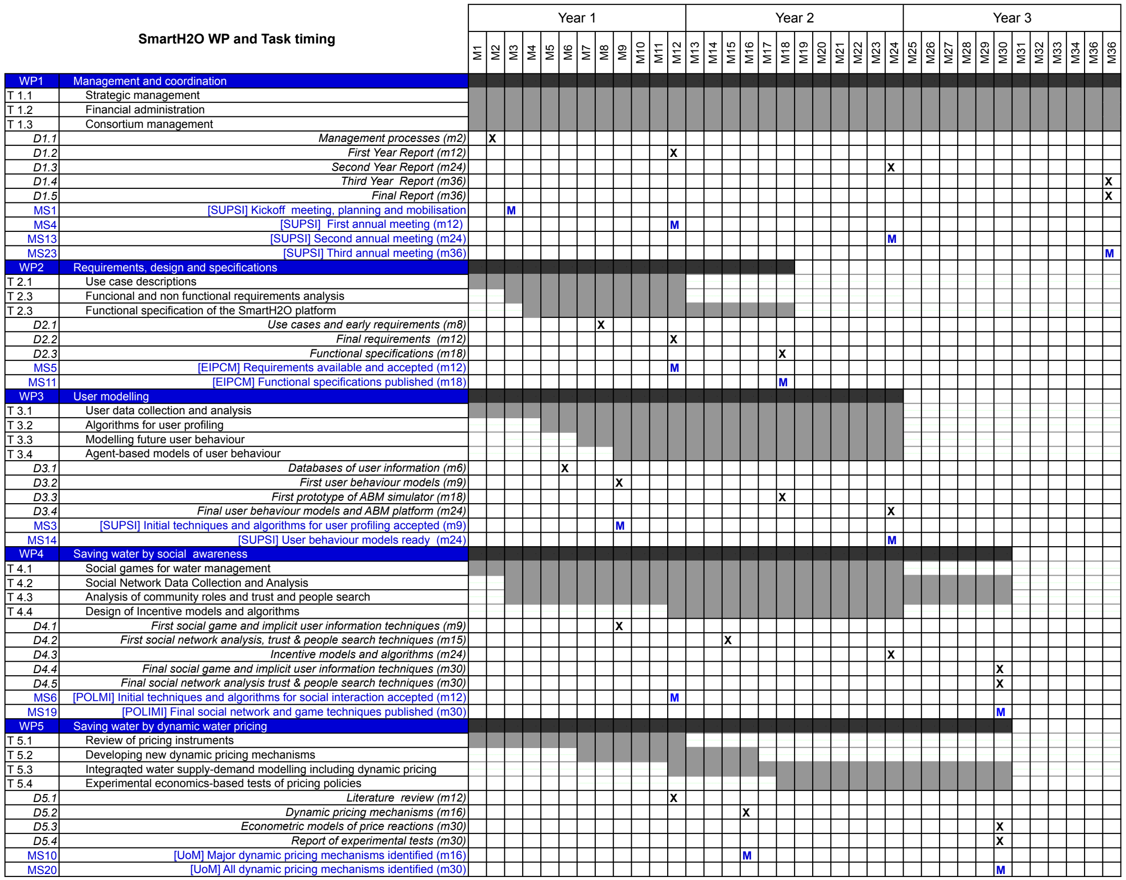

Figure 2. Gantt diagram for WP 1 to 5.

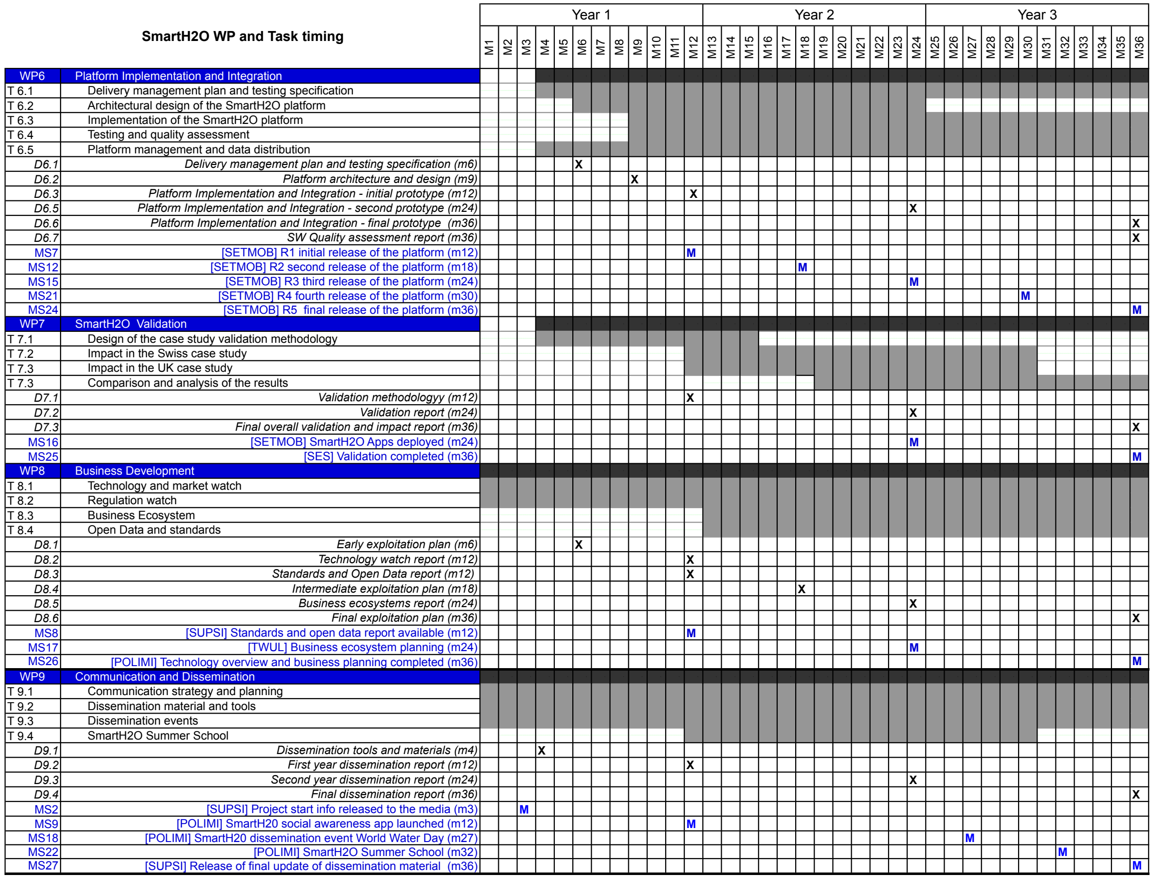

Figure 3. Gantt diagram for WPs from 6 to 9.

3.1.1 Resource usage per partner per work package per deliverable – period 1, period 2 and period 3

In the following tables we report, for each work package, the cumulative amount of resources used by each partner during the first three years 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. Deviations from planning are discussed in the specific workpackage sections.

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

WP1	Deliverable	Lead	SUPSI	POLIMI	UoM	SETMOB	EIPCM	TWUL	SES	MOONSUB	UPV	EMIVASA	Total	Allocated	Delta
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	4.20	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	2.60	0.58	0.25	0.25	0.25	0.00	0.25	0.25	0.26	0.25	4.94	4.75	-0.19
D1.5	Final project report	SUPSI	5.70	1.38	0.00	0.24	0.23	0.00	0.30	0.25	0.26	0.25	8.61	8.30	-0.31
		Actual	14.30	3.19	0.75	0.99	0.94	0.25	1.01	1.00	0.77	0.75	23.95	23.50	-0.45
		Planned	14.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	0.75	0.75	23.50		

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

WP2	Deliverable	Lead	SUPSI	POLIM I	UoM	SETMO B	EIPC M	TWU L	SES	MOONSU B	UPV	EMIVAS A	Total	Allocate d	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
		Actual	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
		Planned	4.00	3.00	2.00	6.00	10.00	1.00	1.00	2.00	0.00	0.50	29.50		

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

WP3	Deliverable	Lead	SUPSI	POLIMI	UoM	SETMOB	EIPCM	TWUL	SES	MOONSUB	UPV	EMIVASA	Total	Allocated	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
		Actual	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
		Planned	20.00	20.00	2.00	0.00	0.50	1.50	1.00	0.00	2.00	0.00	47.00		

The leftover effort in this WP is mainly due to the rejection of deliverable D3.4, which was then resubmitted. The amount of work which was not accepted for D3.4 amounted to 4.77 PM. As D3.4 was accepted in Y3 the concerned partners have entered an adjustment in the financial reporting tool, but this adjustment concerns Year 2.

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

WP4	Deliverable	Lead	SUPSI	POLIMI	UoM	SETMOB	EIPCM	TWUL	SES	MOONSUB	UPV	EMIVASA	Total	Allocated	Delta
D4.1	First social game and implicit user information techniques	MOONSUB	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	1.62	7.92	0.00	2.36	2.72	0.00	0.00	1.50	0.00	0.00	16.12	12.00	-4.12
D4.5	Final social network analysis trust & people search techniques	POLIMI	2.80	6.40	0.00	2.95	4.04	0.00	0.00	0.00	0.00	0.00	16.19	11.65	-4.54
		Actual	5.52	24.66	0.00	6.81	15.36	0.00	0.50	8.50	0.00	0.00	61.35	53.00	-8.35
		Planned	4.50	20.00	0.00	6.00	14.00	0.00	0.50	8.00	0.00	0.00	53.00		

A moderate excess of effort use (10%) has occurred in this WP mostly because of the extra work done in the third year, which also produced a mobile version of the SmartH2O platform, and this impacted the design of the social gaming part. Part of it is also due to the use of junior personnel in parts of the work.

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	0.50	0.00	0.00	0.00	0.00	9.07	8.55	-0.52
D5.2	Developing new dynamic pricing mechanisms	UoM	2.00	4.82	5.30	0.00	0.96	0.50	0.00	0.00	0.00	0.00	13.58	15.00	1.42
D5.3	Integrated water supply-demand modelling including dynamic pricing	UoM	2.20	5.98	7.70	0.00	0.00	0.00	0.00	0.00	2.79	0.00	18.67	13.00	-5.67
D5.4	Experimental economics-based tests of pricing policies	UoM	1.90	4.97	7.75	0.00	0.00	0.00	0.50	0.00	2.21	0.00	17.33	15.45	-1.88
		Actual	6.10	18.34	26.75	0.00	0.96	1.00	0.50	0.00	5.00	0.00	58.65	52.00	-6.65
		Planned	4.50	17.00	25.00	0.00	1.00	2.00	0.50	0.00	2.00	0.00	52.00		

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

WP6	Deliverable	Lead	SUPSI	POLIMI	UoM	SETMOB	EIPCM	TWUL	SES	MOONSUB	UPV	EMIVASA	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	1.11	0.00	10.62	0.92	0.00	1.00	2.00	0.00	1.10	16.75	13.50	-3.25
D6.6	SW Quality assessment report	POLIMI	0.00	4.00	0.00	8.26	0.63	0.00	0.00	0.00	0.00	0.00	12.89	10.00	-2.89
		Actual	3.00	9.68	0.00	46.23	3.72	0.58	1.95	6.00	0.00	2.10	73.26	59.00	-14.26
		Planned	3.00	6.00	0.00	37.00	2.50	0.50	2.00	6.00	0.00	2.00	59.00		

For the Reporting Period 2 (01/04/2015-31/03/2016), following the assessment of the re-submitted deliverables, D6.4 has been accepted, but with a rejection of 12,253 euros as it was considered that D6.4 was overcharged with direct and indirect costs. This rejection is the equivalent of 5.36 PM for SETMOB.

In the following we explain the facts, both objective and subjective that led to this outcome.

From technical point of view, during the second project year, we had to apply changes to the initial approach of the software development technology, as the initial software stack based on Big Data technology running on Linux (Apache Hadoop, Pig, Oozie, Ambari) had to be migrated on a Windows environment made available by EMIVASA in the Spanish case-study. This fact alone required extra development effort for EMIVASA integration.

Also, from a technical perspective, SOAP web services exposed by Emivasa had to be enveloped in pre-developed REST services leading to a necessary effort to adapt the service interfaces.

From financial point of view, the initial unit cost of a PM estimated in the budget was 2,500 Euro. This allowed hiring only junior personnel during the project development (Y2 and Y3) because of the Romanian market condition changes, i.e. the increase of average fees of the IT experts to a higher level than the budgeted one. This led to using junior personnel and subsequently spending more time (PMs) instead of hiring senior personnel and overspending in terms of spending money. So, there was a need of spending more effort with junior personnel to fully achieve the objectives and remain in the budget limit. The use of senior personnel would have led to an exceed of the budget.

The reason for exceeding the number of PM consists of the fact that we did the project task by using junior programmers. Therefore we had to register more working hours at a lower cost than the cost of the budgeted PM. We have not overrun the budget in terms of spent money (in fact we did a saving) but we have overrun the number of budgeted PMs for this deliverable. Below, we present a table with the number of PMs spent in Year 2 and Year 3 for tasks under WP6.

YEAR	DELIVERABLE	No. of PM
Y2	D 6.4 Platform implementation and integration – second prototype	14,80
Y3	D 6.5 Platform Implementation and Integration - final prototype	10,62
Y3	D 6.6 SW Quality assessment report	8,26
TOTAL		33,68

As conclusion: SETMOB worked with persons that cost less than the average budgeted PM so we registered more effort, but the budget in term of spent money is unchanged.

