the smart H2O project

A European project on water sustainability

FINAL DISSEMINATION REPORT

SmartH2O

Project FP7-ICT-619172

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Executive Summary

This deliverable contains the final dissemination report of the SmartH2O project. According to the DoW, “This deliverable contains the last report of the scientific publications and of the dissemination actions performed during the last 12 months of the project. This report will also include the material printed during the Summer School and during the dissemination event at the World Water day, also providing templates and "howtos" for the further dissemination of SmartH2O after the project end, especially aimed for future possible exploitations of the results. [month 36]”

In the third year of activity, SmartH2O has been particularly active in all the communication channels set up during the first two years of the project lifetime and described in previous WP9 deliverables (i.e. D9.1 – Dissemination Tools and Materials, D9.2 – First Dissemination Report and D9.3 – Second Dissemination Report), which allowed performing a variety of activities targeting different audiences.

SmartH2O made a large use of social media, complementing the standard website communications with Twitter, LinkedIn, and Slideshare in order to reach the general public. As a result, all the targets defined in D9.1 – Dissemination Tools and Materials have been met: 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. Moreover, numerous public events with the SmartH2O users were organized. Several contacts with parallel projects and water companies have also been established for showcasing the SmartH2O results and collecting feedbacks from experts in the field.

At the same time, SmartH2O produced top-level scientific results, as demonstrated by the 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, SmartH2O organized a summer school on “Smart Systems for Water Management – Modelling, Simulation, Analytics and ICT for Behavioral Change”. The school, held on August 22-25, 2016 at Monte Verità (Switzerland), 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.

Finally, SmartH2O has also planned to support the ongoing and future activities related to the exploitation of the final project results beyond the project lifetime by means of a series of press releases that will be distributed in the months of April and May 2017 to showcase the validation of the SmartH2O platform in the two case study applications.

1. Introduction

This deliverable D9.4 contains the third and final dissemination report of the SmartH2O project, reporting on the dissemination actions performed during the third year of the project. The deliverable is part of the activity of WP9. WP9 aims at designing an effective communication strategy for the project and at disseminating the project results at the local, national, and international level.

The document includes the results of the active tasks of WP9:

- T9.1 Communication strategy and planning, for the initial definition of the project communication strategy and the continuous monitoring of the communication and dissemination activities' effectiveness.
- T9.2 Dissemination material and tools, for the construction of the project's visual identity and the dissemination material
- T9.3 Dissemination events, for the promotion of the project's results during the project lifetime, both at the local level and at the international level.
- T9.4 The SmartH2O Summer School, which had taken placed in August 2016.

The document is structured as follows: in Section 2 it reports on the dissemination impact through the channels which have been set up, namely website, newsletters and social media. In Section 3 the report describes specific actions performed in targeted events, such as the SmartH2O Summer School and the Final Dissemination Event, besides listing the networking activities which have been continuously carried on. In Section 4 an update on the scientific publications generated by the project is provided. Finally, in Section 5 we present a final assessment of the communication strategy with respect to the goals we had set at the beginning of the project.

2. Dissemination and communication channels

2.1 SmartH2O website

The SmartH2O project website (http://www.smarth2o-fp7.eu) is online since April 2014 and has been constantly maintained and updated to communicate the project progress. It has been implemented using WordPress and is organized in 6 pages plus contact details. The website has been instrumental for multiple objectives, such as disseminating a "brand identity" of the SmartH2O project, informing the main project objectives and research questions, sharing the project outcomes, involving and engaging the stakeholders, broadcasting and sharing news through social networks (see, for example, the tweet roll shown and the video of SmartH2O platform's demo in the homepage of the website in Figure 1).

The website provides a summary of the SmartH2O project in terms of concept, objectives, technical architectures and use cases, a description of the consortium, the project results (i.e., deliverables, publications, software, datasets), a list of the main events organized/attended as well as a collection of media and project presentations (see Section 2.3.3). During the third year of the project lifetime, we continued updating the website with project results (i.e., publications, software, datasets), news and events, and all the public deliverables (see for example Figure 2-3-4).

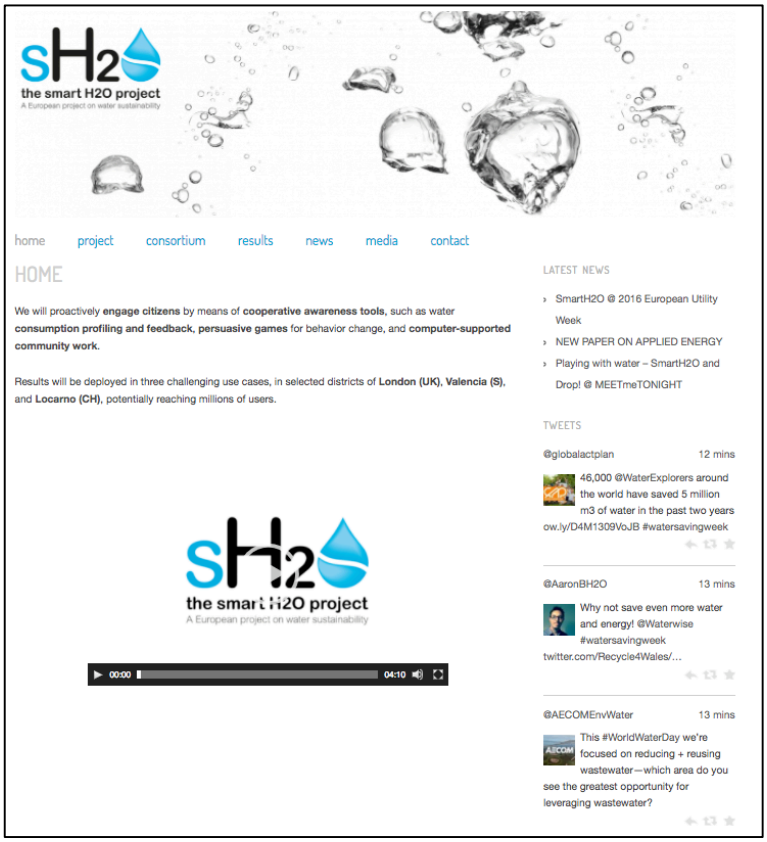

Figure 1. SmartH2O project website (homepage).

Figure 2. SmartH2O project website (publications page).

Figure 3: SmartH2O project website (deliverables page).

Figure 4. SmartH2O project website (news page).

During the third year, we continued monitoring the access to the SmartH2O project website (see Figure 5), in terms of the total number of visualizations, the percentage of new or returning visitors, and the locations of the visitors. The analytics on the website usage are reported in Table 1. Figure 6 shows a map of the geographical distribution of visitors, which shows a wide diffusion of the contacts to our website, now covering all European countries, most of South America, Asia, and Oceania, and few contacts also from Africa.

Table 1: Analytics on the SmartH2O website from 10/10/2014 to 20/03/2017.

Statistics	Y3 results
Number of sessions	9,160
Number of users	5810
New visitor	63.4%
Returning visitor	36.6%

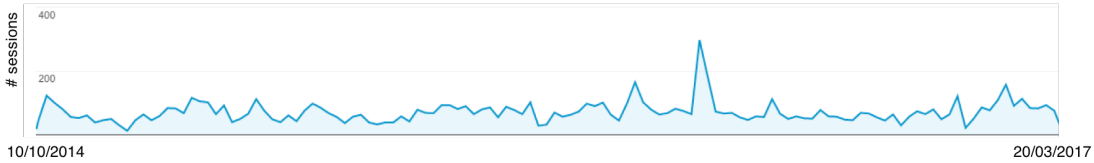

Figure 5. Number of sessions registered on the SmartH2O website from 10/10/2014 to 20/03/2017.

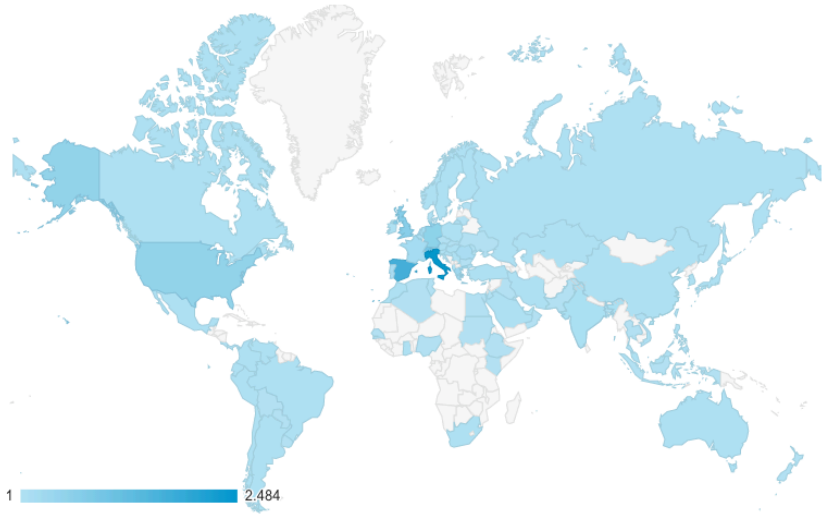

Figure 6. Geographical distribution of the sessions registered on the SmartH2O website from 10/10/2014 to 20/03/2017.

2.2 SmartH2O newsletters

In the first two years, two issues of the SmartH2O project newsletter were published[1]. In the third year, we released the third issue of the newsletter[2] on March 30th, 2017 to update about the final project results.

The underlying idea of the newsletter is to make readers familiar with SmartH2O topics, introducing some of them in-depth, providing flash news about major achievements, and informing about on-going initiatives in the SmartH2O social community. The target is to reach a wide audience, not necessarily belonging only to the scientific community.

