# ICT4Water Cluster sessions at the Water IDEAS 2014 Conference
# (Bologna, Italy, October23rd, 2014)

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**Executive summary**

This report summarises the main discussions held during different special sessions that took place in the second day (October 23rd) of the Water IDEAS 2014 Conference, held in Bologna, Italy, during October 22nd-24th, 2014. Besides, the report provides an overview of the presentations and discussions held during the special sessions throughout the day and collects the action points identified during the ICT4Water cluster meeting.

The main action points agreed during the meeting were mostly related to the organisation of joint dissemination activities between the cluster projects (newsletter, video, portal, journal papers) and to the possibility of finding ways to share data across projects.

Among the main discussions held during the special session, there were points raised on the balance between real-time and non-real-time data, sharing of data and the privacy issues that may appear because of this,estimation and simulation of user data for platform testing, legislation and selection of indicators for regulation, standards and the standardization process, and reuse of open source platforms across projects.

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# 1  Context and Scope

This report covers different special sessions that took place in the second day (October 23rd) of the Water IDEAS 2014 Conference, held in Bologna, Italy, during October 22nd-24th, 2014.

The sessions covered in this report are "Smart Water Projects funded by European Commission" (from 9:30 to 11:10), where the ten projects in the ICT4Water cluster were presented and the ALMANAC project; "Regulation for Efficiency in Water Loss Management" (from 11:20 to 13:00), where different views were given on the topic of regulation for water loss management; "Standards on ICT and Smart Water" (from 14:00 to 15:40), where the current status of standardization in the smart water field was discussed; and "ICT Cluster Meeting" (from 16:10 to 17:50), a closed meeting of the members of the ICT4Water cluster (namely the ten on-going projects: iWIDGET, ICEWater, ISS-EWATUS, UrbanWater, SmartH2O, DAIAD, WISDOM, Waternomics, EFFINET and WATERP).

The remainder of this report covers a summary of the discussions that can be used as input for the elaboration of the final roadmap in 2015, an overview of the different sessions stressing the most relevant discussion topics and, finally, the report concludes with a list of open actions.

# 2   Summary of discussions towards the final roadmap in 2015

This section provides a summary of the discussions held during different special sessions of the Water Ideas 2014 Conference on the most relevant topics related to the area of ICT and Water Management, which can be of use for the elaboration of the final roadmap in 2015. The section is structured according to the following topics:

- Identify gaps and propose concrete actions for R&D in the area of ICT and water management
- Enhance emerging water issues (current and future trends) in terms of interoperability and standardization, including the investigation of the ICT GHG Footprint
- Define the classification/justification of problems and solutions (WHY/HOW MUCH the highlighted issues are problems or solutions)
- Identify cost/benefit estimates of problems and solutions
- Identify synergies between the proposed solutions and with other related sectors (e.g. transport, energy and smartcities)
- Identify references to on-going policies to map where the highlighted problems and solutions fit in or not

## 2.1   Gaps and concrete actions for R&D in ICT and water management

The following main gaps were identified and discussed in the course of the special sessions:

- Need to deal in a balanced way with real-time and non-real-time data. Real-time data, even if desirable, are not always available because of different factors (device characteristics, manual measurement processes, data privacy, non-disclosure of data by utilities, etc.).
- Need to supplement case studies data with generated data coming from simulations because data available in case studies may not exhibit all the characteristics needed for developing ICT platforms (e.g., for testing the behaviour against concrete events or scalability).
- Need to guide and educate on the use of indicators. There are plenty of different indicators that can be used (e.g., for water losses) and people do not always have a clear view which indicator is the best to be used.Selecting a wrong indicator may lead to incorrect interpretations;furthermore, different indicators take into account different perspectives and none of them will satisfy every perspective/stakeholder.