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

WP7	Deliverable	Lead	SUPSI	POLIMI	UoM	SETMOB	EIPCM	TWUL	SES	MOONSUB	UPV	EMIVASA	Total	Allocated	Delta
D7.1	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	26.09	23.25	-2.84
D7.3	Final overall validation and impact report	POLIMI	5.20	10.19	3.50	3.28	2.63	0.00	3.00	1.50	1.45	5.10	35.85	34.85	-1.00
		Actual	8.20	19.08	6.00	5.68	5.73	1.00	9.00	4.50	2.45	9.60	71.24	68.50	-2.74
		Planned	6.00	18.00	6.00	6.00	5.00	2.50	8.00	6.00	2.00	9.00	68.50		

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

WP8	Deliverable	Lead	SUPSI	POLIMI	UoM	SETMOB	EIPCM	TWUL	SES	MOONSUB	UPV	EMIVASA	Total	Allocated	Delta
D8.1	Early exploitation plan	POLIMI	1.00	0.25	0.50	1.20	0.18	0.26	0.15	0.00	0.00	0.00	3.54	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	TWUL	0.50	0.20	2.50	2.62	1.35	0.30	0.50	1.50	1.04	1.00	11.51	11.15	-0.36
D8.6	Final exploitation plan	SETMOB	1.60	3.10	1.75	3.53	1.08	0.00	0.80	1.00	1.88	0.00	14.74	10.30	-4.44
		Actual	5.10	14.27	6.00	9.31	5.43	1.11	2.20	4.75	2.92	1.00	52.09	44.50	-7.59
		Planned	4.00	8.00	6.00	8.50	6.00	3.00	2.00	4.00	2.00	1.00	44.50		

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

WP9	Deliverable	Lead	SUPSI	POLIMI	UoM	SETMOB	EIPCM	TWUL	SES	MOONSUB	UPV	EMIVASA	Total	Allocated	Delta
D9.1	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	8.95	-1.27
D9.4	Final dissemination report	SUPSI	1.72	2.83	0.75	0.59	3.61	0.00	0.40	0.50	1.87	0.60	12.87	8.55	-4.32
		Actual	4.72	8.47	4.00	2.44	11.52	0.11	1.00	2.00	2.87	1.10	38.23	33.00	-5.23
		Planned	4.00	6.00	4.00	2.00	10.00	1.00	1.00	2.00	2.00	1.00	33.00		

3.1.2 Resource usage per partner per work package per deliverable – only period 3

In the following tables we report, for each work package, the amount of resources used by each partner during the last year of the project, as allocated to each deliverable. The PMs of 3rd parties (WEBRATIO for POLIMI, and AdV for EMIVASA) are mentioned in brackets in the linked parties columns. Deviations from planning are discussed in the specific workpackage sections. WP2 and WP3 are not included as they were not active in Year 3.

Table 11. Resource usage per partner per deliverable for WP1 Year 3

WP1	Deliverable	Lead	SUPSI	POLIMI	UoM	SETMOB	EIPCM	TWUL	SES	MOONS UB	UPV	EMIVASA	Total	Allocated	Delta
D1.4	Third year project report	SUPSI	2.60	0.58	0.25	0.25	0.25	0.00	0.25	0.25	0.26	0.25 Tot (0.10 AdV)	4.94	4.75	-0.19
D1.5	Final project report	SUPSI	5.70	1.38	0.00	0.24	0.23	0.00	0.30	0.25	0.26	0.25 Tot (0.07 AdV)	8.61	8.30	-0.31
		Actual	8.30	1.96	0.25	0.49	0.48	0.00	0.55	0.50	0.52	0.50	13.55	13.05	-0.50
		Planned	8.00	0.75	0.50	0.50	0.50	0.50	0.55	0.50	0.50	0.75	13.05		

Table 12. Resource usage per partner per deliverable for WP4 Year 3

WP4	Deliverable	Lead	SUPSI	POLIMI	UoM	SETMOB	EIPCM	TWUL	SES	MOONSUB	UPV	EMIVASA	Total	Allocated	Delta
D4.4	Final social game and implicit user information techniques	POLIMI	1.62	7.92 Tot (3.5 WebRatio)	0.00	2.36	2.72	0.00	0.00	1.50	0.00	0.00	16.12	12.00	-4.12
D4.5	Final social network analysis trust & people search techniques	POLIMI	2.80	6.40 Tot (4 WebRaatio)	0.00	2.95	4.04	0.00	0.00	0.00	0.00	0.00	16.19	11.65	-4.54
		Actual	4.42	14.32	0.00	5.31	6.76	0.00	0.00	1.50	0.00	0.00	32.31	23.65	-8.66
		Planned	3.00	8.15	0.00	4.50	6.00	0.00	0.00	2.00	0.00	0.00	23.65		

Table 13. Resource usage per partner per deliverable for WP5 Year 3

WP5	Deliverable	Lead	SUPSI	POLIMI	UoM	SETMOB	EIPCM	TWUL	SES	MOONSUB	UPV	EMIVASA	Total	Allocated	Delta
D5.3	Integrated water supply-demand modelling including dynamic pricing	UoM	2.20	5.98	7.70	0.00	0.00	0.00	0.00	0.00	2.79	0.00	18.67	13.00	-5.67
D5.4	Experimental economics-based tests of pricing policies	UoM	1.90	4.97	7.75	0.00	0.00	0.00	0.50	0.00	2.21	0.00	17.33	15.45	-1.88
		Actual	4.10	10.95	15.45	0.00	0.00	0.00	0.50	0.00	5.00	0.00	36.00	28.45	-7.55
		Planned	2.50	9.45	12.00	0.00	0.00	2.00	0.50	0.00	2.00	0.00	28.45		

Table 14. Resource usage per partner per deliverable for WP6 Year 3

WP6	Deliverable	Lead	SUPSI	POLIMI	UoM	SETMOB	EIPCM	TWUL	SES	MOONSUB	UPV	EMIVASA	Total	Allocated	Delta
D6.5	Platform Implementation and Integration - final prototype	SETMOB	0.00	1.11	0.00	10.62	0.92	0.00	1.00	2.00	0.00	1.10 Tot (0.14 AdV)	16.75	13.50	-3.25
D6.6	SW Quality assessment report	POLIMI	0.00	4.00	0.00	8.26	0.63	0.00	0.00	0.00	0.00	0.00	12.89	10.00	-2.89
		Actual	0.00	5.11	0.00	18.88	1.55	0.00	1.00	2.00	0.00	1.10	29.64	23.50	-6.14
		Planned	0.00	3.00	0.00	16.00	0.50	0.00	1.00	2.00	0.00	1.00	23.50		

Table 15. Resource usage per partner per deliverable for WP7 Year 3

WP7	Deliverable	Lead	SUPSI	POLIMI	UoM	SETMOB	EIPCM	TWUL	SES	MOONSUB	UPV	EMIVASA	Total	Allocated	Delta
D7.3	Final overall validation and impact report	POLIMI	5.20	10.19	3.50	3.28	2.63	0.00	3.00	1.50	1.45	5.10 Tot (1.27 AdV)	35.85	34.85	-1.00
		Actual	5.20	10.19	3.50	3.28	2.63	0.00	3.00	1.50	1.45	5.10	35.85	34.85	-1.00
		Planned	3.00	10.60	3.00	3.00	2.00	1.50	3.00	3.00	1.00	4.75	34.85		

Table 16. Resource usage per partner per deliverable for WP8 Year 3

WP8	Deliverable	Lead	SUPSI	POLIMI	UoM	SETMOB	EIPCM	TWUL	SES	MOONSUB	UPV	EMIVASA	Total	Allocated	Delta
D8.6	Final exploitation plan	SETMOB	1.60	3.10	1.75	3.53	1.08	0.00	0.80	1.00	1.88	0.00	14.74	10.30	-4.44
		Actual	1.60	3.10	1.75	3.53	1.08	0.00	0.80	1.00	1.88	0.00	14.74	10.30	-4.44
		Planned	1.00	0.10	1.00	3.00	1.40	1.00	0.80	1.00	0.50	0.50	10.30		

Table 17. Resource usage per partner per deliverable for WP9 Year 3

WP9	Deliverable	Lead	SUPSI	POLIMI	UoM	SETMOB	EIPCM	TWUL	SES	MOONSUB	UPV	EMIVASA	Total	Allocated	Delta
D9.4	Final dissemination report	SUPSI	1.72	2.83	0.75	0.59	3.61	0.00	0.40	0.50	1.87	0.60	9.89	8.55	-1.34
		Actual	1.72	2.83	0.75	0.59	3.61	0.00	0.40	0.50	1.87	0.60	9.89	8.55	-1.34
		Planned	1.00	1.00	0.75	0.50	2.40	0.50	0.40	0.50	1.00	0.50	8.55		

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

Task completed

3.3 WP3 User modelling

3.3.1 Progress towards objectives

Task 3.1: User data collection and analysis

Task completed.

Task 3.2: Algorithms for user profiling

Task completed.

Task 3.3: Modelling future user behavior

Task completed.

Task 3.4: Agent-based models of user behavior

Task completed.

3.4 WP4 Saving water by social awareness

3.4.1 Progress towards objectives

Task 4.1: Social games for water demand management

Task completed.

Task 4.2 Social Network Data Collection and Analysis

The task has spanned the first semester of Y3. In this period, the Twitter data collector implemented in Y1 and already used in Y2 has been further exploited to extract micro-posts related to water sustainability topics and the expert crowdsourcing interface has been used by workers to tag relevant tweets. As in Y2, the social media helped us find educational resources and populate the tips section of the Advanced Consumer Portal and the water trivia questions of the Drop!TheQuestion game. As of the end of Y3, more than 400 questions have been collected from sources also suggested by the content of Twitter posts and by the home pages of their originators. 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, 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

The developed model and method for identifying and analyzing behavioural roles and patterns of Twitter users were extensively described and the results of their application to the first case study were documented (Thames Water case, 6,3 Mio crawled tweets). This provided the basis for the validation of the behavioural roles model and analysis method in a second case study (Spanish pilot). To this end a new data set was crawled involving Twitter users from the Valencian metropolitan area (5 Mio tweets crawled) and the behavioural role analysis was performed on it. This case allowed the verification of the external validity of the method, as it addressed a completely different geographical, cultural and language community than in the first case. The results revealed the same types of clusters, behavioural roles and very similar associated behavioural patterns as in the first case study. This confirms the validity of the developed method and its applicability to targeted communication campaigns in social networks. The developed method has been technically implemented as a software component of the SmartH2O platform (the SmartH2O Social Network Crawler and Data Analyzer) for exploration of the results of the behavioural analysis. The obtained results suggest that the proposed method for analysis of behavioural roles in Twitter can identify a set of user types (and corresponding users) that can support targeted information dissemination in Twitter campaigns. The consistent findings between the cases suggest that the introduced behavioural dimensions and metrics are suitable for capturing behavioural patterns that can support targeted information dissemination. The identified roles and their distribution in the two cases demonstrate that a much larger portion of active users, suitable for supporting Twitter-based communication campaigns, can be identified with this method than with other approaches.

Accordingly, the developed behavioural role analysis approach is useful for water utilities that want to set up a targeted communication campaign based on users' social media behavior rather than their position within the social network. The developed approach, the underlying metrics, the dataset crawled, the technical realization and the achieved results have been documented in *D4.5 Final social network analysis trust & people search techniques.*

Task 4.4 Incentive models and algorithms[2]

The implemented SmartH2O incentive system was assessed by analyzing the user activity logs of the gamified portal in the Swiss and Spanish case study, and by collecting user feedback via online questionnaires. Aspects that were evaluated included technology acceptance on application level based on the UTAUT model (performance expectancy, effort expectancy, attitude towards the technology) and technology acceptance on use case level (perceived usefulness, ease of use, joy of use, comprehension, effect of the gamification elements on the motivation to save water and to use the SmartH2O portal). User experience was also measured in terms of perceived hedonic and pragmatic quality. Measurements and results were documented in D4.4 *Final social game and implicit user information techniques*.

The obtained results have shown that both user feedback and user behaviour confirm the appropriateness of the designed SmartH2O incentive model and its implementation. Users valued the balance that was sought between usefulness ('pragmatic quality') and fun-of-use ('hedonic quality'), and they proved to use both consumption feedback functionalities and the game elements (e.g. leaderboard, gamification status sidebar). Finally, the mockups for the SmartH2O social extensions of the incentive model were refined and described in detail in D4.4.This includes social sharing features, i.e. users can share their status and achievements on external social networks (Twitter, Facebook, e-mail), and the neighborhood map, where one can compare ones achievements with friends, family and neighbors who are active on the smartH2O portal.

3.4.2 Main achievements

- Full implementation of the SmartH2O incentive model and algorithms in the Advanced Consumer Portal and correlated water games (real and digital).
- Implementation of the methodology designed in Y2 for tailoring water consumers' incentives to different deployment scenarios.

[2] Note that T4.4 duration till M24 is an error in the Gantt, as T4.4 produces D4.4, so duration of T4.4 was changed to M30 to correspond with D4.4.