All the newsletters were distributed in HTML-format to be easily visualized online as well as on smartphones. They were 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, and via the professional networks of individual project partners, including but not limited to their social media channels.

The third issue of the SmartH2O newsletter contained the following contributions:

- Launch of the web portal in Valencia
- Final water saving results
- Dynamic pricing experiments
- Report from the 2017 WaterWise event
- SmartH2O events, deliverables, and publications
- Selected news and events

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[1] Issue1: http://us10.campaign-archive1.com/?u=f1aec1420b477940372ec8b43&id=5b3c3cd91c&e=5a6e0736d6

Issue2: http://us10.campaign-archive1.com/?u=f1aec1420b477940372ec8b43&id=5fc9f1ad2c&e=6f3edabd2a

[2] Issue3: http://us10.campaign-archive1.com/?u=f1aec1420b477940372ec8b43&id=8f050c22e2&e=677c5c26db


SmartH2O Newsletter - Issue 3

View this email in your browser

sH2O Website sH2O Twitter sH2O Innovation Community

SmartH2O Newsletter

Dear Readers,

the SmartH2O project is finally coming to an end. It has been three intense years with ups and downs as it usually happens in such collaborative projects. We lost the opportunity of deploying the SmartH2O platform in London, as the metering infrastructure had been delayed, but on the other hand this gave us the opportunity to get Valencia on board. The local water utility has more than 400,000 smart meters already deployed and this gave us the possibility of proceeding with the validation of the scientific hypotheses supporting the SmartH2O approach. You can read more about the Valencia case study in this issue of the newsletter.

The question you surely have for us at the end of the project is: does it work? Or better: can we stimulate users to change their water consumption behaviour by means of an increased awareness on the environmental and economic consequences, supported by a gamification approach? Our results are generally positive, in some cases more substantial than those observed in other studies: we have observed a difference in consumption between the intervention and the control group of more than 21%. Yet, we think that these results are preliminary, as we have tested this platform in only two pilots, with a little over 550 involved users.

Figure 7: Excerpt of the SmartH2O newsletter, 3rd issue.

2.3 SmartH2O social media channels

2.3.1 SmartH2O Twitter activity

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.

Figure 8. SmartH2O project Twitter account.

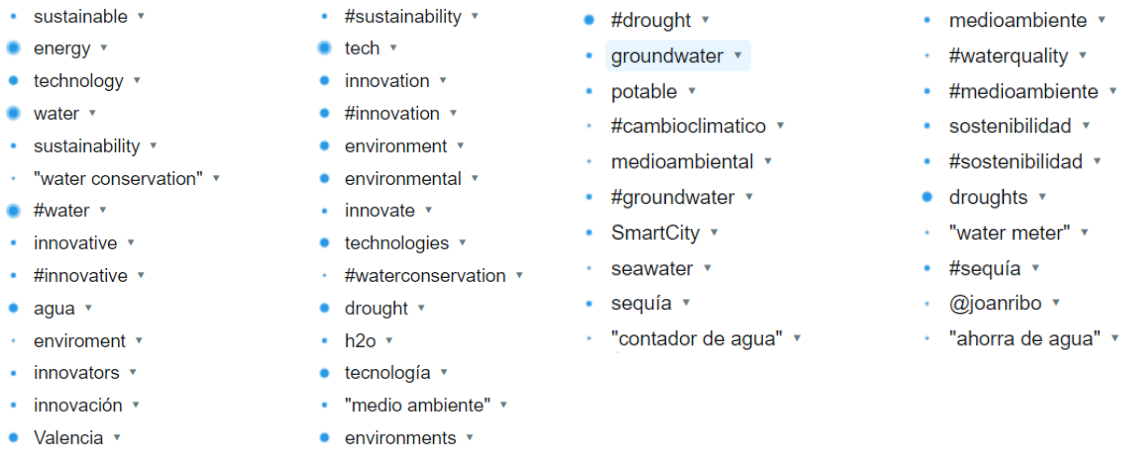
Table 2. Analytics on the SmartH2O Twitter account (21/03/2017).

	Y1 results	Y2 results	Y2 results	Target - Y3
Number of followers	122✔ (297 tweets)	540✔ (1174 tweets)	713✔ (1582 tweets)	300+

At the end of the third year, the SmartH2O Twitter account has reached 713 followers and 1.582 tweets (status March 21, 2017), not only meeting but going greatly beyond the target defined in D9.1 (see Table 2). Most of our tweets get a reaction by our followers: either a like, a retweet or adding as a follower and we are 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). The editorial team of the project also used this page for identifying interesting tweets to be disseminated further also through the SmartH2O Twitter account.

In addition to these continuous Twitter activity and results, in Y3 additional localized Twitter communication targeting the Spanish pilot has been performed. To extend the reach of the promotional activities in order to make the local community aware of SmartH2O and to draw potential users to the SmartH2O platform, two Twitter ads campaigns were launched. Such campaigns offer opportunities for reaching out to users who cannot be reached through traditional communication campaigns. One campaign was held from December 14 to December 19, the

other in 2017 from January 10 to January 15. Both campaigns were targeted at the Valencian metropolitan area. The December campaign was a regular Twitter campaign for which keyword targeting was used. To improve targeting, keywords related to the users' environmental interests (e.g. water, environment, water conservation, sustainability, drought, groundwater), technological affinity (e.g. innovation, technology, SmartCity), and regional relevance (e.g. Valencia) were introduced. The following keywords (English and Spanish) were used:



In contrast to the broad keyword targeting used in the December campaign, the January campaign was targeted at a list of 4270 users from a dataset that was developed in *D4.5 Final social network analysis trust & people search techniques.* Following the approach outlined in this deliverable, for this second Twitter ads campaign users were targeted not based on keywords, but on their behavioral role they demonstrate on Twitter. For each role (e.g. observers, creators, disseminators, authorities) a separate mini campaign was set-up. This Twitter ads strategy is useful to reach small, but highly relevant target audiences that are known to the advertiser (e.g. the utility). As such, it complements the broad keyword campaign that was run in December. The January campaign has run for a week, similar to the campaign in January. For both campaigns, a maximum budget of € 75,00 per day was invested. The campaign featured six advertisements that were designed to appeal to different motivations for users to sign up to the SmartH2O portal. Examples of the ads are displayed in Figure 9. The campaigns have yielded a total of 234,053 impressions with a total cost of €464.

Figure 9: Examples of Twitter ads used in the campaigns.

In parallel to the activities described previously, IIAMA-UPV has also carried out some Twitter dissemination actions using the IIAMA-UPV Twitter account (@iiama_upv, see Figure 10):

1) Launching tweets, in Spanish, during a workshop organized by UPV and EMIVASA with UPV students on December 2016. These tweets reached an audience of between 3,200 and 3,600 people. The official Twitter account of the UPV, with 36,000 followers, retweeted one of them and launched its own tweet about the workshop. They also included a description of the SmartH2O project and how to participate in the Valencia case study in December 5th 2016 UPV Newsletter, reaching the whole UPV community.
2) A tweet about the SmartH2O project was launched using the @iiama_upv Twitter account, citing the Major of the city of Valencia (57k followers), who retweeted it.
3) Tweets were launched announcing the dissemination activities carried out using any other media channel.

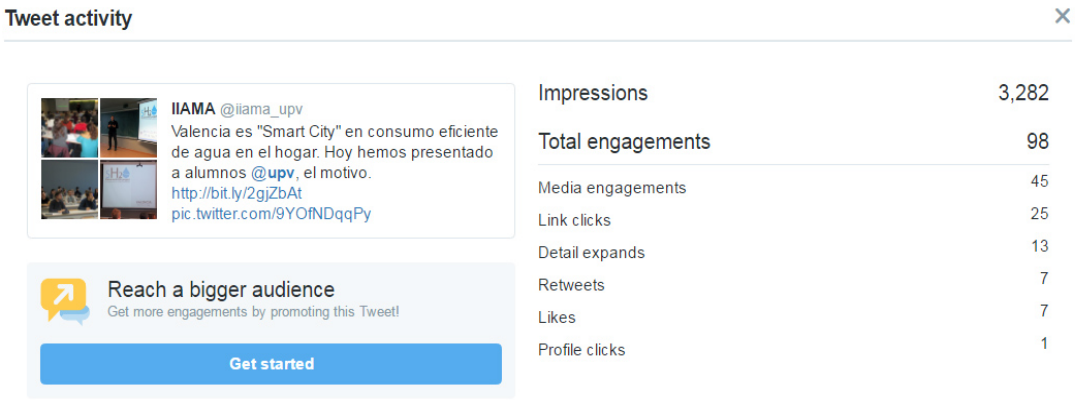


Figure 10: IIAMA-UPV Twitter account.

2.3.2 SmartH2O LinkedIn Innovation Community

The SmartH2O Innovation Community set up in form of a LinkedIn group[3] has been further used in Y3 to communicate project activities, disseminate results, and obtained feedbacks from the community. 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.