## 2.2   Emerging water issues in terms of interoperability and standardization

In this scope, there was a consensus on the usefulness of standards. The following needs for interoperability and standardization were discussed:

- Projects are looking into existing open source platforms or components to be reused in their developments; one of the drivers for this is to achieve interoperability at the software level. To this end, having common programming interfaces (APIs) would also support interoperability.
- Data sharing is an issue. Getting data from utilities in projects is a nearly impossible task with current legislation; this problem could be alleviated

through policies coming from the European Commission. Furthermore, the terms and conditions under which projects can share data are not clear yet, even if projects are willing to do so.

- The standardization process goes beyond the projects in the cluster and currently it is not clear either which standards would be necessary or who should take the lead on them. Furthermore, the need for engaging a larger group of stakeholdersin any standardization process has been pointed out.

## 2.3 Classification/justification of problems and solutions

Most of the aforementioned topics were identified as problems that need to be solved in order to make the community advance at a higher speed, solving problems that are recurrent for almost all projects. Work is progressing on finding solutions, in general, for each of the aforementioned topics.

## 2.4 Cost/benefit estimates of problems and solutions

Currently, projects are working on simulating user data that can be used in the development if the different ICT platforms. However, utilities already have these socio-economic studies (e.g., for social classification of users according to their stratification) but they do not disclose them to projects. As a result of this, a lot of effort is spent by projects in this task without having clear benefits of improvement with respect to the current state-of-the-art in industry.

Furthermore, despite of the benefits of standards, their definition costs a lot of effort and money and their implementation may also be costly when they are very ambitious and, therefore, complex.

## 2.5 Synergies between the proposed solutions with other related sectors

The main synergy that was identified was between the water and energy sectors. On the one hand, it was stated the need for jointly processing consumption data from water and energy. On the other hand, analysing the situation of standards in the energy sector, which is more advanced, could help making better decisions in the water sector.However, it was pointed out that data availability and willingness to share data are an issue when water and energy utility are separate entities.

## 2.6 On-going policies to map where the highlighted problems and solutions fit in or not

Most of the references in this topic were done to the fact that there are no clear policies for data sharing with utilities (e.g., water or energy consumption), which makes progress in the projects slower and hinders the evaluation of developments with real data. There was a clear agreement on the need to have more policies coming from the European Commission in this respect.

The need for selecting correct indicators in regulations was also highlighted, since there are plenty of different indicators that can be used (e.g., for water losses), each taking into account different perspectives.

Finally, the role of regulators in the adoption of new standards or policies has been emphasized.

# 3 Smart Water projects and initiatives funded by the European Commission - ICT4Water Clustering Initiative

The session was chaired by Dragan Savic (University of Exeter, UK). Around 28 people participated in it; participants were a mix of people from partners of the ICT4Water cluster projects and from other organizations.

## 3.1 Project presentations

Projects were asked to perform a 4-slide presentation that covered the project consortium, goals and challenges, and pilot case studies.

All the projects in the ICT4Water cluster were present; there was also a presentation of the ALMANAC project.

There were no questions in these presentations; the discussion took place after them, moderated by the session Chair. The following sections highlight the main discussion topics that were raised.

## 3.2 Real-time data

Real-time data and the experiences of projects with them were discussed.

Even if the deployment of sensing infrastructures is still an on-going activity (with different degree of completion in different projects) it seems clear that a balance is required between real-time and non-real-time data, depending on long time living requirements and on the need for having real-time data (e.g., for leakage detection).

On the one hand, near-real time data acquisition can be performed in those cases where low battery consumption is required on devices. On the other hand, measurement intervals for those devices with significant battery consumption must be large (for example, in the ICEWATER project utilities require that in these cases the interval is 24 hours).

Other issues that prevent real-time data measurement are that some measurement processes require manual intervention or that devices exhaust their capacity when collecting real-time data.

The best data are those that are as much disaggregated as possible; however, both types of data (individual and aggregated) are required.

## 3.3 Data sharing and privacy

Data sharing is an issue. There is a general agreement that utilities have data (e.g., measurements, user categorization) but they usually do not share it because of privacy issues and thus insist on non-disclosure agreements.