- Thorough analysis of response to the full spectrum of incentives by portal users in both the Swiss and Spanish case study.
- Implementation of the GUI and services for the multi-channel social sharing functionality and map-based peer comparison, which complete the spectrum of SmartH20 engagement methods.
- Revision and enhancement of the designed incentive framework into the Gamification Engine and Advanced Consumer Portal, on the deployment in the Valencia use case and the feedback from water utility operators and consumers.
- A second version of *Drop!* and *Drop!TheQuestion* has been realised and integrated with the SmartH2O platform in both the Swiss and Spanish case study as part of the incentive model of the Advanced Consumer Portal.
- Continuation of the use of the social media data collection pipeline to Twitter, in order to acquire water-relevant microblogging posts and evaluate metrics on their authors, so to discover useful content for the smartH20 tips and for the trivia questions of the Drop!The question trivia game.

The following deliverables were completed in the reported period:

- D4.4 Final social game and implicit user information techniques (m30): delivered
- D4.5 Final social network analysis trust and people search techniques (m30): delivered

3.4.3 Use of resources

WP4	Deliverable	m13-m16	m17-m20	m21-m24	Allocated	Remaining
D4.4	Final social game and implicit user information techniques (m36)	8.08	6.54	1.50	12.00	-4.12
D4.5	Final social network analysis trust and people search techniques (m24)	7.08	9.11	0.00	11.65	-4.54

Somewhat higher effort than planned has occurred in Y3 mostly because of the extra work done to produce a mobile version of the SmartH2O platform which also impacted the design of the social gaming part. Part of it is also due to the use of junior personnel in some parts of the work. Over the entire duration of the project overall effort in this WP has exceeded the allocated effort only by 10%.

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 completed.

Task 5.2: Developing new dynamic pricing schemes

Task completed after revision of D5.2. We achieved milestone MS10 by clearly identifying two main dynamic pricing mechanisms: peak pricing and scarcity pricing.

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

This task corresponds to Deliverable 5.3, which it has produced in M30. Activities include:

- Review of indicators of urban water scarcity, and identification of a universal economic indicator: the marginal resource opportunity cost (MROC) of water.
- Review of the usage of MROC in hydro-economic modelling.
- Choice of an aggregate representation (at the utility or city level) to model user response to scarcity pricing.
- Identification of the two case-studies for which scarcity pricing would be relevant: London (UK) and Valencia (Spain).
- Comparison of the basin-wide contexts.
- Use of the Valencia case to explore dynamic increasing block tariffs that would be indexed on upstream reservoir levels.
- Use of the London case to explore the impact of scarcity pricing across a wide range of conditions and parameter values.

Task 5.4: Experimental economics-based tests of pricing policies

This task corresponds to Deliverable 5.4, which it has produced in M30. Activities have been influenced by water utilities' unwillingness to engage with residential customers concerning dynamic tariff, even at the trial stage. Therefore, WP members had to come up with other ways to produce experimental economics based testing of pricing policies. The performed activities include:

- Administration of the questionnaire, prepared in Y2 for the Ticino case-study, to Valencia users.
- Analysis of questionnaire results.
- Identification of the best way to carry out the online experiment: platform, experimental design.
- Use of questionnaire results to help in experimental design
    - Identification of the main questions an experiment could answer
    - Focus on shower time, found by the questionnaires to be price-sensitive
- Design of the online experiment.
- Rollout of the online experiment.

- Analysis of experimental results.

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.
- Use of meta-analysis results to build a simulation tool that estimates price elasticity of demand for residential water consumption.
- Application of the model to the three case studies (London, Valencia and Ticino).
- Identification of two major dynamic tariffs susceptible to be implemented at different time scales: time-of-day pricing and scarcity pricing.
- Evaluation of the potential benefits of time-of-day and scarcity pricing in the London case.
- Methodology to design a dynamic increasing block tariff that is also a dynamic scarcity pricing scheme, in the sense that second block prices vary in time depending on scarcity. Application to Valencia, Spain.
- 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 and Valencia cases
- Design and rollout of an online experiment focused on two main questions:
  - Do water users respond differently to pricing and incentives when they change over time?
  - What is the impact of the circumstances (e.g., occurrence of a drought) in which a pricing scheme, especially a dynamic one, is implemented?
- Analysis of experimental results to address these two main questions.

The following deliverables were produced:

- D5.3 Econometric models of price reactions (m30): delivered
- D5.4 Report on Experimental tests (m30): delivered

Milestones:

- MS20: All dynamic pricing mechanisms identified (m30): **achieved**

3.5.3 Use of resources

WP5	Deliverable	m13-m16	m17-m20	m21-m24	Allocated	Remaining
D5.3	Econometric models of price reactions (m30)	6.68	11.20	0.79	13.00	-5.67
D5.4	Report on Experimental tests (m30)	8.50	8.83	0.00	15.45	-1.88

3.6 WP6 Platform implementation and integration

3.6.1 Progress towards objectives

Task 6.1 Delivery Planning

Task completed.

Task 6.2 Architectural design of the SmartH2O platform

Task completed.

T 6.3 Implementation of the SmartH2O platform

During the third year, continuous improvements of the SmartH2O platform have been developed and deployed to demo sites, such as:

- improved baseline calculation through a better meter reading normalization algorithm;
- improved granularity calculation;
- upgrade of the water administrative portal by adding and improving functionality regarding: goal checking, user statistics, rewards and badges management, rewards delivery management, reporting messages and user notifications;
- improved water meter processing within existing Smart Meter Data Management component;
- added water meter processing route to the Enterprise Service Bus;
- improved Games Platform through a better point assignment to allow multi-platform integration, allowing user to register to the app and receive point from the game to their platform accounts;
- added Social Network Connector component that provides Social sharing for enabling the platform user to get points by inviting other people to join the platform, or by sharing their water saving achievements, status and tips through facebook, twitter and mail;
- upgrade of the Social Network Crawler and Data Analyzer component that searches into Twitter message database for obtaining tweets regarding water consumption and efficiency;
- new questions on water efficiency usage have been included in the educational game DROP! the question;
- Javadoc and IFML documentation for describing the integration API for third parties usage;
- Interface design and content updates have been provided to meet the continuous development needs. This includes producing images for the rewards page, updating the rules page, creating banners for the portal that announced new features, designing the weekly digest e-mails, e-mails to announce new features to portal users, the social sharing elements.

As a conclusion, as presented in the DoW, the Final prototype of the SmartH2O platform developed and deployed within T6.3 in the third year offered to water utilities a full portal to evaluate the impact of policy changes and examine historical data on the performance of the consumers while the Customer portal fully allows to end users an effective complement to the SmartH2O app.

T 6.4 Testing and quality assessment

The process of monitoring and assessing the quality of the software developments has permanently continued in the third year of the project. It concluded with D6.6 Software Quality Assessment Report summarizing all the quality aspects of the software developed for the SmartH2O platform.

Software Quality Assessment Plan (SQAP) has been continuously updated for summarizing the quality aspects of the developed software, the findings of the code verification and application testing procedures which have been used during the development of the platform, the metrics used to assess the overall quality, usability and reliability of the platform.

Quality of source code was pursued by adopting best practice coding procedures and by using tools such as Code Analysers and Code Optimisers (such as JIndent by Newforms Technologies and YourKit) and also tools for automated code generation (such as the WebRatio platform). CheckStyle – Source Code Formatter for Java; JDepend – Source Code Analyzer, YourKit – Profiling Tool, Java NCSS – Source Code Analyzer, FindBugs – Bug detector tool, Emma – Source Code Analyzer. Performance Tests have been perfomed using Apache Benchmark (by Apache Software Foundation). Issue tracking was performed once again using Bitbucket.

During the development and test process each component was tested independently of the other components while at the final integration stage, end-to-end integration tests were performed.

Usability testing has been planned and conducted on different levels to accommodate the agile and iterative development of the portal. This included continuous heuristic expert-based testing during the continuous development, alpha testing of the mobile app and new web portal features using a feature inspection tool and evaluating ease of use of the web portal and the mobile app.

T 6.5 Platform management and data distribution

During the third year, the Final prototype of SmartH2O platform has been deployed on a cloud infrastructure in order to accommodate testing and production accounts for the next water utilities that will assess and implement the platform. The process of cloud deployment had the objective to select a service that automates the creation and management of the platform instances. Following the specific objectives of the SmartH2O platform and the industry best practices we studied the technical and economical offers of the following cloud services providers: Google Cloud, Microsoft Azure, Digital Ocean, Rackspace and Amazon Web Services deciding that Amazon Web Services is the best suited cloud provider for the cloud distribution of the SmartH2O platform.

3.6.2 Main achievements

The main achievements in the period are:

- Deployment of the Final prototype of the SmartH2O platform for the Swiss case study in Locarno, Switzerland and for the Spanish case study in Valencia, Spain as part of EMIVASA Virtual Office portal (T6.3)

- Continuous integration of functionality into the SmartH2O platform following an evolutionary prototyping scenario through component adding or upgrading such as: Gamification Engine, Games Platform, Smart Meter Data Management, Social Network Connector (T6.3)
- Continuous evolution of the integration services of the SmartH2O platform: backend integration services, Enterprise Service Bus (central integration component), Gateway Authentication (central authentication component) (T6.3)
- Deployment of the cloud distribution of the SmartH2O platform on an Amazon Web Services instance (T6.5)
- Updating parts of the Platform Architecture and Design of the SmartH2O platform as resulted from the concrete conditions retrieved on the demo sites. The architectural design of the SmartH2O platform has been maintained by the Consortium as an open document. (T6.2)
- Continuing and finalizing code quality and testing procedures within the Software Quality Assessment Plan (SQAP) by running procedures for testing monitoring from single component to integrated platform (T6.4)

The following deliverables have been produced:

- D6.5 Platform implementation and integration – final prototype (m36): delivered
- D6.6 SW Quality assessment report (m36): delivered

The following milestones have been achieved

- MS21 R4 fourth release of the platform (m30): **achieved**
- MS15 R5 final release of the platform (m36): **achieved**

3.6.3 Use of resources

WP6	Deliverable	m13-m16	m17-m20	m21-m24	Allocated	Remaining
D6.5	Platform Implementation and Integration - final prototype (m30)	9.63	4.29	2.83	13.50	-3.25
D6.6	SW Quality assessment report(m36)	3.84	4.72	4.33	10.00	-2.89

The higher effort in this WP is attributable to two main causes: the extra amount of work which was needed to integrate the SMartH2O platform into EMIVASA's Virtual Office. EMIVASA already had a customer platform, and the only possible way forward was to integrate SmartH2O into this existing platform. The issues and the problems have been described in D6.4 and in D6.5. Another cause of overspending, in terms of resources, but not in financial terms, is the use of junior personnel in some parts of development.

3.7 WP7 SmartH2O Validation

3.7.1 Progress towards objectives

Task 7.1 Design of the case study validation methodology

Task completed.

Task 7.2 Impact in the Swiss case study

The objective of the Swiss small-scale pilot was to iteratively develop and test the portal and the measurement infrastructure in a contained setting, before rolling out the SmartH2O system in the large Spanish pilot. The small-scale Swiss pilot involved 25 basic portal and 22 advanced portal users. For the purpose of the final evaluation of this pilot a questionnaire was developed that addressed water consumption awareness and technology acceptance, while queries on the logging database were constructed to extract key metrics of user activity and engagement with the SmartH2O portal.

SmartH2O users were invited to participate in the final questionnaire by e-mail. A raffle was organized as an incentive (with an Amphiro b1 showerhead as a reward for the winner). User response rate to the final evaluation questionnaire was 16% for the basic portal, and 41% for the advanced portal. The collected data was provided for analysis in T7.4 The results were analysed in T7.4 and elaborated in D7.3 *Final overall validation and impact report*.

Task 7.3 Impact in the Spanish case study

The third year of the project witnessed the deployment of the SmartH2O portal in Valencia in April 2016. After nearly a full year of usage, the SmartH2O portal has reached 508 users and its impact was evaluated in the final evaluation. To this end questionnaires were prepared that addressed water consumption awareness and technology acceptance.

For the control group, a call center took the questionnaires, both at the baseline and after the trial. The questionnaire to the SmartH2O users was distributed by mail, incentivizing users to participate with a small Amazon voucher and the chance to win an iPad Mini 2.

Response rates to the questionnaires were high. From the 508 users, 452 users have filled out the sign-up questionnaire (82%), while 94 users responded to the final questionnaire (18.5%). In the control group, 204 users answered to the phone survey at the start of the trial, of which 82 respondents also participated in the final evaluation.

Additionally, queries on the logging database were constructed to extract key metrics of user activity and engagement. This includes a comparison of the usage of the mobile app against the web portal.

The collected data was provided for analysis in T7.4. The results of the portal evaluation including the achieved impact KPIs were analysed in T7.4 and elaborated in D7.3 *Final overall validation and impact report*.

Task 7.4 Comparison and analysis of results

In this task the final evaluation results were analyzed for both case studies. For the small-scale Swiss case study, a decrease in water consumption has been found of 9.9%, in comparison to a 5.8% reduction for non-SmartH2O households in the same area. Even though questionnaire results should be interpreted with care given the small scale nature of the pilot, user feedback has been consistently positive for both the basic portal and the advanced portal users, with users confirming the effect of the portal on their motivation to think about water consumption and to save water. The results of the log analysis also showed that the gamification portal was used much more frequently than the basic portal, providing indications for the effectiveness of the gamified incentive model (see D7.3 for details)

In the Spanish case study, water consumption has been evaluated by comparing the difference between the historic baseline average daily consumption against the observation period covering the full duration of the trial, as well as between a control group and the users of SmartH2O. Results revealed a 21% relative difference between the SmartH2O group and the control group, thereby achieving the associated KPI.