[3] SmartH2O Innovation Community: https://www.linkedin.com/groups/SmartH2O-INNOVATION-COMMUNITY-6531529

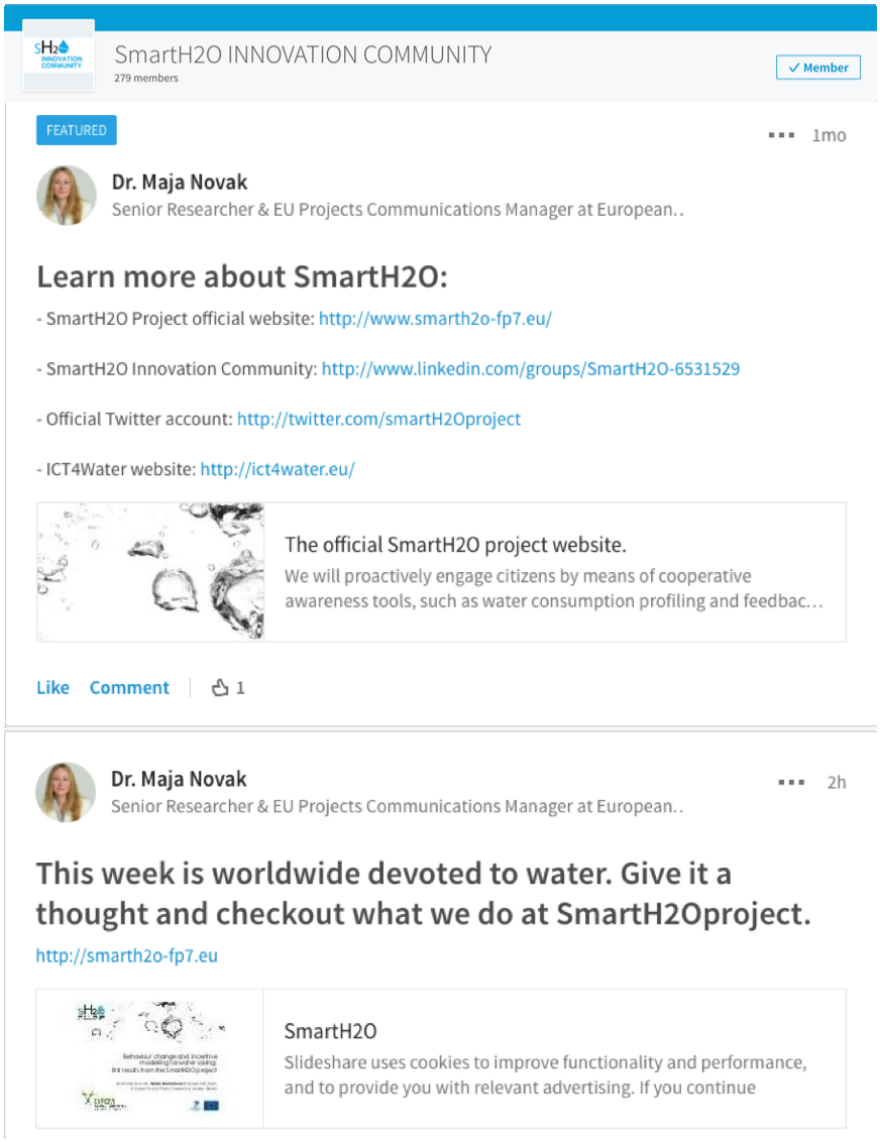


Figure 11: LinkedIn Innovation Community.

Table 3 lists the current member status of the Smart2O LinkedIn Innovation Community, showing that the year 3 target was successfully reached and significantly overcome (279 group members). 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.

Table 3. Analytics on the SmartH2O LinkedIn innovation community.

	Y1 results	Y2 results	Y3 results	Target - Y3
Number of members	100✔	226✔	279✔	120+

2.3.3 *SmartH2O Slideshare activity*

The presentations produced during the project lifetime have been shared on the SmartH2O Slideshare channel[4] and are linked in the Media section of the SmartH2O website. Their publication on Slideshare was also promoted on the Twitter and LinkedIn channels of the project.

In Y3, 8 presentations were uploaded, for a total of 21 published presentations during the three years of the project lifetime. This result meets the target defined in D9.1 (see Table 4). The total number of views of the SmartH2O presentations is **47,927** (status March 20, 2017).

Table 4. Analytics of the SmartH2O Slideshare channel.

	Y1 results	Y2 results	Y3 results	Target - Y3
Presentations published	6 (2,305 views)	13 (41,312 views)	21✔ (47,927 views)	20

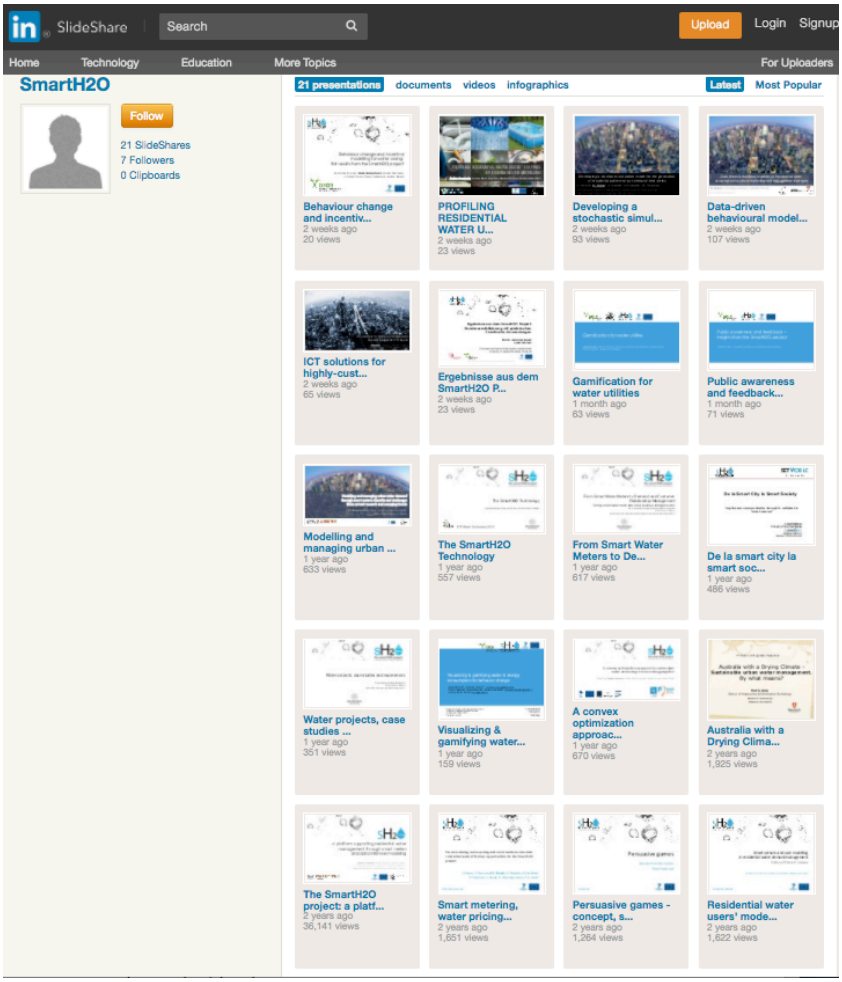


Figure 12. SmartH2O Slideshare channel.

[4] SmartH2O Slideshare channel: https://www.slideshare.net/SmartH2O

2.3.4 *Facebook*

IIAMA-UPV launched a facebook campaign (paid ads) in order to increase the participation of people from Valencia in the SmartH2O portal (see Figure 13). This campaign lasted for two weeks. The audience targeted corresponded to people living in Valencia with a profile's interests in line with the ones of the SmartH2O project, sorted by age and educational level. The Facebook campaign reached 2,811 people. Its cost was 5€/day.

Figure 13: Summary of the Facebook campaign launched by IIAMA-UPV

2.3.5 *Other social media*

Dissemination involving other social media developed by IIAMA-UPV consisted in publishing news about SmartH2O in water-specialized Spanish portals. In particular:

- iAgua (288 views): http://www.iagua.es/noticias/espana/iiama/16/11/23/valencia-aprende-hacer-uso-eficiente-agua-hogares-smarth2o
- Retema magazine (598 views): http://www.retema.es/noticia/valencia-aprende-a-hacer-un-uso-eficiente-del-agua-en-hogares-con-smarth2o-egmZ4?platform=hootsuite
- Aguas Residuales (182 views): http://www.aguasresiduales.info/revista/noticias/valencia-aprende-a-hacer-un-uso-eficiente-del-agua-en-hogares-con-smarth2o-jiEXL
- Ruvid: http://ruvid.org/wordpress/?p=29271
- Tys magazine: http://www.tysmagazine.com/smarth2o-app-valencianna-reducir-consumo-agua/
- IIAMA webpage: http://www.iiama.upv.es/iiama/index.php/home/sala-prensa/noticias/437
- IIAMA newsletter (sent to 4,500 people): http://www.iiama.upv.es/boletin/boletin13.html?platform=hootsuite

2.4 Videos

During the third year of the project, one video reporting one of the several SmartH2O dissemination events targeting elementary and high school students was produced[5]. The meeting portrayed in the video was held on October 2016 with the pupils of two secondary school classes of the Scuola Secondaria di 1 Grado IC-Prandoni Como Lago, Torno (CO). The pupils and their teachers were invited to attend the **Meetme Tonight** event at Politecnico di Milano, which is a science dissemination event oriented to the citizens and, especially, to elementary and secondary schools. Around 40 pupils attended the event, which included a short lecture on water sustainability given by Prof. Piero Fraternali. This was followed by an introduction to the **Drop! Game**, which was then played for about an hour. The event was organized in conjunction with the teachers of the two classes as part of the school education programs on sustainable use of natural resources and on the water cycle. The event was extremely successful. The video that was published by the Scuola Secondaria di 1 Grado IC-Prandoni Como Lago, Torno (CO) on their youtube channel and attracted the attention of several other schools, which invited SmartH2O researchers to replicate the initiative at their premises.

2.5 Press and radio

Press and radio communiques were mostly issued at the project start. An exception is EMIVASA, a partner that has joined the Consortium in the second year, that has concentrated the press releases in the second year. In the third year, the dissemination activities with traditional media were somehow limited, as the project was focused on the validation of the project hypotheses, and clearly no major news could be reported to the media. The SmartH2O project will prepare a press release in April/May to communicate the final project results, hoping to get a good coverage given the positive outcomes of the validation.