Projects are coping with this issue in different ways. One option is to publish only metadata and ask people to contact the data owner for accessing the data (DAIAD).Another is to engage individuals as volunteers and ask them for their agreement to disclose somepersonal information (iWIDGET) or to locate themselves in a map area (not individual location) to increase the granularity of the anonymised data provided by utilities (ISS-EWATUS).

## 3.4 Legislation

In some cases the required data come from different utilities (e.g., water and energy) and data sharing becomes a nearly impossible task with current legislation. One solution to this problem would be that some legislation forces utilities to share data.

## 3.5 Data estimations

The development of ICT infrastructures requires more data than those currently available. The reason for this is that there is a risk that data do not exhibit the required characteristics for such development (e.g., for testing). For example, it could happen that no water leaks appear in the data available.

Therefore, there is a need for supplementing case studies data with synthetic/generated data (usually involving simulating different scenarios according to some probability distributions).

The fact here (which is related to the topic of data sharing) is that utilities already have socio-economic studies (e.g., for social classification of users according to their stratification). However, those data are not available toconsortia and this causes that a lot of effort is spent by EC projects in replicating those works.

## 3.6 Reuse of existing platforms across projects

Software platforms that integrate real-time data and make predictions (such as early warnings) have existed for a long time and projects are looking into open source platforms or open source components that they can reuse. Besides, there is the need for defining common programming interfaces (APIs) for agile integrations.

## 3.7 Irrigation water

A comment was raised about not disregarding irrigation water in the EC work programme, because the effect on energy of this type of water is high (for example, in Spain 80% of water consumption is used in irrigation) and it could also benefit from ICT.

# 4 Regulation for Efficiency in Water Loss Management

The session was chaired by Tim Waldron. After an introduction to the session by the Chair, several presentations were given and a panel discussion was held at the end, which was moderated by the session Chair.

The following sections give an overview of the panel presentations and of the main discussion topics in the panel[1].

## 4.1 FederUtility (Italian Water Association), Gianfredi Mazzolani

The presentation discussed the indicators and measurements used for the regulation of water losses.

Different indicators can be used for water losses; however, it is not clear which of them can be used for regulation because not every indicator is useful for every case. As an example, pressure indicators are not always available or reliable and pressure is just an aspect of quality of service (for example, reducing pressure reduces leakages but does not allow serving the highest buildings).

Regarding measurement, measuring and using measured data is not in the common culture and practice of organizations. Smart metering can contribute to measurement and pressure measurement is already frequent, so it should be applied as a first step.

## 4.2 IWA Water Loss Specialist Group, Allan Lambert

The presentation discussed the problem of selecting a proper indicator for leakage measurement and potential problems that may arise if the chosen indicator is not interpreted correctly.

When deciding for the indicator to be used for leakage measurement, it will depend on the particular objectives and context factors.

Because of the context, some indicators (e.g., UARL) can be used for monitoring individual systems but not for comparison. Furthermore, sometimes indicators include competing objectives and reducing one thing increases the other (e.g., % of System Input Volume mixes amount of consumption and leakage).

## 4.3 Austrian OVGW W 63 Guideline 2009, Joerg Koelbl

The presentation introduced the guidelines elaborated by the Austrian Association for Gas and Water (OVGW) for Water Losses in Water Supply Systems (available in English at www.ovgw.at).

It discussed the arguments and influencing factors for water losses, how to define the observed system (e.g., with or without storage tanks), how to select performance indicators (e.g., percentages are not valid, including % of System Input Value), how to measure, and how to assess.

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[1] The rapporteur could not attend the first and last minutes of this session because of the need for coordination in order to prepare the next sessions.

## 4.4 EUREAU Commission 3, Francesco Bosco

The presentation dealt with regulation for efficiency in water loss management.

It presented the types of ownership of water services in the EU (public, public-public partnership, public-private partnership, and private), being the current landscape with plenty of public ownership.