A similar mixed repeated measures and between-subjects design has been used to evaluate water consumption awareness. Results demonstrated positive interaction effects between time (baseline vs. post-trial) and condition (control group vs. SmartH2O users) for beliefs about water consumption and confidence in the ability to change one's behavior. Apart from responses to awareness questions, SmartH2O users provided consistently positive feedback on the portal, in terms of usefulness, but also in terms of the motivational effect of the portal. More than 75% of the users responded that the consumption chart and overview, the tips, self-setting goals, and the water consumption alerts increased their motivation to save water and think about water consumption. Moreover, these results were also strongly correlated to the respective awareness measures, suggesting that the incentive model elements have succeeded in inducing a raise in awareness through an increased motivation of users.

Analysis of the logs demonstrated that SmartH2O users logged in much more often than users of the standard Virtual Office portal: close to five times a month for SmartH2O, while 97% of the users of the standard Virtual Office logged in less than once a month. More specifically: 43% of SmartH2O users log in every month or more, while 11% even uses the system on a weekly basis. Other customers who do not use the Virtual Office, only receive a water bill every two months, so the increase of attention trough SmartH2O is even larger compared to this group. Furthermore, the system logs showed an increase in activity for those users who have installed the mobile app. This applied to both the inspection of consumption feedback and the users keeping track of the gamification status.

Finally, results have shown that the usage of both the water consumption-related features (e.g. water consumption chart and pipe overview, self-set goals) and the use of the leaderboard within the SmartH2O portal is significantly correlated with a decrease in consumption. This further confirms the suitability of the SmartH2O system design, demonstrating that the portal not only yields positive customer responses, but actually induces a change in behaviour.

The detailed results for both the Spanish case study and the Swiss case study were documented in *D7.3 Final overall validation and impact report*, including an assessment of the overall project KPI's The detailed results were documented in *D7.3 Final overall validation and impact report*

3.7.2 Main achievements

- Sign-up questionnaires collected for the Spanish case study (the Swiss questionnaire had been issued in Y2).
- Water consumption awareness and technology acceptance questionnaires collected for the users of both case studies with good response rates.
- Key metrics of user engagement collected and positive results obtained on the impact of engagement on water consumption.
- A sensible reduction of water consumption has been observed in SmartH2O users in both case studies.

The following deliverable has been produced:

- D7.3 Final overall validation and impact report (m36): delivered

Milestones:

- MS25 Validation completed (m36): **achieved**

3.7.3 Use of resources

WP7	Deliverable	m13-m16	m17-m20	m21-m24	Allocated	Remaining
D7.3	Final overall validation and impact report (m36)	6.00	12.66	17.19	34.85	-1.00

3.8 WP8 Business Development

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 was given 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.

Similar to Y2, a short update on technology and market watch can be found in the Section 2 of the D8.6 Final Exploitation Plan. That part of the deliverable analyses the interplay of evolving regulation (see Task T8.2) providing incentives for utilities and consumers to acquire smart metering and water saving technologies, and the emergence of such devices. It focuses in particular on 1) devices that make smart metering easier to use by individuals in order to reduce water consumption, and 2) emerging apps and platforms that have some functionalities similar to the SmartH2O platform. This analysis has the same goals as in Y2 (see bullet points).

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. Short updates can be found in D8.5 Business Ecosystems Report for Y2, and in D8.6 Final Exploitation Plan for Y3.

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 mainly in D8.5 Business Ecosystems Report in Y2.

In Y3, a short update is given by D8.6 Final Exploitation Plan. It focuses on the emerging implication of the installation of smart meters by water utilities of various European countries are analysed through the needs they create for these utilities, and the opportunities that open up for the SmartH2O brand as a result.

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, and more broadly, it identifies actors involved in emerging markets involving smart water technologies.

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 (Y2), then updated in D8.6 Final Exploitation Plan (Y3). Performed activities in 1) during Y3 include:

- Final exploitation plans for the project three assets, to be exploited together or separately:
    - SmartH2O platform
    - Drop! The Game (Board game + online app)
    - Smart Data Management Component (SMDC)
- For the three above assets, update of business plan outlines and provisional financial analyses given in previous deliverables.
- Elaboration of a final joint and individual exploitation strategy for the SmartH2O platform, which is the project's core asset. This exploitaion plan primarily concerns the water utility market, but also some complementary markets in which some project partners have business interests.
- A joint post-project strategy involving both businesses and water utilities involved in the SmartH2O project had been put together in Y3, to make sure the project's assets outlive the end of the project. This strategy involves concrete actions to take by various partners, as well as three precise business opportunities.

Outputs from part 2) consist in narrowing down the broad list of actors given in D8.5 Business Ecosystems Report to a smaller list of precisely identified potential partners. The number and nature of contacts vary among partners depending on their role in the project. Performed activities in 2) include relationships forged by all project partners in relation with project-related activities. The full lists of business ecosystem contacts found in deliverable D8.5 have therefore evolved into partner-by-partner lists of potential partners are given in D8.6. What is more, confidential information on three business opportunities for project outputs can be found in D8.6.

These activities have also been carried out by research institutions to leverage the outputs into future research and development opportunities. Scientific exploitation efforts from research partners are primarily focused on the usage of smartH2O results for new research proposals on national and European level and the integration in the teaching activities of their staff. That applies to universities as well-as to non-profit research institute EIPCM, whose main focus for exploiting the SmartH2O results is in applied research projects that bring together scientific and business partners. Thus, for instance, EIPCM has contacted a number of environmental associations, network organisations, local utilities and municipalities to first raise awareness and second to acquire these organisations as project partners for new proposals using the Smart H2O portal as a demonstrator to illustrate the value of SmartH2O assets for these organisations.

This strategy has already resulted in the submission of a number of follow-up proposals that strongly leverage the assets that have resulted from the SmartH2O project, extended by acquiring new partners: environmental associations, municipalities, and local utilities. Here, we highlight the POWER and the enCOMPASS projects that have been approved for funding by the European Commission and currently being carried out. These projects allow partners to further extend their expertise on and track record on platforms seeking to stimulate behavioural change through gamification, visualisations and community analysis techniques. In addition, by demonstrating the platform to local utilities and environmental associations also new leads for the business exploitation for other partners of the consortium have been created

T 8.5 Open Data and standards

Task T8.5 (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 Y1, and a final update monitoring the evolution of relevant standards in the ICT for water sector is given by D8.6 Final Exploitation Plan.

Besides, the task has produced a document describing the procedure for the anonymization of the data prior to publication as Open Data https://github.com/corradovaleri/smarth2o-anonymizer/blob/master/smarth2o-anonymizer.ipynb

The data has been then made available on Zenodo.org as open datasets.

3.8.2 Main achievements

The main achievements in Y3 are:

- **Updates on technology and market watch, and on smart metering standards.** Those are the product of a continued analysis of new trend in the emerging market for smart water technologies.
- **Final joint and individual exploitation strategies,** centred on the core asset that is the SmartH2O platform. The joint exploitation strategy focuses on the principal market identified in the project for the platform (the water utility market), but individual partners also outlined complementary exploitation plans for the asset in other, related markets.
- **Final exploitation plans for the other SmartH2O assets:** the Drop! Game and the Smart Data Management Component (SMDC). These assets can be proposed alongside the platform or independently from it, and can therefore target different markets depending on that.

- **Outline of next actions**: a concrete roadmap to ensure the assets keep developing after the end of this project has been put together. Potential partners – e.g., business partners – have been identified.

The following deliverables have been produced:

- D8.6 Final exploitation plan (m36): **delivered**

The following milestones have been achieved

- MS26 Technology overview and business planning completed (m36): **achieved**

3.8.3 Use of resources

WP8	Deliverable	m13-m16	m17-m20	m21-m24	Allocated	Remaining
D8.6	Final exploitation plan (m36)	1.88	5.30	7.56	10.30	-4.44

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 in Year 3 as part of the communication planning phase:

- Regular monitoring of the specific targets (KPIs) defined in the previous years to assess the effectiveness of the dissemination actions performed
- Several collaborations with institutions and companies have been established to obtain feedbacks and open up opportunities for follow-up of the SmartH2O project. Beside participating to the European Utility Week 2016 and the 2017 WaterWise Annual Water Efficiency conference, SmartH2O had meetings with the following institutions and companies: WaterSmart, Center for Water-Energy Efficiency at UC Davis, Environmental Defense Fund – Pecan Street, Singapore Public Utility Board, Cap Holding S.p.A.

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 the entire project lifetime, producing a mix of internet and traditional communication channels/tools. The use of social media channels was further expanded and intensified in year 3, leading to a further increase in project visibility.

The SmartH2O website: This is the main point of reference where static and permanent information is being published. This includes links to the scientific publications, copies of the public deliverables, and a general description of the project objectives and the case studies. It is online since April 2014 and it obtained a good visibility with more than 9,000 sessions from around 5,800 users connected from all around the world (we registered connection from all European countries, most of North and South America, large part of Asia and Oceania, and few contacts also from Africa).

The SmartH2O Twitter account: The Twitter communication strategy was successfully continued and implemented also in Y3 with a significant number of new tweets produced, leading to a further increase in project visibility: 1582 tweets and 713 followers were reached, well over the established targets. This was accompanied by successful engagement, as most of the tweets received a reaction by the SmartH2O followers (a like, a retweet or adding as a follower). The account continued receiving high number of impressions per month (e.g. 1,890 impressions in November 2016, 2,934 impressions in May 2016). The Twitter aggregator page that collects tweets in the areas of water research and water business implemented in Y2 (see D9.3) has also been used in Y3, integrating relevant tweets from these two curated twitter lists directly into the smartH2o website (serving target groups that may not be using Twitter). In addition to these continuous Twitter activity and results, in Y3 two localized Twitter communication campaigns targeting the Spanish pilot (Valencian metropolitan area) have been performed: to extend the reach of the promotional activities, make the local community aware of SmartH2O and to draw potential users to the SmartH2O platform. The second of these campaigns also employed the results of the community behavioural analysis documented in D4.5 *Final social network analysis trust & people search techniques,* to explicitly target the identified set of target users with specific behavioural roles (4270 top users). Details of these targeted campaigns (yielding 234.053 impressions at a cost of only €464) have been elaborated in D9.4 *Final dissemination report*.

The SmartH2O LinkedIn innovation community: The SmartH2O Innovation Community set up in form of a LinkedIn group has been further used in year 3 to communicate project activities, disseminate results, and obtained feedback from the community. The performed activities increased the group membership to 275 users. The target audience of the LinkedIn Innovation Community are professionals and researchers working in the wider area of interest related to the project, from water management, environmental and sustainability issues, to economics, user-centered design and innovation research communities, as well as the general public that is interested in project ideas and outcomes. In the focus of Y3 communication in the SmartH2O LinkedIn community were in particular the promotion of the SmartH2O summer school and the project results coming together in the final year of the project.

The SmartH2O newsletter: as a traditional means of communication used to summarise a number of events and news, the third issue of the SmartH2O newsletter has been released in March 2017 in order to promote the final results of the project. As for the other issues released in the previous years, this issue was spread through a number of contacts including, among others, mailing lists the SmartH2O project has access to (e.g. iEMSs, ASCE-EWRI, IFAC). In addition, the newsletter was promoted on the project website, via the Twitter and LinkedIn accounts of the SmartH2O project.

Traditional media: Newspapers, radio and TV have been also used to reach out to the wider public. Access to this media is more limited, and it is reserved to major SmartH2O events, such as the launch of the SmartH2O platform in Valencia.

Scientific publications: this is the traditional communication channel for scientists. Major project results have been published in journal papers at highest scientific standards, and disseminated to the scientific audience. Conference papers aim at presenting fresh interim project results of appropriate scientific quality in a timely manner, in order to disseminate them as quickly as possible in the scientific community. Finally, workshop and demo papers aim at sharing interim project results, which may not be yet substantial enough for a full conference publication but present a promising basis for timely dissemination and for being developed further through interaction with workshop or demo session attendees. In that way, they also represent a valuable feedback loop from the scientific and professional community back into the project.

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 the Summer School on Smart Systems for Water Management – Modelling, Simulation, Analytics and ICT for Behavioral Change, and the final dissemination event during the 2017 WaterWise annual conference.

T 9.3 Dissemination events

SmartH2O participated in several dissemination activities at different scales (see D9.4 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 and in Spain, to raise the awareness on the ongoing deployment of the smart meters and SmartH2O portal in Terre di Pedemonte (CH) as well as on the launch of the SmartH2O portal in Valencia. In addition several events have been organized in schools, where students played the Drop!TheBoardGame and have been stimulated about the general topics of sustainability and natural resources management.
- **Dissemination at the national level:** dissemination at the national level has been performed through national-wide news release to the media, especially in the two project pilots in Switzerland and in Spain. In addition, the good results produced by the validation of the SmartH2O platform enable the consortium partners to prepare a series of press releases that will be distributed in the months of April and May 2017
- **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.
- **Major dissemination events:** the final dissemination event of the SmartH2O project took place in March 2017 during the WaterWise Annual Water Efficiency, the premier event for showcasing water efficiency in the UK where all the major players in the UK water sector are present, including the private water utilities but also regulatory agencies tackling with water and environmental issues.