In conclusion, during the third year the publications listed in Table 5 appeared.

Table 5. Press and radio releases.

Parnter	Title/Appeared on	Date
SUPSI	Press release in *La Regione Ticino*	May 2014
Politecnico di Milano	Press release in *Assolombarda*	June 2014
University of Manchester	Press release in UoM Research Newsletter	Autumn 2014
SUPSI	Press release in *Azione*	December 2014
SUPSI	Radio announcement “News about SmartH2O” on *RSI ReteUno*	June 2014
SUPSI	Radio interview on *RSI ReteTre*	June 2014
SUPSI	Radio interview on *RSI ReteUno*	September 2014

[5] The video is available at the following link: https://www.youtube.com/watch?v=BxfIsM-ME-4

SUPSI	Press release in *La Regione Ticino*	May 2014
EMIVASA	Valencia, ciudad elegida para participar en el proyecto europeo "Smart H2O" iagua	29/04/2015
EMIVASA	El Grupo Aguas de Valencia participará en el programa europeo 'Smart H2O' *Levante EMV P.45*	03/07/2015
EMIVASA	Aguas de Valencia conciencia sobre el consumo responsable *La Razón Valencia P.5*	03/07/2015
EMIVASA	AGUAS DE VALENCIA Programa europeo SmartH2O *Levante EMV P.36*	03/07/2015
EMIVASA	Aguas de Valencia participa en el programa europeo Smart H2O, para concienciar sobre consumo de agua *http://www.eleconomista.es*	02/07/2015
EMIVASA	Aguas de Valencia participa en el programa europeo SmartH2O *http://www.valenciaplaza.com/*	02/07/2015
EMIVASA	El Grupo Aguas participará en el programa europeo SMARTH2O *http://www.elperiodic.com/*	02/07/2015
EMIVASA	Aguas de Valencia participa en el programa europeo SmartH2O *http://www.lavanguardia.com*	02/07/2015
EMIVASA	Aguas de Valencia participa en el proyecto europeo para concienciar sobre el buen uso de agua *http://www.economia3.com*	02/07/2015
EMIVASA	Aguas de Valencia participa en el programa europeo SmartH2O *http://www.abc.es/*	02/07/2015
EMIVASA	Aguas de Valencia participa en el programa europeo SmartH2O *http://www.lasprovincias.es/valencia/*	02/07/2015
EMIVASA	Aguas de Valencia participa en el programa europeo SmartH2O *http://www.finanzas.com/*	02/07/2015
EMIVASA	El Grupo Aguas participará en el programa Europeo SmartH2o para potenciar la gestión de la demanda en el servicio del agua en Valencia *http://aguasresiduales.info*	02/07/2015
EMIVASA	AGUAS DE VALENCIA Programa europeo SmartH2O *Levante EMV P.36*	03/07/2015
SUPSI	"Risparmiare acqua significa risparmiare energia!"	May 2016

	Rivista Elettricità 1	
SUPSI	“Acqua in Rete” La Regione Ticino	October 2016
SUPSI	“Collegati a ogni cosa” HiTest	May 2016
SUPSI	“Il progetto SmartH2O nel Comune di Terre di Pedemonte” Rivista TreTerre	Summer 2016

3. Dissemination activities

3.1 Networking activities

3.1.1 Conferences

The scientific conferences attended by members of the consortium during Y3 are reported in Table 6. Further details on the associated publications are reported in Section 4.2.

Table 6: List of conferences attended by project members in Y3.

Conference	Place and Date	SmartH2O publications
AGU Fall Meeting 2016	San Francisco (CA), December 12-16, 2015	Giuliani et al. (2016b)
AiIG Annual Meeting 2016	Bergamo (Italy), October 13-14	Garrone et al. (2016c), Garrone et al. (2016b)
WINIR Annual Meeting 2016	Boston (MASS), September 2-5	Garrone et al. (2016a)
International Congress on Environmenal Modelling & Software – iEMSs2016	Toulouse (France) July 10-14, 2016	Rottondi et al. (2016), Novak et al. (2016), Cominola et al. (2016b) Cominola et al. (2016c)
ACM WebSci 2016	Hannover (Germany) May 22-25, 2016	Lazaridou et al. (2016)
EGU General Assembly	Vienna (Austria) 17-22 April, 2016	Giuliani et al. (2016a)
International Workshop on the Social Web for Environmental and Ecological Monitoring, SWEEM 2016	Cologne (Germany) May 17, 2016	Giuliani and Mossina (2016)
International Workshop on Cyber-Physical Systems for Smart Water Networks (CySWater 2016)	Vienna (Austria) April 11, 2016	Rottondi and Verticale (2016)
In California Water and Environmental Modeling Forum (CWEMF) 2016 Annual Meeting	Folsom Lake (California) April 11, 2016	Cominola et al. (2016a)

3.1.2 Collaborations with other projects

During the whole life of the SmartH2O project, several contacts have been established with other research projects with similar interests and objectives. During Y3, links are being established with the POWER project (Political and sOcial awareness on WaterEnviRonmental challenges) where

EIPCM is involved. The SmartH2O approach, with a particular focus on the gamification aspects, has been presented to the POWER consortium and possibilities for reciprocal project synergies and knowledge sharing are being identified. The POWER project is also linked to EIP Water activities and EIPCM has participated at the EIP Water Conference 2016 in Leeuwarden to support the SmartH2O project networking and connection with the EIP Water platform.

3.1.3 Collaborations with institutions and companies

During the project lifetime, several presentations, demos, and meetings have been held in order to get in contacts and, possibly, establish collaborations with institutions and companies active in the broad field of residential water demand modelling and management. Such collaborations open up opportunities for follow-up of the SmartH2O project. The collaborations listed here update the content of D9.3.

WaterSmart

WaterSmart (www.watersmart.com) is a software company founded in 2009 by Peter Yolles and Rob Steiner in San Francisco. They identified an opportunity to develop a unique combination of behavioural psychology, big data analytics, and cloud computing to improve global water-use efficiency and are currently working with several water utilities across the Unites States. After some informal meetings already held during the second year of SmartH2O, a more formal collaboration between SmartH2O and WaterSmart is currently being set up. The object of the collaboration, currently being formalized under non-disclosure agreement, is a joint effort to apply customer segmentation and profiling techniques developed within the SmartH2O project onto datasets comprising hourly water consumption data and socio-psychographic features for water consumers of different utilities in the Western USA.

Moreover, WaterSmart contributed with an oral presentation in the session co-organized by SmartH2O members “Water and society: water resources management and policy in a changing world" of the AGU 2016 conference (San Francisco), as well as at the SmartH2O Summer School (August 2016, Switzerland).

University of California Davis - Center for Water-Energy Efficiency

The University of California Davis (https://www.ucdavis.edu/), founded in 1905 in Davis (California), is one of the world's leading cross-disciplinary research and teaching institutions, worldwide know for high-level education and research on topics related to food, health, the environment and society. The SmartH2O project has been presented during a Water Management Workshop organized at the Watershed Science Center, in 2014, 2015 and 2016. Following that, Andrea Cominola from POLIMI spent a visiting PhD semester (December 2015 - May 2016) at the Watershed Sciences Center working with Prof. Jay Lund.

The Center for Water-Energy Efficiency (CWEE -http://cwee.ucdavis.edu/) at UC Davis seeks to improve the ability to measure, monitor and jointly manage water-energy systems this gap and advance resource use efficiency through integrated water–energy management. A collaboration with the CWEE started along with the visiting period of Andrea Cominola at UC Davis.

Object of the above collaboration has been the refinement of modelling techniques to perform customer segmentation and profiling of water and electricity residential users, in order to inform customized demand management. While setting up the collaboration, seminars on the SmartH2O project and demos of its web portal were given by Andrea Cominola at both institutions in April/May 2016. Moreover, some preliminary results have been presented in April 2016 at the California Water and Environmental Modelling Forum.

Finally, Prof. Jay Lund attended the SmartH2O Summer School as invited Speaker, with a contribution on “Economic and energy analysis of household water conservation”.

Environmental Defense Fund – Pecan Street

The Environmental Defense Fund (https://www.edf.org/about) is one of the world’s largest non-profit environmental organizations, with more than one million members and a staff of 500 scientists, economists, policy experts, and other professionals around the world. An initial contact

was established in early 2016 (see deliverable D9.3), when the SmartH2O project was presented to a data scientists and managers from EDF in San Francisco. Following that, a second visit at the EDF headquarters in Austin was organized in May 2016. Andrea Cominola met with Kate Zerrenner, manager of the Water-Energy initiatives of EDF in Texas and staff from Pecan Street (http://www.pecanstreet.org/),

During the meeting, the SmartH2O project was showcased and, since then, potential synergies with the programs run at EDF, some including high-resolution data collection and gamification started being discussed.

Singapore Public Utility Board

The Public Utility Board (PUB - http://www.pub.gov.sg/) is the Singapore's national water agency. PUB is responsible for the collection, production, distribution and reclamation of water in Singapore. A first connection was established in March 2016, when the SmartH2O project was presented during an invited seminar at the Singapore University of Technology and Design (March 4th, 2016).

Following that, on September 30th, 2017 POLIMI participated in a meeting between PUB, Singapore's National Public Agency, and Aguas de Valencia at the EMIVASA's headquarters in Valencia. The first SmartH2O outcomes from the analysis of several thousands of water consumers' in Valencia were discussed with EMIVASA's and PUB's staff, in order to gather feedback and explore opportunities to collaborate in Singapore.

Cap Holding S.p.A.