It also presented the types of regulation (full cost recovery, regulation by contract and regulation by regulator) discussing their particular characteristics.

Right now leakage at the EU level is handled through blueprints and common implementation strategies but there is still an issue with costs.

## 4.5 Water UK, Stuart Trow

The presentation explained different particularities regarding water regulations in the UK and using Scotland as a concrete example.

Water supply ownership (public/private) depends on the region, as well as the amount of water available. Furthermore, there are a lot of regulatory agencies (both global and local). Water balance has been reported in a consistent format for 20 years.

There are multiple indicators that can be used for different perspectives (political, economical, social, technical, legislative, and environmental). However, an indicator will never satisfy all perspectives/stakeholders.

## 4.6 Discussion topics

In the panel, it was discussed what approach to take when politicians ask for the best indicator. The suggested solution was to point to other examples and to the lessons learned from them, and to aim for education, which takes time.

There was also a discussion about bound systems (i.e., A, B, C, D). It was argued that since there is a big jump between bounds, they could demotivate people. On the other hand, there are usually other drivers for people to improve; these drivers are usually economy-driven and there is no economic base behind the development of the bound system. Furthermore, once regulators push for the bound system, demotivation will be no issue.

# 5 Standards and Standardisation Bodies for ICT and Smart Water Technologies

The session was chaired by Roger Moore (HR Wallingford/iWIDGET). Around 25 people participated in it. The Chair shortly introduced the session by stating the format of the session, the goals and the expected outcomes. After this, the rest of the session was devoted to open discussions, facilitated by the Chair. At the end of the session, the session rapporteurs (Lydia Vamvakeridou-Lyroudia/iWIDGET and Elenia Duce/WISDOM) summarized the session discussions.

Previously to the session, a questionnaire was submitted to the different ICT4Water projects by HR Wallingford/iWIDGET to request information and support the discussion on standardization.

## 5.1 Advantages and disadvantages of standards

The advantages and disadvantages of standards collected through the questionnaire were summarised; in them, there are two points of view: the technical and the commercial one. People participating in the session commented them and added new ones; there was consensus on the usefulness of standards.

Apart from the advantage in terms of interoperability and of using something already established and used (therefore, avoiding reinventing the wheel), other specific advantages were identified. In a scenario where different people are speaking different languages, it is very difficult to map between standards automatically. For this issue, standardizing a common dictionary would be of help (as was the case of the IEC 61360 standard in the smart grid domain). Furthermore, standards bring new business opportunities and allow a market expansion through more competitive products with lower cost. For example, for small companies it is useful to be standards-compliant, since it allows entering a market that was previously in the hands of a few big players (mainly from the US) and allows establishing ecosystems of small companies.

The main disadvantages identified for standards are their complexity, which leads to difficulties in implementing them; one of the reasons for this is that some of them are very ambitious. One example of this are the INSPIRE standards which, in practice, are usually partially implemented. Besides, the whole process of defining a standard costs a lot of effort and money, and standardization bodies do not involve all the relevant stakeholders. Furthermore, standards can increase the price of products to end users (e.g., by requiring certification).

## 5.2 Relationship with existing standardization bodies

When standardizing, existing standardization bodies (e.g., OGC) should not be disregarded and decisions taken should not go against them. If possible, it is positive to build on existing standards instead of starting from scratch. However, another possibility would be to create a new body for water ICT standardization.

It would also be interesting to analyse the situation of standards in the energy sector, due to the parallelisms between the water and energy sectors.

## 5.3 Avoid early standardization

Early standardization should be avoided; standards are only introduced when there is a winning solution (or two of them and one wants to be dominant). After seeing the results of the ten projects in the ICT4Water cluster, it can be analysed whether some combined output could be a potential standard. Being premature and trying to standardize before is risky without proper lessons learnt and experimentation.

## 5.4 Participation in standardization

The standardization process goes beyond the projects in the cluster and currently it is not clear whether which standards would be necessary or who should lead them.