T 9.4 SmartH2O Summer School

The SmartH2O Summer School on Smart Systems for Water Management – Modelling, Simulation, Analytics and ICT for Behavioral Change was held on August 22-25, 2016, at Monte Verità (Switzerland).

The school focused on the following topics (see D9.4 for the final program): profiling user water consumption, end use disaggregation of consumption, innovative smart meter technologies for water usage monitoring and control, improved user awareness for behavioural change, innovative water pricing policies, the role of gamification in behavioural change in the water domain, the water and energy nexus in urban context, open data and standards for smart water systems, software platforms and tools for smart water management.

The topics discussed during the school are expected to contribute to the associated Thematic Issue on Urban Water Demand Management hosted by Environmental Modelling & Software journal, which is expected to be published during the Fall 2017.

3.9.2 Main achievements

WP9 has set the foundations for an effective dissemination and visibility of the project results, achieving the following main results:

- 3 publications in scientific journals, along with 6 currently under review.
- Very successful communication on the Social Channels (713 followers on Twitter, 279 members of LinkedIn SmartH2O Innovation Community, 47,927 views of Slideshare presentations).
- 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 during Y3, for a total of 23 events attended. In addition, members of SmartH2O co-organized two sessions on topics related to residential water demand management at the 2016 AGU Fall Meeting and at the 8th International Congress on Environmental Modelling & Software, respectively.
- Production and successful distribution of the 3nd SmartH2O Newsletter.
- Orchestration with the ICT4Water Cluster and dissemination of first project results in two ICT4Water Newsletters.
- All dissemination targets reached (see D9.4 for further details):

Website	Reached > 5810 visitors (63.4% new visitors)	
Newsletter	3 issues which reached > **2000** recipients	
Conferences and workshops	**23** presentations	
Publications	**17** conference papers published, 6 workshop papers **3** journal papers published 6 journal paper under review	
Twitter	**1582** tweets **713** followers	Y3 target: 300 followers✔

LinkedIn	**279** members	Y3 target: 120 members✔
Slideshare	**21** presentations **47927** views	Y3 target: 20 presentations✔
Screencasts	**2** screencast published	
Video	1 video published	
Radio interviews and Press releases	26	

The following deliverables has been produced:

D9.4 – Final dissemination report (m36) delivered

3.9.3 Use of resources

WP9	Deliverable	m13-m16	m17-m20	m21-m24	Allocated	Remaining
D9.4	Final dissemination report (m24)	3.50	3.54	5.83	8.55	-4.32

The use of resources in Y3 is somewhat higher than planned, but in line with the needs of the final year of a successful project with extensive activities and results to be communicated. This is reflected in the achieved results of the performed communication & dissemination activities (>700 followers on Twitter, >1500 tweets produced, many publications, summer school etc.). Over the entire project duration, the effort consumed in this WP is only 10% higher than allocated.

4. Project management during the period

4.1 Consortium management

During the third year the management processes described in Deliverable D1.1 (management processes have been continuously enforced allowing to guarantee a high quality on the produced deliverables. Thus, consortium management in the third year has mostly focussed on the following activities:

- 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 third year of the project no new problems have been identified.

4.3 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.

4.3.1 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 project.
- 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.

4.3.2 Technical meetings

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

Besides these regular meetings, a specific meeting was organised in Reading (UK) on the 6th of June 2016 in order to verify the role of Thames Water in the project, as then reported during the subsequent review meeting.

4.4 Project planning and status

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

4.5 Impact of possible deviations

No deviations from the revised plan were experienced.

4.6 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 3:

- ICT4Water cluster meeting, in Jerez de la Frontera, Spain, 17 June 2016
- Waterwise 2017 cluster event, in London, UK, 8 March 2017.

5. Deliverables and milestones tables

In the following two sections 5.1 and 5.2 we summarize the deliverables and the milestones for Year 3, which cumulate with the deliverables already delivered in Year 1 and Year2.

Note: in the following table the delivery dates for some Year 1 and Year 2 deliverables differ from the contractual delivery date as the deliverables were rejected and resubmitted at a later date.

In year 2 Deliverable D3.4 was rejected and the consortium has been asked to resubmit a revised version by mid December 2016.

All deliverables of Year 3 have been submitted on time, apart from D1.4 (Third year report, this document) and D1.5 (Final report), which will be delivered at the latest within 60 days from the end of the project.

5.1 Deliverables

Del. no.	Deliverable name	Version	WP no.	Lead beneficiary	Nature	Dissemi-nation level [3]	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	Approved
D2.1	Use cases and early requirements	1.1	2	EIPCM	R	PU	30.11.2014	05.12.2014	Approved
D2.2	Final requirements	2.0	2	EIPCM	R	PU	31.03.2015	31.03.2015	Approved
D3.1	Databases of user information	3.1	3	POLIMI	R	CO	30.09.2014	31.05.2015	Approved
D3.2	First user behavior models	2.1	3	SUPSI	R	PU	31.12.2014	02.06.2015	Approved
D4.1	First social game and implicit user information techniques	1.7	4	MOONSUB	R +O	PU	31.12.2014	12.12.2014	Approved

3 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).

D5.1	Review of pricing instruments	2.4	5	UoM	R	PU	31.03.2015	31.03.2015	Approved
D6.1	Delivery management plan and testing specification	1.7	6	SETMOB	R	PU	30.09.2014	30.09.2014	Approved
D6.2	Platform architecture - initial architecture design	3.2	6	POLIMI	R	PU	31.12.2014	02.06.2015	Approved
D6.3	Platform Implementation and Integration - initial prototype	2.2	6	SETMOB	O	PU	31.03.2015	30.03.2015	Approved
D7.1	Validation methodology	1.1	7	TWUL	R	PU	31.03.2015	31.03.2015	Approved
D8.1	Early exploitation plan	9.1	8	POLIMI	R	RE	30.09.2014	02.06.2015	Approved
D8.2	Technology watch report	1.1	8	POLIMI	R	RE	31.03.2015	31.03.2015	Approved
D8.3	Standards and open data report	1.1	8	SUPSI	R	PU	31.03.2015	31.05.2015	Approved
D9.1	Dissemination tools and materials	1.0	9	POLIMI	R	PU	31.08.2014	05.09.2014	Approved
D9.2	First dissemination report	1.1	9	SUPSI	R	PU	31.03.2015	31.03.2015	Approved
D1.3	Second year report	1.0	1	SUPSI	R	RE	31.03.2016	29.07.2016	Approved
D2.3	Functional specifications	1.2	2	SETMOB	R	PU	30.09.2015	30.09.2015	Approved
D3.3	First prototype of ABM simulator	1.0	3	SUPSI	O	PU	30.09.2015	30.09.2015	Approved
D3.4	Final user behavior models and ABM platform	1.0	3	SUPSI	R	PU	31.03.2016	31.03.2016	Approved
D4.2	First social network analysis trust and people search techniques	1.1	4	POLIMI	R	PU	30.06.2015	30.06.2015	Approved

D4.3	Incentive models and algorithms	1.2	4	POLIMI	R	PU	31.03.2016	31.03.2016	Approved
D5.2	Developing new dynamic pricing mechanisms	1.7	5	UoM	R	RE	31.07.2015	29.07.2016	Approved
D6.4	Platform Implementation and integration – second prototype	2.0	6	SETMOB	O	PU	31.03.2016	29.07.2016	Approved
D7.2	Validation Report	1.0	7	SES	R	PU	31.03.2016	29.07.2016	Approved
D8.4	Intermediate Exploitation Plan	3.0	8	POLIMI	R	RE	30.09.2015	29.07.2015	Approved
D8.5	Business Ecosystems Report	1.0	8	TWUL	R	PU	31.03.2016	29.07.2016	Approved
D9.3	Second Dissemination Report	1.0	9	SUPSI	R	PU	31.03.2016	31.03.2016	Approved
D1.4	Third year project report	1.1	1	SUPSI	R	RE	31.05.2017	22.06.2017	Approved
D1.5	Final report	1.0	1	SUPSI	R	RE	31.05.2017	30.05.2017	Resubmitted
D4.4	Final social game and implicit user information techniques	1.1	4	POLIMI	R+O	PU	30.09.3016	30.05.2017	Approved
D4.5	Final social network analysis trust & people search techniques	1.1	4	POLIMI	R	PU	30.09.2016	30.05.2017	Approved under conditions
D5.3	Integrated water supply-demand modelling including dynamic pricing	1.1	5	UoM	R	PU	30.09.2016	30.05.2017	Approved under conditions
D5.4	Experimental economics-based tests of pricing policies	1.1	5	UoM	R	PU	30.09.2016	30.05.2017	Approved under conditions
D6.5	Platform Implementation and Integration - final prototype	1.0	6	SETMOB	O	PU	31.03.2017	31.03.2017	Approved

D6.6	SW Quality assessment report	1.1	6	POLIMI	R	PU	31.03.2017	30.05.2017	Approved under conditions
D7.3	Final overall validation and impact report	1.3	7	POLIMI	R	PU	31.03.2017	30.05.2017	Approved under conditions
D8.6	Final exploitation plan	1.1	8	SETMOB	R	RE	31.03.2017	30.05.2017	Approved under conditions
D9.4	Final dissemination report	1.0	9	SUPSI	R	PU	31.03.2017	31.03.2017	Approved

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 awareness app launched	9	POLIMI	31.03.2015	Yes	31.05.2015	The app was ready, but its launch was 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
MS18	SmartH2O Dissemination event at World Water Day	9	POLIMI	30.09.2016	Yes	8.03.2017	The dissemination event has been held in London, at Waterwise 2017
MS19	Final social network and game techniques published	4	POLIMI	30.09.2016	Yes	30.09.2016	D4.3 and D4.4 have been released
MS20	All dynamic pricing mechanisms identified	5	UoM	30.09.2016	Yes	30.09.2016	D5.3 and D5.4 have been released
MS21	R5 final release of the platform	6	SETMOB	30.09.2016	Yes	20.12.2016	The final release of the platform was deployed in Terre di Pedemonte and in Valencia

MS25	Validation completed	7	SES	31.03.2017	Yes	31.03.2017	D7.3 has been released
MS26	Technology overview and business planning completed		POLIMI	31.03.2017	Yes	31.03.2017	D8.6 has been released
MS27	Release of final update of dissemination material		SUPSI	31.03.2017	Yes	31.03.2017	D9.4 has been 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.

7. Appendix 1. Reply to the SmartH2O Technical Review - 2nd reporting Year

In this section we address the comments the reviewers has made on the status and progress of the SmartH2O project. We are thankful for a very detailed and in depth review of our work, that surely will improve the quality of our deliverables. This document explains how we have addressed the reviewers' comments in the revised versions of the deliverables.

In red we report the reviewers' comments. In blue our answers.

7.1 Deliverable D1.3

In general this is a good quality, adequate overview and summary of the work done in second year in. Only some descriptions within the individual work packages dismiss the overall good standard.

Thanks for the praise, the workpackage descriptions have been revised and improved, in particular WP6.

Consortium needs to:

- provide detailed information on use of resources,

New section 3.1.1 on resource usage per partner per deliverable has been added.

- explain and justify the role of TWUL and UPV

Description of role of EMIVASA and TWUL has been detailed in Section 4.3.1, making clear how EMIVASA takes on the previous role of TWUL in providing smart meter access, and how TWUL still contributes to the innovative pricing work package 5.

7.2 Deliverable D5.2

The review of this deliverable raised a number of important issues and therefore we have structured our reply in three parts:

1) General remarks regarding the deliverable's objectives and contents.

2) A summary of modifications.

3) A detailed response to reviewers' comments, and a series of amendments to improve the deliverable

7.2.1 General remarks

The crucial remark here is that contrary to what was expected when the project started, no data linking water price to water consumption dynamics was available at the time of writing that deliverable – and this is still the case today. This is due to the delays in smart metering implementation at TWUL that forced us to engage with EMIVASA.

Therefore, the best alternative to data retrieved from social media and smart meters was to compute the price elasticity of demand for the two case studies considered at the time of writing the deliverable: London and Ticino. The data available to do this was extracted from all the evaluations of price elasticity used in the meta-analysis. It was then used to perform the meta-analysis and use its results to evaluate the price elasticity for the two case-studies. Therefore, **far from being a mere academic exercise, the meta-analysis of price elasticity (Section 5, formerly Section 3) was selected as the best way to compensate the lack of data.**

Lastly, Section 4 (formerly Section 5) reports on the design of a tool for supporting the experimentation of pricing schemes with customers. Eventually it turned out that experimental testing with customers has become a no-go for the companies, out of fear of stirring customer fears on pricing changes - even if communicated that these are not intended. Accordingly, a different strategy for assessing pricing schemes has been adopted, namely, the price elasticity simulations as documented in Section 5.