CAP Holding S.p.A. works in the water services sector and is one of Italy's leading operators (in terms of inhabitants served), a "mono-utility" manager with a customer base of over 2.18 million residential users served. CAP is a 100% publicly-owned company founded in 1928, with 197 municipality shareholders and 5 shared companies. The CAP Group manages the integrated water service in the Milan Metropolitan area, Monza and Brianza, Pavia, Varese, and Como. It is active member of the European association of public water operators (http://www.aquapublica.eu/) and won the first TOP UTILITY 2017 Italian prize. Now in its 5th season, the 2017 Top Utility Analysis focused on how technology contributes to growth in the urban fabric.

POLIMI will sign an agreement for deploying an experiment of installation and use of the SmartH2O platform with Cap group in the city of Magenta, in the metropolitan area of Milan. As part of the collaboration, members of the SmartH2O project were also hosted by Cap Holding at the exhibition "Ecomondo 2016", held in Rimini (Italy) in November 2016. In that occasion, POLIMI showcased the SmartH2O project, digital tools, and games to experts working in the Italian water distribution field and utilities.

European Utility Week 2016

The SmartH2O project was also presented to a number of companies and institutions during the European Utility Week in Barcelona on 15-17 November 2016. During this event, 11,414 international visitors, 414 speakers and 550 exhibiting companies from around the world presented, exhibited and shared insights on how the utilities sector and market can move forward. As part of the ICT4water cluster, the SmartH2O project was presented by Isabel Micheel (EIPCM) during the Smart Metering and Smart Applications session, which was chaired by Lydia Vamvakeridou-Lyroudia from the projects iWidget and WISEST. The topic of the talk was Public Awareness and Feedback. Isabel Micheel also actively participated in the concluding panel discussion about the "Smart city: The Role of Smart Water and Energy" moderated by Dragan Savic (Project Coordinator WIDEST and iWIDGET). In addition to the session, SmartH2O was also presented at the joint ICT4water booth.

3.2 Spreading knowledge to the users

The **SmartH2O portal** was successfully launched for Emivasa customers in April 2016 and was made available to more than 420,000 householders in Valencia.

The launch of the portal was followed by a promotional campaign that included emails to those Emivasa customers registered on the Virtual Ofiice (more than 50,000), banners in local online newspapers and in the water bill, social network ads, etc. As a result, more than 550 users are participating in SmartH2O. These users are striving to save water and to interact with the portal to learn about water conservation in order to become sustainable consumers.

The SmartH2O portal promoted competition among users, as one of the gamification strategies followed to improve customer engagement. The competition had a two-fold approach, with rewards given to winners of weekly and general classification. One the one hand, winners of the weekly competition has won two tickets to the Oceanografic musem in Valencia, the largest aquarium in Europe, every week. On the other hand, the general competition took place in two stages. First round ended 31st December 2016, while the second ended 31st March 2017. Top 3 users in each competition won an iPad that will be handed out during the SmartH2O gala that will take place on May 3th 2017. Moreover, all those users reaching 2500 points won a copy of Drop!TheBoardGame. The launch of the portal was followed in 2017 by the release of the mobile version of SmartH2O, available for Android devices on Google Play. This app was intended to improve the accessibility of the users to the portal and foster participation.

In parallel, to the launch of the portal, Emivasa, in collaboration with the local consumer's association AVACU, started another promotional campaign in schools. Different workshops were organized where more than 500 scholars were taught about the water cycle and the importance of saving water. During the workshops, children learned how to play **Drop!TheBoardGame**, and were given a copy of the game.

Figure 14: SmartH2O workshop in schools in Valencia (Spain).

Figure 15: Children of schools in Valencia playing Drop!TheBoardGame.

The educational value of the Drop! board game has been exploited not only in the schools of Valencia, but also more generally in several presentations with schools of elementary and secondary level. These events were organized with the teachers, in a period of the school year where the teaching program addressed topics such as the water lifecycle and natural resource management and conservation. Figure 16 shows images from a school meeting held in the Secondary Scholl of Albavilla (Como Italy) on March 27th, 2017. Other meetings have been requested by several schools and will be held also after the end of the project.

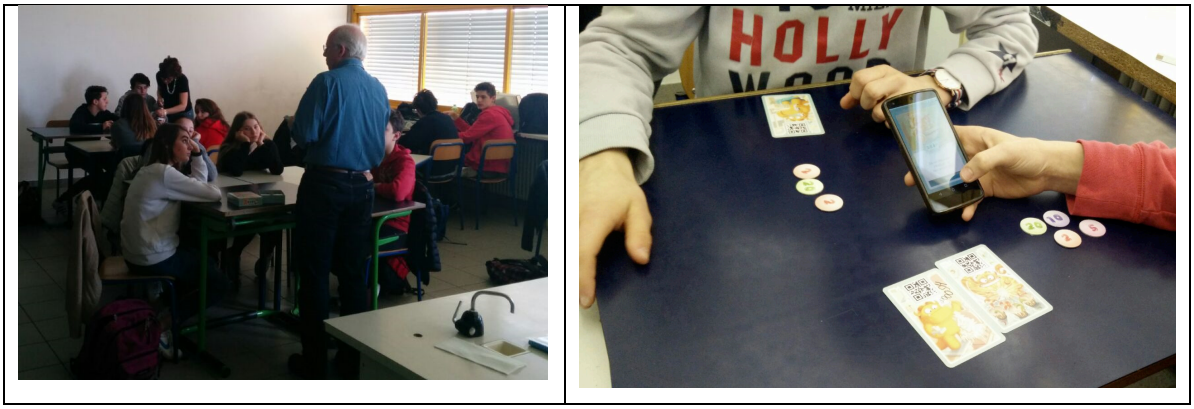


Figure 16: Drop! game session in the secondary school of Albavilla (Italy).

A complete list of the SmartH2O dissemination events aiming at spreading the knowledge to the users is reported below:

- Final SmartH2O event at Waterwise Water Efficiency Conference (London, March 2017) – more details are reported in the next section
- Drop! game session organized in the Secondary Scholl of Albavilla (Como, March 2017)

- SmartH2O presentation at Smart Metering - Tecnologie di misura e controllo 4.0 nella gestione delle risorse idriche event of the Lombardy Energy Cleantech Cluster (Monza, February 2017)
- SmartH2O presentation at the German association of water and energy industry (BDEW), Working group on Digitalization (February 2017)
- 2016 European Utility Week (Barcelona, November 2016)
- SmartH2O project presentation at CLimathon 2016 (Como, November 2016)
- Demo of SmartH2O web portal at Ecomondo 2016 hosted by CapHolding (Rimini, November 2016)
- Smart H2O mobile app and Drop/The Question mobile game released in Valencia (November 2016)
- SmartH2O and the Drop! game presented at the fifth edition of MEETmeTONIGHT – The researchers' night (Como, September 2016)
- SmartH2O platform launch in Valencia, Spanish case study site (Valencia, April 2016)

3.3 The SmartH2O final dissemination event

The **2017 WaterWise annual conference** had been chosen as the venue for the final dissemination event of the SmartH2O project. This conference has been selected to host the dissemination event for the following reasons:

- The WaterWise Annual Water Efficiency conference is considered the premier event for showcasing water efficiency in the UK. As such, all the major players in the UK water sector, including the private water utilities but also regulatory agencies tackling with water and environmental issues (the Environment Agency, Ofwat, DEFRA) are present.
- Due to the dynamic nature of the UK water sector, where private companies tightly regulated by Ofwat need to investigate emerging water efficiency technologies to remain profitable, attendance to this event is a sign of being at the forefront of water efficiency innovation. This is good for marketing products from the SmartH2O project.
- The theme of the conference this year, "Delivering Water Efficiency" matches the objective of the SmartH2O project to blend academic research with innovation in order to put forward new solutions to help water utilities and their residential customers increase their water efficiency.
- The date of the conference this year (8 March) is ideally placed right before the end of the project (31 March).
- All sessions are plenary, so everyone attends each presentation.
- There are several breaks during the day, during which attendees are in the same room as the exhibit booths, and can interact with the project's outcomes.

The event took place in a prestigious venue in the center of London, the Royal Society of Arts. It was marked by a strong attendance of project members:

- Andrea-Emilio Rizzoli (SUPSI) as project coordinator and presenter of the project during a 20-minute talk (14:20 to 14:40)
- Joan Carles Guardiola Herrero (EMIVASA), member of the "Engagement" panel (12:30 to 13:20)
- Sergio Luis Herrera Gonzalez (POLIMI), Isabel Micheel (EIPCM) and Andrea Cominola (POLIMI) were in charge of the SmartH2O booth.
- Luigi Caldararu (Setmobile) was there to network with water market actors in order to help commercialise the project's product.
- Julien Harou and Charles Rougé (UOM) had been in charge of the organisation of the dissemination event: contacts with WaterWise, handling of the logistics.

SmartH2O's participation to the event was in particular through three events, all linked with each other:

1) Participation to the panel on "Engagement" in the plenary session by J. Guardiola

The panel started with a short presentation from each of the panellists, which provided the opportunity to make a short account of EMIVASA's experience of engaging with the development and implementation of the SmartH2O platform (see Figure 17). This account from the point of view of a utility operator was particularly relevant to the audience, as Joan Guardiola then was asked 4-5 questions directly by attendees (not to mention the moderator's questions to all panelists). This utility-oriented introduction to the platform was also a prelude to the following event.

Figure 17. Introductory presentation by Joan Carles Guardiola Herrero (EMIVASA) during the panel session.