7.2.2 Summary of modifications

- The structure of the deliverable has been changed to help clarify its aims. In particular, Sections 3, 4 and 5 have traded places. The introduction (Section 1) quotes:
- "After reviewing existing water tariffs (Section 2), this deliverable proposes dynamic pricing schemes (Section 3). Then, this deliverable introduces a simulator that will allow utilities and consumers to evaluate the impacts of dynamic pricing, when this will be considered by regulators, utilities, and water users (Section 4). Yet, in the absence of real-life experimentation from water utilities on dynamic water pricing, it has been necessary to explore alternative solutions to evaluate the behavioural response to dynamic tariffs. This is why Section 5 introduces a price elasticity simulator that relies on past studies on changing water price – with static tariffs. The detailed section-by-section breakdown is as follows".
- The executive summary, introduction and some section headers have been modified to also better articulate how the work was conducted to meet the deliverable's contractual content given the context.
- Headers in Section 2 have been modified to clarify that the Section reviews existing pricing schemes, discusses their potential and their limitations.
- Section 3, which now introduces the dynamic pricing mechanisms (formerly Section 4) has been completed with new information, so the Section explicitly and fully meets the requirement of MS10 (definition of dynamic pricing mechanisms).
- Section 4 now presents "A tool for the experimental exploration of innovative pricing schemes (formerly Section 5). The section already stresses the reluctance of utilities to experiment with dynamic pricing, and this includes such tools (as now made explicit in the conclusion: "This tool could not be implemented and used because of the aforementioned reluctance of water utilities to engage with dynamic pricing at all.")

●Section 5 now presents the price elasticity simulations for all three case studies. The first paragraph of the Section now emphasizes how this is an experimental simulation of user response to price changes:

●"As explained in previous sections, there is no data available about the user's' response to dynamic water pricing, because water utilities have been unwilling to engage with an idea demanding such a radical change in their relationship with residential users, even at the trial stage. As a result, we could neither find existing datasets, nor build one by implementing the tool described in Section 4. In order to circumvent this problem, this section carries out a meta-analysis of the price elasticity of water demand, in order to find the determinants of price response. It then uses the results of this analysis to propose an estimate of price response in the three case studies of the SmartH2O project: London, Ticino and Valencia."

●Besides, the deliverable has been amended as detailed below.

7.2.3 Detailed response to reviewers' comments

Comment 1: This Deliverable appears more like a scientific paper rather than a Report Deliverable. Indeed it gives good overview of the SOTA but the "new mechanisms" or at least the definition of "new" or "innovative" pricing mechanism is missed.

Response: Section 3 (formerly Section 4) does introduce the two types of dynamic pricing schemes identified in this project. They do not exist without smart water metering. Such water tariffs have not been implemented anywhere that project partners are aware of. Therefore, **we state that the water tariffs proposed in Section 3 are dynamic and innovative, and thus constitute the milestone MS10**. These tariffs are simple, because in the absence of actual implementation by utilities, we focus on the basic rationale that underpin them, and on the simplest tariffs that could correspond to this rationale. Besides, there is evidence from the power sector that consumers fail to react rationally to incentives provided by complex tariffs, therefore complex tariffs might miss their goal of changing consumers' behavior.

In order to make the deliverable's structure clearer, we replaced Section 4 right after Section 2, so it is now Section 3. We amended its title and replaced it with "Proposed dynamic pricing mechanisms". Then, we clarified the presentation of the content of the section within the Executive Summary and Introduction. We improved the contents with illustrations of how those dynamic pricing schemes would work, using demand curves. Lastly, we revised Section 3.1 to better insist on why smart metering enables dynamic pricing schemes. On one hand, frequent measurements of consumption are a prerequisite to designing such tariffs. On the other hand, frequent feedbacks to customers, both on consumption and on what it means for their water bill, are necessary for tariffs to cause the expected behavioral change; such frequent feedbacks also are made possible by smart metering.

Comment 2: The flow of reading is disturbed by too many quotations (which should be in square brackets like in other Del).

Response: We fixed the quotation format. Nevertheless, this deliverable (and especially the meta-analysis) relies on a strong analysis of the literature to make up for the lack of data. For this reason, we believe that these references are needed within this deliverable. In particular, Section 2 describes the state-of-the-art in (static) pricing schemes, while Section 5 (formerly Section 3) relies on 125 published studies to simulate price elasticity.

Comment 3: Sections 2 - 4 are a compilation of already existing pricing schemes, well elaborated but the main content expected in this Deliverable starts in Section 5. Which is informative but in comparison to the whole deliverable turns out rather short.

Response: In the version 1.7 of the deliverable, submitted on 31 July 2015, Section 2 was the only section that dealt with existing pricing schemes. As explained in the "general remarks" part, Section 3 aimed at making up for the lack of data by compiling previous studies regarding price response – and we wish to insist that studies on price response are not an enumeration of pricing schemes. Then, Section 4 reported on the innovative pricing schemes that are proposed in this project. Section 5 reported on a tool that has yet to be tested for the real-life implementation of a dynamic pricing scheme (this decision is a utility's to take).

We amended the introduction and traded places between Sections 3, 4 and 5, so as to provide a much better justification of the deliverable's structure.

Comment 4: The lack of definition of what is new in this regard leads to the sensitive theme of social equity. The recommendation of "innovative" IBR (p. 41) stands contrarily to "… has been often asserted that IBRs may not promote the objective of social equity, since the consumption blocks are designed based on implicit assumptions concerning each individual's water use and household consumption (Bithas, 2008)..." (p. 12) This discrepancy is also shortly stated in Section 5.

Response: Thanks for pointing out this contradiction. We amended the passage (formerly p41, now p48), by removing the ambiguous word of "innovative":

"Secondly, our results reveal that the adoption of more sophisticated (yet non-dynamic) pricing schemes, such as increasing block rates (IBR) significantly makes pricing policies more effective. IBR introduction is found to increase the absolute value of price elasticity by approximately 40.5% (from -0.3505 to -0.4925)."

Besides, we pointed out ways to redistribute the excess revenue raised by "innovative" IBR is proposed, e.g., under the form of social tariffs (see Section 3.4)

Comment 5: Experimental exploration is minimalistic and consequently does not provide a convincing argument that the goals set for dynamic pricing can be achieved in real life scenarios.

Response: We understand the reviewer refers to Section 4 (formerly Section 5) here. We believe the Section title is misleading and should be replaced with "A tool for the experimental evaluation of innovative pricing schemes".

This being said, it seems difficult to provide an argument that dynamic pricing would achieve his goals in terms of modifying behavior, without smart meter data on the real-life implementation of such schemes. Therefore, the deliverable cannot go further than providing the design of a tool for the experimental evaluation of dynamic pricing schemes.

Comment 6: Further questions raised: - Why price elasticity is only for London and Ticino simulated? Why not Valencia as well? (p. 32, 3.6 Simulations:...)

Response: At the time of writing, UPV, EMIVASA and the Valencia case-study were not in the project yet. Yet, we added an estimate for Valencia

Comment 7: Model 2 (p. 33, paragraph 1, first line) is the econometric model? This could be better indicated (e.g. at 3.3. the econometric Model = Model 2)

Response: There are two econometric models, Model 1 and Model 2. We agree that they should be properly introduced, and did after Table 6 in Section 5.3.1.:

"We estimate two meta-regression models: Model 1 and Model 2. Model 1 entails a specification including only study-specific factors, i.e. factors capturing the way in which the primary study has been designed and conducted. Study-specific factors include data characteristics, empirical methodologies, variables taken into account in the water demand estimation and so on. Model 2 is augmented with location-specific factors, which include gross domestic product per capita, tariff structures, location, water scarcity and regulatory framework."

Comment 8: in the list of Deliverables in PPR2, p 47, there is a typo in the delivery date – should be 03.08.2015 (instead of 2016)

Response: Sorry for that. It is amended in the new version.

7.3 Deliverables D6.4 and D6.3.1

The purpose of these two deliverables is not clear especially that they contain lots of common information. Deliverables submitted contain an installation guide, while it seems they should present implementation and integration of the platform - work already reported in first year deliverables. It is expected that consortium provides updated version of these deliverables explaining their role and referring to essential content of other deliverables (e.g. D6.2, D7.2.

Response: one document is an annex to the Deliverable D6.4 which is OTHER nature (as defined in the Annex I). That is, the deliverable actually consist of the software artefacts which make the SmartH2O platform. Said this, we agree that this role was not sufficiently clear in the documents, and therefore we have restructured them, in order to make it clear to the reader their purpose.

In the executive summary we have now highlighted how the 2nd Platform Prototype is the outcome of the work done in a number of different work packages, as documented in the deliverables that are mentioned there.

On the other hand, we did not change the document labelled D6.3.1 for the reason that it is not an official deliverable (i.e. mentioned in the Annex I), but it is a document we issued to mark the release of the SmartH2O platform in correspondence to Milestone 12, second release of the Platform.

In the future we will use a different naming for these documents, in order to avoid misunderstandings and possible confusion with the software deliverables.

7.4 Deliverable 7.2

Comment 1: Report is of good quality, however due to changes in the consortium it presents validation results from only Swiss pilot (Valencia pilot is running and data is being collected). In order to accept this deliverable consortium needs to create an updated version providing baseline data for groups of users that have already used the SmartH2O platform in Valencia. Consortium needs to provide detailed validation results for Spanish pilot,for significantly larger number of consumers in the D7.3 that is due in M36.

Response: In section 5.4.1, baseline consumption data for 286 users of the SmartH2O platform in Valencia (clusterized in four consumption classes) have been reported. Moreover, section 5.4.2 has been expanded with presentation and assessment of the collected data on the behavioral baseline of those users.

Comment 2: Regarding presentation of Swiss pilot results in D7.3 - Consortium should have provided convincing explanation of high reduction in water consumption, especially that daily consumption rates reported, during the validation period of 3 months, are surprisingly low.

Response:The baseline consumption data for 33 users of the SmartH2O platform in Tegna have been recomputed excluding 6 users after inspection of their daily water consumption patterns, which showed anomalous behaviors (e.g. households remained unrented or seldomly used during the validation period). Average reductions (per consumption class and for the whole group of users) have been recomputed and are around 25% w.r.t. the baseline. However, the impact of seasonal variations (around 10-20% w.r.t. yearly average consumption according to the literature) will be fully assessed in deliverable D7.3, when data spanning several months will be available, thus allowing for a more accurate elimination of the seasonal biases.

Comment 3: Minor findings: pagination missing and the „feedback“conclusion“ were of rather average quality.

Response: The final sections have been expanded and rewritten to improve the overall quality.

7.5 Deliverable D8.4

The Deliverable is in line with the DoW. Section 3.3 states well the list of competitors - but it would have been appreciated to have also the information about how the Project SmartH2O will be / is distinguished, (the promising title of Section 3.4. "... competitive advantage" is only one figure...)

In Section 3.4 (page 38 and 39) a new text describes the competitive advantage of SmartH2O, which resides, in our opinion, in the combination of water analytics with gamification, an approach not present in any other competitor.

The Section 3.7.4. Sales strategy is well reasoned but no expected amounts of money are mentioned (a.k.a. "hard facts") Same for Section 5 Board Game - it is just mentioned as a reward, why not selling it directly?

The data related to expected revenues from sales are presented in another deliverable, D8.5. An explicit link is added in the text. In Section 5 it is mentioned that the game can be sold directly. Also Section 6, which describes the Digital Games, has been revised and improved, in order to better highlight the competitive advantage.

In an 'updated' version of section 9.2 individual exploitation plan for the “new” Spanish partners are expected to be included.

The individual exploitation plan of EMIVASA and UPV have been added.

Minor issues:

- ●check pagination,
- ●correct minor spelling mistakes (e.g. p8 - bi”d” data instead of biG data),
- ●figure 22 - layout PEST is unreadable - please provide a better way to present it, provide information of what is the advantage of SmartH2O compared to competitors presented in section 3.3 (this section provides good overview of competitors but does not explain how SmartH2O platform will outperform those). Section 3.4 is supposed to provide this information but is not,
- ●analysis and exploitation plan of digital games is minimalistic and needs to be improved.

Pagination has been added.

Spelling mistakes have been fixed where spotted.

Figure 22 has been split in two (Figure 22 and Figure 23) and its quality has been improved.

7.6 Deliverable D8.5

This Deliverable is of mixed quality: Intention and content are good and detailed elaborated, but the structure is unclear – starting with the table of contents is first seen that Section 2 + 8 are titled equally: business ecosystem context, also 3 + 9 titled equally: new utility business models. This fact is explained only then in the introduction, but it has to be discussed if it is possible to have one part public and another confidential in one deliverable. Nevertheless the confidential part with the financial analysis is quite realistic always given the fact that unpredictabilities can happen and the figures are not taken for granted.

Thanks for the kind overall comments. The parts I and II have been separated into **two separate deliverables**. **D8.5 presents the public part**, and it is submitted along **D8.5.1 which presents the confidential part**. Reasons for confidentiality are exposed for each public section that has a confidential counterpart in D8.5.1.

Some sloppiness in the performance minors the general good impression:

- How is the Nestle game called? 3 different names: WaterUseItWisely (Fig. 1) / Use Water Wisely (Table1) / Project Wet’s Use water wisely (Fig. 5)

Corrected (see Figures and Tables)

- p15: this paragraph is doubled - “ ...WaterSmart has found households who receive the reports are about twice as likely to participate in rebate and audit programs. Although WaterSmart's service has achieved positive results, the pilots raised questions about how frequently the reports should be sent and what sort of actionable information should be presented. For example, it might be more important to know how to shop for a water-efficient clothes washer than to know specifically how much water the household is using.”