2) Plenary presentation of the project's outcomes by A.E. Rizzoli

The presentation showcased the project outcomes (see Figure 18), insisting on the demonstrable impact on consumption that the implementation of the platform had had. This presentation was also relevant to the audience, in which several English utilities implementing smart metering are developing, or thinking about developing, similar customer engagement interfaces. It also provided an incentive to the interested persons in the audience to further engage with the interactive tools developed by the project, with the interactive booth.

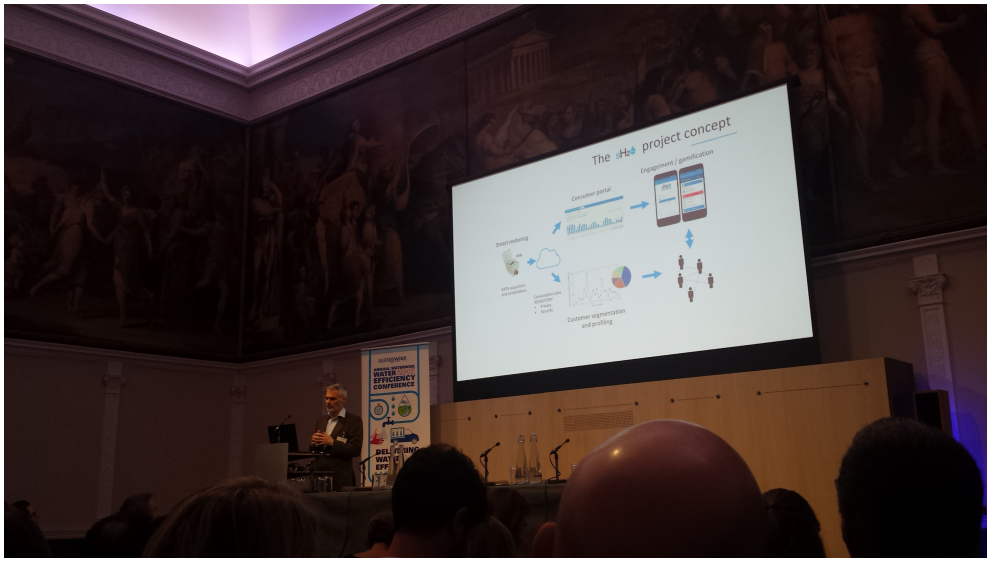


Figure 18. Presentation of the SmartH2O project by Andrea-Emilio Rizzoli.

3) Interactive presentation of the platform, presentation of the Drop! Game by S. Herrera, I. Micheel, A. Cominola

The exhibit booth comprised 1) an on-screen interactive demonstration of the SmartH2O platform (see Figure 19), where attendees could learn about the features of the platform they felt most interested in, and relate firsthand with how it could be relevant for their business, 2) a presentation of the Drop! board game with the real game box, and 3) fliers designed especially for dissemination.

Figure 19. The SmartH2O exhibit booth, with screen to present the platform, demo of the Drop! game and fliers. With Sergio Luis Herrera Gonzalez of POLIMI.

3.4 The 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).

Figure 20: Group Picture at Monte Verità.

The school focused on the following topics: 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 final program of the school included the following lectures and workshops:

Monday 22nd of August
9:30 – 10:00 - Welcome address by *Lorenzo Sonognini*, Director Fondazione Monte Verità and *Chiara Cometta*, Administrative Manager Congressi Stefano Franscini
10:00 – 11:00 - Water resource economics and finance - *Greg Characklis*, University of North Carolina at Chapel Hill, USA
11:00 – 12:00 - Water pricing policies and consumer behaviour - *Julien Harou* and *Charles Rougé*, University of Manchester, UK
14:00 – 15:00 - Integrated modelling of demand and supply. The role of hydroeconomic models - *Manuel Pulido Velasquez*, Universitat Politecnica de Valencia, Spain
15:00 – 16:00 - Behavioral interventions to successfully reduce residential water consumption - *Verena Tiefenbeck*, ETH Zurich, CH
16:00 – 18:00 - Workshop - The drivers of water user behaviour: social norms and economic

reasons Empowering water consumers through smart metering: evidence from a field study in a residential suburb of Montpellier (south of France) - *Marielle Montginoul* - Irstea – UMR G-Eau, Montpellier France

Tuesday – 23rd of August
9:00 – 10:00 - Synergistic water and energy demand modeling, management, and conservation **-** *David Rosenberg*, Utah State University, USA
10:00 – 11:00 - Economic and energy analysis of household water conservation - *Jay Lund*, UC Davis, USA
11:00 – 12:00 - Forecasting water demand **-** *Wojciech Froelich*, University of Silesia, Poland
14:00 – 15:00 - Modelling water user behaviour: from smart metered data to agent based modelling **-** *Matteo Giuliani, Politecnico di Milano, Italy & Alessandro Facchini, SUPSI, CH*
15:00 – 16:00 - Hardware and software tools for precise End Use disaggregation - *Francisco Arregui de la Cruz, UPV, Spain*
16:00 – 16:30 - Stochastic generation of residential water end-use demand traces – *Andrea Cominola, Politecnico di Milano, Italy*
16:30- 18:00 Workshop - Understanding and modelling the behaviour of water users A Framework for Real-Time Spatially Distributed Demand Estimation and Forecasting, *Dominic L. Boccelli, University of Cincinnati, Cincinnati, OH, USA*

Wednesday 24th of August
9:00 – 10:00 Multiobjective Water Management Under Uncertainty - *Patrick M. Reed*, Cornell University USA
10:00 – 11:00 ICT solutions for real time smart water management - *Lydia Vamvakeridou & Dragan Savic,* University of Exeter, UK
11:00 – 12:00 Standardization Activities and Gaps for Smart Sustainable Cities - *Gabriel Anzaldi,* EURECAT, Spain
13:00 – 14:00 New control techniques for smart water systems - *Pantelis Sopasakis,* IMT Lucca, Italy
14:00 – 16:00 - Workshop - Innovation in ICT for water management The GIS-integrated FREEWAT platform as an ICT tool for sustainable water resources management. *Giovanna De Filippis - Scuola Superiore Sant'Anna, Pisa (Italy)* Hydra 3D: A Tool to Simulate Hydric Resources Scenarios. Javier Díaz,, LINTI, La Plata National University, Buenos Aires (Argentina)
16:00 – 18:00 Public event – Increasing the awareness on water use

Thursday 25th of August
9:00 – 10:00 - Water Savings Clustering: Which types of households respond best to social norms messaging? - *William Holleran*, WaterSmart, CA, USA
10:00 – 11:00 Gamification for water utilities - *Piero Fraternali,* Politecnico di Milano, Italy, *Isabel*

Micheel, Jasminko Novak, European Institute for Participatory Media, Berlin
11:00 – 11:15 Award ceremony: best young researcher award
11:15 – 12:00 Plenary session: the future challenges of urban water management Panel discussion with Jay Lund, Lydia Vamvakeridou, Patrick Reed, Greg Characklis, William Holleran, and David Rosenberg. Moderated by Andrea E. Rizzoli.

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[6], which is expected to be published during the Fall 2017.

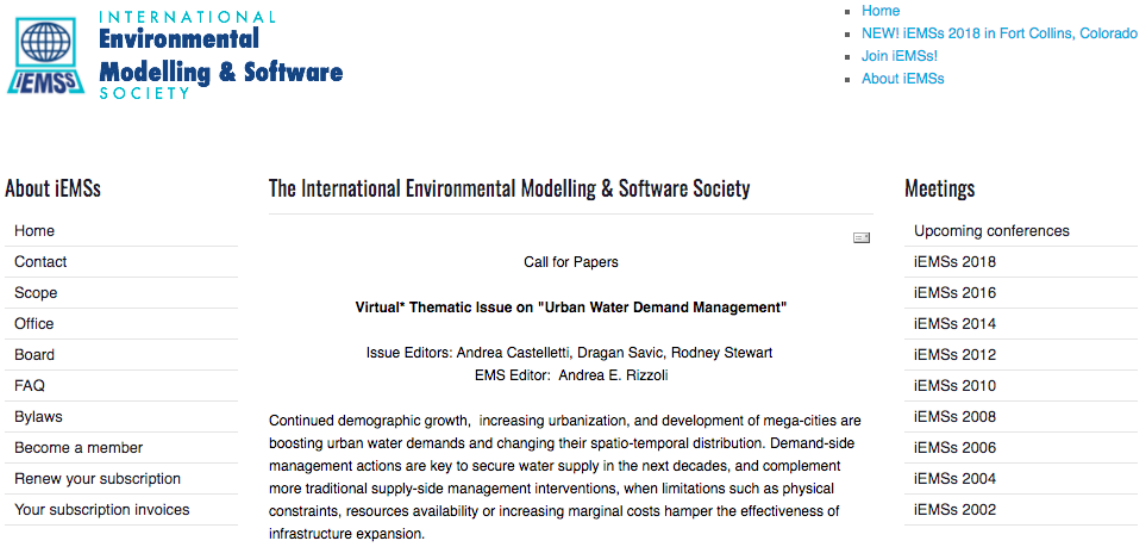


Figure 21: EMS thematic issue - call for papers.

6 See the call for papers at http://www.iemss.org/society/index.php/special-issues/289-cfp-thematic-issue-on-urban-water-demand-management

4. Scientific publications

4.1 Journal papers

Major project results have been published in journal papers at highest scientific standards, and disseminated to the scientific audience. The list of the journal papers published during the project lifetime is reported below.