Corrected

- first paragraph Section 4 is somehow unready: “In this chapter, elements already presented in Compared with deliverable D8.4 –Intermediate Exploitation Plan, chapter “3. SmartH2O Platform: joint exploitation strategies” –are taken to a more concrete level, and additional information is presented

The phrase “compared with” has been removed.

- p37 : same spelling mistake as in D8.4 (… biG data instead of biD data) → seems that is has been c+p

Corrected

- 4.4.1 Functionalities and modules in D8.5 is the same as 3.1.4. Modules and Packaging in D8.4

As precised at the beginning of Section 4, the Section builds on D8.4. This is the only instance where a bit of D8.4 was imported almost with no modification, because it was relevant as Section 4.4.1 in this deliverable

- p 42: correct the section - “...financial plan of Drop! The Game is found in section (Section 0).”

Corrected

-p 42: Executive summary – the chosen Business model of Moonsubmarine is B2C or B2B? → B2C is only mentioned in the text, not in the listing.

Thanks for spotting this mistake

- p75: Appendix indication Error

Corrected

- p88: cross reference to section is missing (“….section 0”) A revision of the Deliverable before making it public is highly recommended.

Corrected

8. Appendix 2. Reply to the third year technical report and to the observations made during the final review meeting

In this document we address the comments the reviewers has made on the status and progress of the SmartH2O project.

Here we address the comments on specific WP issues

8.1 WP1

No major issues

8.1.1 D1.4

“Doubts concerning impact of excess of efforts on financial claims **must be answered during the Final Review.**”

[SETMOB] For the Reporting Period 2 (01/04/2015-31/03/2016), following the assessment of the re-submitted deliverables, D6.4 has been accepted, but with a rejection of 12,253 euros as it was considered that D6.4 was overcharged with direct and indirect costs. This rejection is the equivalent of 5.36 PM for SETMOB.

In the following we explain the facts, both objectives and subjectives that led to this outcome.

From technical point of view, during the second project year, we had to apply changes to the initial approach of the software development technology, as the initial software stack based on Big Data technology running on Linux (Apache Hadoop, Pig, Oozie, Ambari) had to be migrated on a Windows environment made available by EMIVASA in the Spanish case-study. This fact alone required extra development effort for EMIVASA integration.

Also, from a technical perspective, SOAP web services exposed by Emivasa had to be enveloped in pre-developed REST services leading to a necessary effort to adapt the service interfaces.

From financial point of view, the initial unit cost of a PM estimated in the budget was 2,500 Euro. This allowed hiring only junior personnel during the project development (Y2 and Y3) because of the Romanian market condition changes, i.e. the increase of average fees of the IT experts to a higher level than the budgeted one. This led to using junior personnel and subsequently spending more time (PMs) instead of hiring senior personnel and overspending in terms of spending money. So, there was a need of spending more effort with junior personnel to fully achieve the objectives and remain in the budget limit. The use of senior personnel would have led to an exceed of the budget.

The reason for exceeding the number of PM consists of the fact that we did the project task by using junior programmers. Therefore we had to register more working hours at a lower cost than the cost of the budgeted PM. We have not overrun the budget in terms of spent money (in fact we did a saving) but we have overrun the number of budgeted PMs for this deliverable. Below, we present a table with the number of PMs spent in Year 2 and Year 3 for tasks under WP6.

SET MOBILE: NUMBER OF SPENT PM UNDER WP 6

YEAR	DELIVERABLE	No. of PM
Y2	D 6.4 Platform implementation and integration – second prototype	14,80
Y3	D 6.5 Platform Implementation and Integration - final prototype	10,62
Y3	D 6.6 SW Quality assessment report	8,26
TOTAL		33,68

As conclusion: SETMOB worked with persons that cost less than the average budgeted PM so we registered more effort, but the budget in term of spent money is unchanged.

8.1.2 D1.5

From the review report: "Minor remarks: Aggregated quantitative summaries of publications and dissemination actions would have been appreciated. Societal implications are addressed in a separate document (Questionnaire)."

The aggregate summaries have been presented at page 31, before the detailed tables. The societal implications have been added as Section 3.

From the project review: Describe in D1.5 in the final report why to save water is important for the utilities. Why save water, when utilities make money by selling water? The efficiency, optimisation pumping and pricing.

The Executive summary has been revised:

The main objective of the project was to develop an ICT solution to enable water utilities to face the future challenges posed by a growth of urban water demand in face of diminishing or constant availability of water supply. While water utilities profit by selling water, it is their utmost interest to be able to provide water to the customers in an efficient and reliable way, minimizing waste of water and of energy (e.g. pumping and treatment). This explains why even water utilities are interested in saving water.

To this aim, the SmartH2O platform supports water utilities in this aim by: understanding and modeling the consumers' current behavior on the basis of historical and real-time water usage data; predicting 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; and finally raising the awareness of water consumers on their current water usage habits and their lifestyle implications and to stimulate them to reduce water use.

Section 1.4.1 The socio-economical impact and the wider societal implications has been slightly revised

Water demand is growing worldwide, especially in densely populated areas, as a consequence of population growth and urbanization. The increase in water consumption should be, in principle, positive for the business model of a typical water utility. Yet, the spatial concentration of water demand in urban areas is impacting demand magnitude, peak intensity, share between use sectors, and indoor and outdoor usage. This, coupled with climate change and land use change, is intensifying the stress on finite water resources, creating both operational and environmental challenges to water utilities, which still need to satisfy the demand of their customers.

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and outdoor usage. This, coupled with climate change and land use change, is intensifying the stress on finite water resources, creating both operational and environmental challenges to water utilities, which still need to satisfy the demand of their customers.

8.2 WP2

Not active in Y3

8.3 WP3

Not active in Y3

8.4 WP4

"Next, the DoW asked for recommendations and identification of the most effective leverage to stimulate water use change. This issue should be strongly underlined and explicitly described as one of the most important results."

This comment has been addressed in D4.5, see below.

8.4.1 D4.4

Minor remarks:

● Some sections of the document (e.g. 2.1.2) have not been updated (use of future tense, we expect reporting of the action taken)

Sections have been updated.

● Only Android version of "on-the-go" consumer portal is reported. Will an IOS version be developed?

Only Android.

● How many copies of the card game have been actually distributed?

1500

● What reception to the crowdsourcing (translation of the questions)?

Translation was done by an internal crows of international students

● It would have been good to have learning curves, showing the evolution of answers of the portal users over time

The learning curve have been added in D4.4 section 3.3.

● Section 4.4: the average in page 59 may be distorted by the very high outliers (200). More interesting would have been the weekly averages per user.

This comment refers to Figure 41. Explanations have been, showing that lead users with a large number of logins are not a statistical problem, but a commonly found, and also necessary pattern in online communities and social awareness applications.

● Figure 16: the title should be "Distribution of performance expectancy scale", not sale.

Fixed.

8.4.2 D4.5

From the review report: "However the DoW asked for recommendations and identification of the most effective leverage to stimulate water use change. This issue should be strongly underlined and explicitly described as one of the most important results."

From the project review: Extend section 6.3: Lesson learnt to be expanded. Expand the description of Figure 41. Explain the "achievers".

Section 6.2 Lessons learnt and recommendations has been expanded appropriately, covering both the use of the introduced behavioural role analysis for communication campaigns, as well as the most effective incentives to induce water saving behaviour.

Minor remarks

The structure of the document is a little bit confusing: why were the case studies split by the description of the network crawler and data analyzer?

Because the NC and SN data analyzer have a broader target than pilot users only

● Do users know that they are profiled?

NO, they are generic twitter users. By signing up for Twitter they have consented to the Terms & Conditions, which includes the public visibility of their tweets, unless they have switched this off in the settings.

● Automated analysis provided by the module can probably be completed. Has this been considered?

As discussed during the review, this can be a possibility for further development and extension.

● Figure 3 and 13 need further explanation. As a public deliverable the document should be easy to understand by a public audience.

Explanations about what is shown in the figures have been added

● It is not clear why the metrics are described twice (once at pg. 7 -10 and secondly at pg. 23-24)

This duplication is redundant and has been removed

WP5

"A minor concern with the developed work concerns the ability to adaptively learn the demand response model, which has not been addressed."

R1:

Given the context – utilities being reluctant to engage with forms of pricing they see as a PR risk – the ability to adaptively learn the demand response model can, for now, only be carried out using data from "traditional" price increases. This is what has been done in D5.2 with the meta-analysis. This work is being extended in a publication (in revision) where we demonstrate that data from previous studies can be used to build a statistical model that provides a first assessment of the price response in a given situation. In particular, results suggest the nature of the pricing scheme has an impact. Thus, increasing block tariffs lead to a more elastic price response than price increases with a uniform volumetric price.

In principle, this adaptive learning of the response model can be extended to dynamic pricing schemes when such tariffs are implemented in practice. But for this, data on implemented dynamic pricing schemes are needed; otherwise, there can only be speculation on what factors may influence dynamic tariffs the most.

“it should bring more insight in understanding explanation why the dynamic water price considered in the project does not account for consumption uncertainties.”

R2:

We are not sure what reviewers mean by this, because we are fully aware that the price response is uncertain. Without direct observation of the consumption changes in response to dynamic pricing, the impact of prices on consumption can be explored:

1) By assessing the potential of dynamic pricing schemes under a range of different price response, i.e., a range of different consumptions in response to a dynamic pricing scheme. This is what was done in particular for the London case-study in D5.3, Section 4.

2) By building statistical models that explicitly incorporate uncertainty while describing consumption in response to price. This is what was done in the meta-analysis of D5.2, Section 5, and with the experimental data from D5.4.

“However, one of the major objectives of the project was “Saving water by dynamic pricing schemes”. The content of the corresponding deliverable (D5.4, See 2c.) **does not fully prove that this objective was reached**.

R3:

First of all, we would argue that the workpackage title “saving water by dynamic water pricing” is not an objective that should be taken literally, but rather a topic to explore. Thus, the goal here is to explore how water could be saved by dynamic pricing, not necessarily provide a full-fledged assessment of how much water dynamic pricing saves exactly.

As we are sure reviewers are aware of, the only way to fully prove that dynamic pricing can save water is through a real-world implementation of dynamic pricing. Barring that, we can only evaluate and try to demonstrate the potential for dynamic pricing to save water. Demonstrating this potential is a necessary step towards the real-world implementation of real world dynamic pricing schemes, and therefore, towards the end objective of “saving water by dynamic pricing schemes”. We demonstrated that potential through two types of analysis:

1) In D5.3: hydro-economic analysis to demonstrate the potential for dynamic pricing to save water when this is most needed: in time of drought.

2) In D5.4: results from the online experiment (Section 5) suggest that the dynamic nature of the pricing schemes (i.e., the fact of getting to a price p after a price increase) can lead to a reduced consumption, compared with imposing that price p from the onset. Results also demonstrated that the response due to dynamic pricing could be magnified during droughts, when saving water becomes imperative.

Additional comments from the project review:

-Add critical discussion of hypotheses that were done (see slide 15, first red point)

-state how the obtained results can help in the future strategies

This was done:

●D5.3 a conclusion section was added, with a discussion of critical hypotheses

●D5.4, a perspective section was added to understand how obtained results can help in the future

D5.3

"It has no conclusion section."

We wrote a 3-page conclusion to put the findings into perspective.

"The connection between scarcity and water price is described as it was requested in the DoW. The application of the dynamic pricing was presented on the examples of two case studies. The approach is quite similar, but not the same. The reviewers would appreciate if the differences of the applied approaches would be explicitly described together with the summary of the achieved results for both case studies."

We understand this remark refers to content that reviewers would appreciate to see in a conclusion section. Methodological differences are related to the different contexts of the case studies. Explanations on the different characteristics (e.g., part of residential consumption as a fraction of total consumption, existence of current vs. future stress, along with results have been inserted the conclusion (Section 6.2)

Detailed comments:

The comparison of the two case studies is not done.

● A number of hypotheses are made, the impact of which is not discussed.

● The integration with other (external) systems providing relevant information is not discussed.

Reply to all three comments in the same order:

Ø The compared characteristics of the case studies are outlined in the introduction, to justify the differences between the sections. They are now re-discussed in the conclusion section, including a table summarising these differences (Section 6.2)

Ø Assumptions are discussed in Section 6.3.

Ø Discussing these assumptions amounts to pointing out how they could be relieved by new data and methods. In particular, the input of other disciplines, and real-world tests of pricing policies, are needed to make progress on the assessment of residential price response (modelled in D5.3 with the price elasticity of demand).

SUMMARY OF ACTIONS:

- We added a conclusion section (6) and added a paragraph in the introduction to announce it.

D5.4

"However, the first experiment gives the information about the consumers willingness to save water since dynamic pricing has not been applied in the project's case-studies. Hence this experiment cannot provide a "final assessment of the water pricing schemes", as stated in the description of work."

No assessment can be considered final without a real-world implementation. Barring that, a necessary step toward that final assessment is to use an experiment to demonstrate that there is a price response from dynamic pricing schemes that can be exploited. In particular, the second experiment of D5.4 provides an assessment of the dynamic nature of a dynamic tariff, and shows that there is an impact from changing the price, rather than simply depending on the price levels.

We agree that the experiment alone is not a "final assessment of the water pricing schemes". In that respect, a newly added Section 6.2 puts finding from WP5 into perspective, by showing that WP5 work, though forced to worked at the stage prior to real-world tariff trial, does answer the two most relevant question at that stage: can dynamic pricing have an effect in reducing consumption? And what are the potential utility- of basin-scale impacts of these schemes?

"In the second experiment users mainly from United States and Canada were considered. The Authors explanation of this fact is rather fuzzy (the consortium points out that it was mainly due to language problems. This clarification is rather strange, because the questionnaires could be translated) and **should be clarified during the review meeting**."

Reviewers are right to point out that the explanation given is incomplete. In fact, a key concern when designing the experiment was to propose an innovative type of design that water utilities could replicate, except they would reach directly to their customers via their own online platform or website, rather than through a site such as Microworkers. With that in mind, the goal is then to design an experiment that draws from a culturally (and linguistically) homogeneous pool of respondents that is large enough that the entire experiment can be carried out within the pool. If there are not enough respondents, then conclusions cannot be drawn and resources have been wasted. We also wanted respondent to be of Western culture, so the experiment can be easily adapted to any water utility within the EU. With that in mind, the largest pool of respondent was that chosen after preliminary tests including North America and EU countries. Those tests 1) tested the experimental setup but also 2) the rate at which respondents would take the experiment (used as a proxy for the size of the pool).

These explanations are included in the Section 5.3.5 of the revised version of D5.4.

However, one of the major objectives of the project was "Saving water by dynamic pricing schemes". The content of the deliverable does not fully prove that this objective was reached. **This issue should be clarified and discussed during the review meeting in Brussel**

Please see our response to your first comment for D5.4.

The (qualitative) conclusions of the tests reported were expected (what was learned?) and bear no strong message with respect to actual modelling of the demand curve under the considered constraints. A better use of the spent resources could have been to formulate properly the learning problem as an adaptive experimental design problem under different constraints.

We disagree that the conclusions were all expected, especially when it comes to the second experiment (Section 5). Its goal was to design an innovative online experiment to bring about answers to the following two questions:

1) Do water users respond differently to pricing and incentives when they can change over time?

2) What is the impact of the circumstances (e.g., occurrence of a drought) in which a pricing scheme, especially a dynamic one, is implemented?

Unless we are mistaken, those questions have not been asked before; therefore, their responses cannot be "expected" – intuitive as they may be. They highlight the potential of dynamic pricing.

D5.4 documents how questionnaires and experiment can only assess the price response for one fixture at a time, while the demand curve aggregates all fixtures. Therefore, modelling the demand curve would mean conducting questionnaires / experiments on more fixtures at the same time, while investigating the response to different prices. Such an endeavour seems to be way beyond available time and resources.

“What was learned” from the whole workpackage is summarised and put into perspective in a new Section 6.2. Additionally, that section shows that the work provides tools and templates to pre-assess dynamic pricing schemes; utilities can later use the data at their disposal (including smart metering data) to fit these templates to the more focused questions they may want an answer to in order to fine-tune their dynamic pricing schemes.

At last, the reviewers would like to ask why dynamic water price considered in the project does not account for consumption uncertainties ?

The issue related to consumption uncertainties, i.e. the inability of people to precisely assess their own water consumption and more importantly the consumption associated with each water consuming activity, is very relevant and plague also studies that use real water consumption trajectories. After all, if actual and perceived water consumptions may be different, how can we be sure that responses are to be completely attributed to the change in the incentive mechanism?

The issue does not vanish when using surveys or experiments as we did. However, recall that to test the effectiveness of pricing measures we are interested in measuring the changes in water consumption under a given incentive mechanism, more than consumption levels. This allowed us to mitigate the uncertainty issue in two ways.

First, in the experiment we asked people to indicate what their showertime would be under different prices. Thereafter, we computed the effect of price change by difference. This procedure allowed us to wipe away potential upward/downward errors each individual should have made in assessing her/is own usual showertime.

Second, should the amount of the potential upward/downward error be related somehow with the actual showertime of each individual, we have coped with this by controlling for how much time each respondent indicated her/is usual shower takes in our econometric models.

We introduced a Section 2.1.2 that clarifies this within the deliverable

SUMMARY OF ACTIONS:

- Added a section 6.3 that puts the whole workpackage into perspective.
- Added a paragraph on the geographical location of respondents in Section 5.
- Added Section 2.1.2 to tackle uncertainties in consumption.

8.5 WP6

From the Project Review: the Project Officer suggests to put the EU logo in a more prominent position both on the web and the mobile version of SH2O

DONE, it now appears prominently at launch

From the project review: a question on the accessibility of the app on online store: how someone can donwload it?

SH2Oapp is currently restricted to Spain since it can be used only by Emivasa users, we also enabled Italy, Switzerland, Germany and Romania for testing purposes.

We can enable it worldwide but it would not make much sense since only Emivasa users could actually log in.

Drop is available worldwide, but you can find it on the store only searching for "drop smarth2o" or "DropTheQuestion". We are not indexed for "drop the question" or "drop game water", for example. The indexing of our metadata is correct but the app has no reputation since we have 120 installs and 100 uninstalls and just a few reviews, so the play store will never increment our index with such a reputation. There's nothing we can do, if not starting a marketing campaign to increment the number of downloads.

8.5.1 D6.5

No major issues

8.5.2 D6.6

"However, the details regarding validation tests have to be presented, i.e: the wide descriptions and in depth analysis of the validation tests with a strong stress of each test purpose, expected and achieved result (what was tested and how, are modularity and evolution easiness conveniently covered, what were the results in terms qualitative and quantitative results), or at least wide clarification of the presented data should be delivered. **Without a description of the above listed topics this deliverable cannot be accepted** as a document that fulfills the DoW expectations. The report should contain the full list of results of all the performed tests, which could be joint as an annex to the document."

As agreed with reviewers we added a section in the document, section 5 Performed tests where we detailed the tests (code quality, performance and stress tests) we performed on each component. Also, we added an appendix with the testing results on the main functionalities.

POLIMI provided new testing logs of the main functions of POLIMI's components.

SETMOB provided new testing results on the Quality code testing results for the main REST services. The Quality code testing results have been added to section 5.1 The tests have been performed using using FindBugs, CheckStyle and JavaNCSS against software components that have not been developed with Webratio or other automation tools that ensure built-in quality check: ESB integration services (Generic-Customer-Signup project and CustomerSignUp project).

A reach Annex (1793 pages) completed with the logs of all the performed tests against the software components has been added to the deliverable.

8.6 WP7

"However, clarifications are necessary with respect to the pertinence of KPI_4 % of customers expressing intention to voluntarily adopt a dynamic pricing scheme if available. In fact, the SmartH2O experiment is designed in a way not implementing the dynamic pricing mechanisms therefore extrapolation of the results for this KPI may be difficult if not impossible."

We do not deny the fact that real world experimentation with dynamic pricing was not possible in the real world case studies. This was outside of our direct control, unfortunately. Yet, we think that expressing the results of the questionnaire on acceptability of dynamic pricing schemes will be, while not the same thing, a useful information for the readers, so we decided to keep it in this report.

“The obtained results KPIs related to the improvement of efficiency of water utilities (KPI_5, KPI_6 and KPI_7, KPI_8, KPI_9) are less convincing, and some of them even impossible to be applied. This lowers considerably the validation outcome and therefore the potential impact.”

As suggested during the project review, KPI which were not directly relevant to the case studies have been removed.

8.6.1 D7.3

“The only one problem is the lack of real life validation of dynamic pricing policies, which was replaced by Percentage of customers expressing intention to voluntarily adopt a dynamic pricing scheme if available. As was mentioned above **this issue has to be discussed during the review meeting in Valencia.**”

Detailed comments:

● Why consider separate indicators that are directly proportional to another?

As suggested during the project review, the concerned KPI’s (KPI_6, KPI_7, KPI_8) should not have been considered and have therefore been removed from the final version of the deliverable.

● Some non-observable indicators (e.g. KPI_9) could have been predicted.

● The issue of personal consent for use of personal data would deserve a deeper treatment.

We agree with the reviewers that this can better be explained. Explanations have been added to Section 2.4 (Final social awareness app), containing Terms & Condition, pseudonymization of smart meter data, and the privacy issue related to the display of the user’s address on the map. Second, a brief explanation has been added to Section 3.2 Validation method that addresses the collection and treatment of questionnaire data.

● All remaining issues related to the hydro-economic modelling that will support the scarcity dynamic pricing strategies, which is based on a number of assumptions, are not adequately covered.

We have not described hydro-economic modelling in this deliverable. For a more complete description we refer to D5.3 and D5.4 deliverables.

● The results of the ABM on monthly and daily consumptions (Figs 23, 24) are rather disappointing. The same happens for the Swiss case. The model seems to be unable to reproduce variations.

We agree with the reviewer that the performances of the ABM at the level of granularity of the concerned figures (monthly average consumption or daily average consumption over the whole simulation period) do not look very good. This is however not the case if we consider a lower granularity. More specifically, if we take into account the percentage MSE between the simulated daily consumption results and the observed daily consumption results, this value is usually low (even very low). For this reason, and as suggested by the reviewer during the final review meeting in Valencia, the controversial figures have been eliminated, and all percentage MSE have been thence explicitly added to the tables of the simulation results.

From the project review:

> -ABM: either comment the concerned figures the issue related to the fact that , at that level of granularity, the ABM does not capture variation, or actually just remove figures and point directly on KPI 1 and 2.

The figure has been removed.

8.7 WP8

No major issues at WP level

8.7.1 D8.6

"D8.6 Final Exploitation Plan is uncomplete and for this reason the activity cannot be considered as completed. In particular the following information should be provided in the part related to the industrial/commercial exploitation plan:

● Stakeholders' analysis, which should take into account the granulometry of water utility companies (public, private and mixed) and their needs and expectations ;

We added a Table at the end of Section 2 "Smart water technology and regulation: update", which differentiates the analysis of the needs and expectations of public and private utilities and highlights the prominent areas where the SmartH2O approach and platform may benefit. The situation of mixed utilities is somehow intermediate between the observations reported in the Table.

Also we added a mention in Chapter 4 Final exploitation plans stating that an analysis of the granulometry of water utility companies has been addressed in deliverable D8.1 Early exploitation plan.

● More precise definition of SmartH2O offer with respect to products and services and in particular its technological maturity (Technology Readiness Level (TRL)) and interoperability with the existing automated smart water meter and legacy water management systems;

We added Chapter 3 SmartH2O offer, interoperability and security that:

- analyses the SmartH2O offer in regard to the TRLs of the integrated platform and of the assets making the platform; the TRL table has been added too;

- describes the interoperability of the SmartH2O platform to existing IT infrastructures of the water utilities, stating that the integration is performed at data level and doesn't depend on a proprietary system.

- describes how the SmartH2O platform deals at its core with the security and privacy topics and the process of observing the EU directives, communications and strategies regarding cybersecurity, that has been undertaken by the developing partners during the development, testing and validation of the SmartH2O platform.

● Competition positioning of SmartH2O products and services on the segmented market;

We added a mention in Chapter 4 Final exploitation plans stating that the competition analysis has been addressed in deliverable D8.4 Intermediate exploitation plan while the analysis of the market positioning of the SmartH2O platform has been performed in D8.5 Business ecosystem report.

● IPR agreements between beneficiaries;

We added section 4.2 IPR and agreements among partners, mentioning that the partners have signed before the beginning of the project a Consortium agreement stating the rules on pre-existing IPR and the IPR developed within the project and mentioning the type of relation between WEBRATIO and SETMOB as partners in the joint venture to commercially exploit the outcome of the SmartH2O project.

● Clarification of the WebRatio/SETMOB Joint Venture with respect to time-to-market and more details on the product industrialization issues (investment, risks, etc.)

In the same section 4.2 we evaluated the risks and investment required for the industrialization of the platform. We consider the risks as being low, because the joint venture is offering a finished product (out of the shell) as well as integration and customization services intended to guarantee the integration and the adaptation of the SmartH2O platform to specific technical conditions that may be encountered at different water utilities.

● Clarification as for the roadmap related to intentions of water companies EMIVASA and SES in the industrial exploitation of SmartH2O platform.

We added the business actions that will be undertaken by SES and EMIVASA for exploiting the SmartH2O project outcome, as stated by the representatives of these partners during the review.

The updates are necessary in section 2 for market barriers and conclusions on position of SmartH2O technological and architectural choices with respect to the non-standardized market and the variety of national-wise recommendations.

We have added a subsection “Market barriers and SmartH2O interoperability and architectural choices” to Section 2 to summarize the SmartH2O technological and architectural choices with respect to the non standardized market and the variety of national-wise recommendations.

In addition, more information on the pricing strategies for SaaS SmartWater web analytics targeted by WebRatio would allow assessing the credibility of the corresponding business plan.”

We added the paragraph Pricing strategy in section 4.1.3, stating that the pricing strategy of the joint venture is based on:

- the SaaS business model;

- an initial offer starting from 5 Euro/active user/year (we’ll continue assessing how this price level fits with the client expectations while we’ll adapt the pricing level based on the market feedback);

- commercial offer including integration and customization services

8.8 WP9

“Datasets section is empty and open source software not available.”

This has been corrected in the meantime. We have published two datasets on Zenodo.org and the source code on Github.

Software: http://smarth2o.deib.polimi.it/results/software/

Datasets: http://smarth2o.deib.polimi.it/results/datasets/

8.8.1 D9.4

No issues