- Novak., J., Melenhorst, M., Micheel, I., Pasini, C., Fraternali, P., Rizzoli, A.E. (*under review*) Integrating behavioural change and gamified incentive modelling for stimulating water saving. *Environmental Modelling & Software*.
- Castelletti, A., Cominola, A., Facchini, A., Giuliani, M., Fraternali, P., Herrera, S., Melenhorst, M., Micheel, I., Novak, J., Pasini, C., Rizzoli, A.E., Rottondi, C. (*under review*). Gamified approaches for Water Management Systems: an Overview. In *Water Smart Grids - A Cyber-Physical Approach*.
- Rougé, C., Harou, J., Pulido-Velazquez, M., Matrosov, E., Garrone, P., Marzano, R., Lopez-Nicolas, A., Castelletti A., Rizzoli, A.E. (*under review*). Economic-engineering utility-scale assessment of smart-meter-enabled dynamic pricing. *Journal of Water Resources Planning and Management*
- Marzano, R., Garrone, P., Grilli, L., Harou, J., Pulido-Velazquez, M., Rougé, C. (*under review*). Understanding the impacts of tariff structure and study design on the price elasticity of residential water demand: a meta-analysis. *Water Resources Research*
- Garrone, P., Grilli, L., Marzano, R. (*under review*). Incentives to water conservation: comparing price and reward effects through stated preferences. *Journal of Environmental Economics and Management*
- Garrone, P., Grilli, L., Marzano, R. (*under review*). Price elasticity of residential water demand and water scarcity. *Land Economics*

- Cominola, A., Giuliani, M., Piga, D., Castelletti, A., Rizzoli, A.E. (2017). A Hybrid Signature-based Iterative Disaggregation algorithm for Non-Intrusive Load Monitoring. *Applied Energy*, 185, 331-344, doi: 10.1016/j.apenergy.2016.10.040

Abstract: Information on residential power consumption patterns disaggregated at the single-appliance level is an essential requirement for energy utilities and managers to design customized energy demand manage- ment strategies. Non-Intrusive Load Monitoring (NILM) techniques provide this information by decom- posing the aggregated electric load measured at the household level by a single-point smart meter into the individual contribution of each end-use. Despite being defined non-intrusive, NILM methods often require an intrusive data sampling process for training purpose. This calibration intrusiveness ham- pers NILM methods large-scale applications. Other NILM challenges are the limited accuracy in reproduc- ing the end-use consumption patterns and their trajectories in time, which are key to characterize consumers' behaviors and appliances efficiency, and the poor performance when multiple appliances are simultaneously operated. In this paper we contribute a hybrid, computationally efficient, algorithm for NILM, called Hybrid Signature-based Iterative Disaggregation (HSID), based on the combination of Factorial Hidden Markov Models, which provide an initial approximation of the end-use trajectories, and Iterative Subsequence Dynamic Time Warping, which processes the end-use trajectories in order to match the typical power consumption pattern of each appliance. In order to deal with the challenges posed by intrusive training, a supervised version of the algorithm, requiring appliance-level measure- ments for calibration, and a semi-supervised version, retrieving appliance-level information from the aggregate smart-metered signal, are proposed. Both versions are demonstrated onto a real-world power consumption dataset comprising five different appliances potentially operated simultaneously. Results show that HSID

is able to accurately disaggregate the power consumption measured from a single- point smart meter, thus providing a detailed characterization of the consumers' behavior in terms of power consumption. Numerical results also demonstrate that HSID is robust with respect to noisy signals and scalable to dataset including a large set of appliances. Finally, the algorithm can be successfully used in non-intrusive experiments without requiring appliance-level measurements, ultimately opening up new opportunities to foster the deployment of large-scale smart metering networks, as well as the design and practical implementation of personalized demand management strategies.

- Piga, D., Cominola, A., Giuliani, M., Castelletti, A., Rizzoli, A.E. (2016). Sparse optimization for automated energy end use disaggregation. *IEEE Transactions on Control Systems Technology*, 24(3), pp. 1044-1051, doi:10.1109/TCST.2015.2476777

Abstract: Retrieving the household electricity consumption at individual appliance level is an essential requirement to assess the contribution of different end uses to the total household consumption, and thus to design energy saving policies and user-tailored feedback for reducing household electricity usage. This has led to the development of Nonintrusive Appliance Load Monitoring (NIALM), or energy disaggregation, algorithms, which aim to decompose the aggregate energy consumption data collected from a single measurement point into device-level consumption estimations. Existing NIALM algorithms are able to provide accurate estimate of the fraction of energy consumed by each appliance. Yet, to the authors' experience, they provide poor performance in reconstructing the power consumption trajectories over the time. In this work, a new NIALM algorithm is presented, which, beside providing very accurate estimate of the aggregated consumption by appliance, also accurately characterises the appliance power consumption behaviour over time. The proposed algorithm is based on the assumption that the unknown appliance power consumption profiles are piecewise constant over time (as it is typical for power use patterns of household appliances) and it exploits the information on the time- of-day probability in which a specific appliance might be used. The disaggregation problem is formulated as a least-square error minimization problem, with an additional (convex) penalty term aiming at enforcing the disaggregate signals to be piecewise constant over the time. Testing on household electricity data available in the literature is reported.

- Cominola, A., Giuliani, M., Piga, D., Castelletti, A., Rizzoli, A.E. (2015). Benefits and challenges of using smart meters for advancing residential water demand modeling and management: a review. *Environmental Modeling & Software,* vol. 72, pp. 198-214, doi:10.1016/j.envsoft.2015.07.012

Abstract: Over the last two decades, water smart metering programs have been launched in a number of medium to large cities worldwide to nearly continuously monitor water consumption at the single household level. The availability of data at such very high spatial and temporal resolution advanced our ability in characterizing, modeling, and, ultimately, designing user-oriented residential water demand management strategies. Research to date has been focusing on one or more of these aspects but with limited integration between the specialized methodologies developed so far. This manuscript is the first comprehensive review of the literature in this quickly evolving water research domain. The paper contributes a general framework for the classification of residential water demand modeling studies, which allows revising consolidated approaches, describing emerging trends, and identifying potential future developments. In particular, the future challenges posed by growing population demands, constrained sources of water supply and climate change impacts are expected to require more and more integrated procedures for effectively supporting residential water demand modeling and management in several countries across the world.

- Guardiola-Herrero J.C. (2015). SmartH2O: Plataforma TIC basada en la computación social que promueve la gestión eficiente del consumo de agua (SmartH2O: ICT platform based on social computing that promotes sustainable water consumption). Revista Técnica de Medio Ambiente (RETEMA), vol. 186, pp. 42-48, ISSN 1130-9881

4.2 Conference papers

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. The list of the conference papers published during the project lifetime is reported below:

- Giuliani, M., Cominola, A., Castelletti, A., Fraternali, P., Guardiola, J., Barba, J., Pulido-Velazquez, M., Rizzoli, A.E. (2016b). ICT solutions for highly-customized demand management strategies. In *2016 AGU Fall Meeting*, San Francisco (California).
- Garrone, P., Grilli, L., Marzano, R. (2016c). Incentives to water conservation: comparing price and reward effects through stated preferences. *AiIG Annual Meeting 2016*, October 13-14, Bergamo (Italy)
- Garrone, P., Grilli, L., Marzano, R. (2016b). Water saving: Do residential consumers respond to price? A meta-analysis, *AiIG Annual Meeting 2015*, October 15-16, Vicenza (Italy)
- Garrone, P., Grilli, L., Marzano, R. (2016a) Water saving: Do residential consumers respond to price? The role of informal institutions, *WINIR Annual Meeting 2016*, September 2-5, Boston (MASS)
- Rottondi, C., Facchini, A., Rizzoli, A.E. (2016). An agent based model for water consumption forecasting under socio-economical stimuli. In *Proceedings of the 8th International Congress on Environmental Modelling and Software*, Toulouse (France).
- Novak, J., Melenhorst, M., Micheel, I., Pasini, C., Fraternali, P., Rizzoli, A.E. (2016). Behaviour change and in- centive modelling for water saving: first results from the SmartH2O project. In *Proceedings of the 8th International Congress on Environmental Modelling and Software*, Toulouse (France).
- Cominola, A., Giuliani, M., Castelletti, A., Abdallah, A. M., Rosenberg, D. E. (2016c). Developing a stochastic simulation model for the generation of residential water end-use demand time series. In *Proceedings of the 8th International Congress on Environmental Modelling and Software*, Toulouse (France).
- Cominola, A., Moro, A., Riva, L., Giuliani, M., Castelletti, A. (2016b). Profiling residential water users' routines by eigenbehavior modelling. In *Proceedings of the 8th International Congress on Environmental Modelling and Software*, Toulouse (France).
- Escriva-Bou, A., Pulido-Velazquez, M., Lund, J. (2016). Targeting rebates in the water-energy nexus. In *Proceedings of the 8th International Congress on Environmental Modelling and Software*, Toulouse (France).
- Rougé, C., Harou, J., Pulido-Velazquez, M., Castelletti, A., Giuliani, M., Rizzoli, A.E. (2016). Smart meter enabled dynamic pricing of water. In *Proceedings of the 8th International Congress on Environmental Modelling and Software*, Toulouse (France).
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In addition, members of SmartH2O consortium co-organized the following sessions:

- **Water and Society: Water Resources Management and Policy in a Changing World** at the *2016 AGU Fall Meeting* (K. Madani, M. Giuliani, P.M. Reed, A. Escriva-Bou)
- **ICT for Energy and Water Demand Management** at *the 8th International Congress on Environmental Modelling and Software* (M. Giuliani, A.E. Rizzoli, A. Castelletti, K. Madani, M. Pulido-Velazquez, D.E. Rosenberg, D. Savic, M. Tavoni.

4.3 Workshop and demo papers

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. The list of the workshop and demo papers is reported below:

- Cominola, A., Giuliani, M., Castelletti, A., Lund, J. R. (2016a). Advancing residential water management by smart metering and data intensive modelling of consumers' behaviors. In *California Water and Environmental Modeling Forum (CWEMF) 2016 Annual Meeting Session Abstracts*, Folsom Lake (California).
- Rottondi, C. and Verticale, G. (2016). Enabling privacy in a gaming framework for smart electricity and water grids. In *2nd International Workshop on Cyber-Physical Systems for Smart Water Networks (CySWater 2016)*, Vienna (Austria).
- Giuliani, M. and Mossina, J. (2016). Reducing the intrusiveness of energy and water end-use disaggregation via social media and users interactions. In *Proceedings of the 1st International Workshop on the Social Web for Environmental and Ecological Monitoring*, SWEEM 2016.
- Ciceri, E., Catallo, I., Martinenghi, D., Fraternali, P. (2015). When food matters: identifying food-related events on twitter. In *1st International Workshop on Knowledge Discovery on the WEB (KDWeb 2015)*, Cagliari (Italy).
- Micheel, I., Novak, J., Fraternali, P., Baroffio, G., Castelletti, A., Rizzoli, A.E. (2015). Visualizing gamifying water energy consumption for behavior change. In *Workshop on Fostering Smart Energy Applications (FSEA) 2015 at Interact 2015*, Bamberg (Germany).
- Padula, S., Harou, J., Marzano, R., Paola, G., Velazquez, M. P., Cominola, A., Rizzoli, A.E., Giuliani, M., Castelletti, A. (2015). Could smart-meter enabled dynamic pricing schemes lower water demands? In *Workshop on Managing Water Demand*, London (UK).

5. Assessment of the communication strategy

In this section, we evaluate how our dissemination actions have a real impact outside the project and if our strategy is efficient, effective and coherent.

5.1 SmartH2O dissemination and communication strategy

SmartH2O is a project centred on the human and social role in water management and, therefore, dissemination is a key component. The communication strategy sets the targets for the message to be communicated and it also takes care of both effectiveness and the right balance of technical/general purpose information to be disseminated, depending on the target audience. An overview of the communication strategy is shown in Table 7.

Table 7: Overview of the SmartH2O communication strategy.

Target audience	Dissemination message	Dissemination channel	Value for target audience
The public	New knowledge is provided in an organized way	• The web • Articles and interviews with mass media • Social media channels (Twitter, Slideshare) • Consumer workshops • Press departments of project partners • Customer relationship departments of business partners (TWUL, SES)	• Benefits for the citizen and the environment • Openness to social interaction
Stakeholders (public administrations)	Quantifiable approaches of SmartH2O in water savings	• Technical reports • Demonstration at validation sites • SmartH2O summer school	• Measurable benefits in resource management
The industry (water utilities)	A scalable solution that can be easily adopted to save on infrastructure by a better water management	• Technical reports • Demonstration at validation sites • Technology transfer events • SmartH2O summer school	• Partnerships can be established with the consortium to adopt/test the project innovation • Sustainability of investment: the SmartH2O solution can generate

			benefits along the value chain (SW vendors, utilities, PA)
The H2020 community and the scientific community	Scientific activities within a collaborative space where formal and informal teams and networks promote sharing of best practices and experiences	• Scientific papers documenting the research made in the project • Participation to international conferences and ICT4Water[7] Cluster Meeting • Social media channels (Twitter, Slideshare, LinkedIn)	• Synergy and cooperation cross projects provide advance of the state of the art

The dissemination activities first focussed on building a strong SmartH2O project visual identity (i.e., logo, stylesheets) to harmonise communication both internally among the consortium, and externally to the general public and the scientific community. The SmartH2O website (see Section 2.1) acts as an attractive showroom providing insights, documenting project progress and promoting events that provide the opportunity to get in touch with the SmartH2O community. The website dynamically reflects the progress made and the project achievements, hosting different information by thematic section: insights about the work being carried out, access to technology, project deliverables, promotional material for download (tutorials and other documentation), news and guidelines in research and industrial projects.

A key component for the success of the SmartH2O project is a thriving social community of users, including citizens, public administration bodies, public utilities, water utilities and SMEs. These stakeholders, who are external to the project, are reached by means of existing social network platforms (e.g., Twitter and LinkedIn). The social communities ensure effective spreading of project news, providing information on the vision and on opportunities for adoption, ultimately reinforcing the water saving message of SmartH2O.

Another major role in the creation of an active community of interest will be provided by the SmartH2O customer portal and app, the latter of which will be downloadable for the major mobile operating systems (iPhone and Android) and which will be usable not only by users from the two case studies, but by any user who might want to manually enter water consumption to get recommendations on how to save water. To further engage the stakeholders and reach out to a younger and family-oriented target group, a SmartH2O game will be developed which combines a digital mobile game with a traditional card game (Drop!), and which may be connected to the SmartH2O customer portal and app.

As additional communication material, screencasts and videos about the SmartH2O prototypes and applications and their resonance among users and stakeholders will be provided.

5.2 Assessment of dissemination goals

The main dissemination goals were the following:

[7] http://wwwict4water.eu

1. To design and implement an effective communication strategy for the SmartH2O project.
2. To disseminate the project outputs at local level, including strengthening end user participation, expanding to other local and regional water authorities and businesses.
3. To disseminate at national level, increasing the knowledge on ICT-supported water resource management.
4. To disseminate at the international level, exploiting the various scientific and business networks of the project partners.
5. To organise the major dissemination events of the project.

We discuss here how we achieved such goals.

5.2.1 GOAL1: effective communication strategy

We have reached this goal in Year 1 by constructing a solid communication strategy based on:

- **The SmartH2O website:** This is the main point of reference where static and permanent information is being published. This includes copies of the scientific papers, of the public deliverables, and a general description of the project objectives and the case studies.
- **The SmartH2O Twitter feed:** Dynamic information, newsflashes, links to other interesting news taking place in the general area of "Smart water" are being published using our Twitter feed: This communication channel allows SmartH2O to be prepared for the communication challenges to be faced in Year 2, when the SmartH2O platform and the SmartH2O game will be distributed to the wider public.
- **The SmartH2O LinkedIn innovation community:** This channel is aimed at professionals in fields related to SmartH2O, and a wider community of water consumers and innovators. The innovation community organises discussions on specific topics and project outcomes, enabling interaction among the community members in an open innovation manner.
- **The SmartH2O newsletter:** It is a traditional means of communication that is used to summarise a number of events and news, which happened over a specific time period. It provides a channel to redirect the readers to the three above communication channels.
- **Traditional media:** Newspapers, radio and TV are also used to reach out to the wider public. Access to this media is more limited, and it is reserved to major SmartH2O events.
- **Scientific papers and conferences:** this is the traditional communication channel for scientists. It is essential to provide the necessary credibility to support all other communication channels, even if the number of reachable individuals is much smaller in theory.
- **SmartH2O events:** SmartH2O also organised specific events to maximise its impact. Such event include the presence with dissemination materials and demos at conferences, the organisation of a Summer School, and the organisation of a special dissemination event in occasion of the 2017 WaterWise annual conference, an important event on water efficiency.

In summary, the SmartH2O communication strategy was based on the following instruments with the related attributes:

- Internet media:
  - Website: broadcast communication, static, a point of reference, pull approach;
  - Twitter: broadcast, interactive, highly dynamic, shallow;
  - Linkedin innovation community: multi-directional communication, open to interaction and in depth discussions in an open innovation manner;
  - Newsletter: broadcast, static, push approach.
- Traditional media:
  - TV/Radio/Newspapers: broadcast, static.
  - Scientific communication: broadcast, static.

We evaluate this goal as reached.

5.2.2 GOAL2: dissemination at the local level

Dissemination at the local level has been performed mostly using traditional media. This type of dissemination has been mostly used in Switzerland, to raise the awareness on the ongoing deployment of the smart meters in Tegna.

We evaluate this goal as reached.

5.2.3 GOAL3: dissemination at the national level

The national-wide news release to the media is currently carefully being planned for the project result dissemination that will take place in April/May 2017 in order to maximise the impact of the results of the SmartH2O project. During the project lifetime a number of press releases have been issued at the local dissemination level.

We evaluate this goal as reached for what it concerns the scope of the project. We will pursue this action also after the project closing.

5.2.4 GOAL4: dissemination at the international level

Dissemination at the international level has taken place mostly through the online channels, including the SmartH2O website, newsletter, Twitter, and LinkedIn accounts, through the publication of scientific papers and the attendance of international conferences by members of the project.

We evaluate this goal as reached.

5.2.5 GOAL5: major dissemination events

SmartH2O has attended a number of major dissemination event, both at the local (Tre Terre d'Autunno in Tegna) and the international level (European Utility week 2015 and 2016, ICT 2015 Lisbon, Swiss Pavillion at EXPO 2015). It has also successfully presented SmartH2O at the final dissemination event during the 2017 WaterWise annual conference in London.

We evaluate this goal as reached.

6. Conclusions

In this deliverable we have reported the dissemination activities we have rolled out during the three years of the project. Such activities have been organised along the following directions:

- Set up of a coherent and structured visual identity.
- Deployment of a website for the project to provide a “safe harbour” where all the relevant project info can be easily searched, accessed and retrieved.
- Management of various social media outlets, with different targets and different communication styles: from the broadcast, terse and compact style of “tweets” on Twitter to more articulated discussions on the LinkedIn portal.
- Dissemination on traditional media, from local press, to radio interviews.
- Scientific dissemination, delivering a set of contributions to international conferences and to scientific journals.

The dissemination activities have been conducted by all partners in a concerted manner and a good impact has been achieved. The next challenge, beyond the project lifetime, will be to support the ongoing exploitation activities by an adequate dissemination and communication support. 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.