The need for engaging a larger group of people is there. Clear targets are the SWAN Forum and the Control+SWAN Action Group ofthe European Innovation Partnership on Water; people from both groups attended the special session and the Action Group already filled the questionnaire. Device manufacturers are another sector whose involvement is required. Other targets can come from people in the water domain or from the IWA, CCWI, WDSA or the IAHR conferences.

## 5.5 Scope of standardization

The scope of standardization must also be clear. Technical standards must be avoided and defining broad standards in the domain of smart water may be an impossible task.

Furthermore, there are a lot of things apart from standards that have to be decided and that can benefit the cluster, such as best practices or data models (e.g., user profile and behaviour ones).

## 5.6 Standardization is not a technical problem

In standardization processes, the main problems are not technological but in terms of getting consensus in a domain. As an example of this, the XBRL standards in the financial domain were mentioned.

## 5.7 Feedback to consumers

There was a discussion on how to standardize feedback to consumers so they understand the message (through visual rules of codes, such as with the carbon footprint) and on whether there is a need for such standard.

It was mentioned that it is better to standardize the way of computing metrics than to standardize at the dashboard level, since people should be able to choose the way of communicating metrics.

## 5.8 Role of the ICT4Water cluster in standardization

Currently, it is not clear which standards would be necessary in the Cluster or whether any output from it could be standardized. Something that the Cluster can do is to analyse the current technical standards and recommend a set of them.

# 6 ICT4Water Cluster Meeting

The session was chaired by Dragan Savic (University of Exeter/iWIDGET), because of the absence of an EC officer (Aude Zimmermann). 17 people participated in it; all the projects from the ICT4Water cluster were present (the names of participants and their projects appear at the end of this document). The session was moderated by the Chair and was devoted to reviewing action items and identifying potential joint actions to be performed in the cluster.

## 6.1 Review of pending actions

First of all, pending actions from the previous meeting at Bari in July 2015 were reviewed. All the actions have been performed with the exception of the one in which Grazyna Wojcieszkoshould check whether the EC would accept the costs involved for any or for a group of existing projects in having some lawyers to check/write terms and conditions for data sharing across projects. The status of this task was unknown during the meeting.

- **Action.** GrazynaWojcieszko to check whether the EC would accept the costs involved for any or for a group of existing projects in having some lawyers to check/write terms and conditions for data sharing across projects. If possible, then projects interested on this should get organised. **No specific deadline discussed.**

## 6.2 Events

One part of the session was devoted to discussing future relevant events.

The next big event will be the IAHR World Congress in early July 2015 inThe Hague (the Netherlands); there will be a special session and in order to participate projects must submit an abstract by November 4th.

All of the projects present in the room confirmed that they will submit at least 1 paper and some plan to submit up to 3 or 4; there is also a planned joint paper between two projects. From the Control +SWAN Action Group on European Innovation on Water some papers could also be submitted.

The required papers are technical papers with project findings, not papers with project descriptions.

It was asked whether it is scientifically worth to publish in the conference. The conference publishes proceedings, but it is not clear whether a special issue will be produced from the best papers in it. However, the congress is huge (over 1000 participants) and if the paper is good it can be invited to a journal or other collaborations could start.

- **Action.** Dragan Savic/iWIDGETto send an email to everyone reminding about the IAHR abstract deadline.**Deadline:** ASAP.
- **Action.** Projects planning to submit papers to IAHR to let Lydia Vamvakeridou-Lyroudia/iWIDGET know about the papers, so they don't end up in other sessions.**No specific deadline discussed.**

Other relevant events will be the SWAN forum (in April 2015) and/or the CCWI conference (in September at Leicester, UK) where there will be a special session and proceedings will be published.

The Action Group will organize and event in November 2014 in Barcelona. It is the responsibility of the projects if they want to advertise their project and prepare a poster for the Action Group event.

The ICeWater project is also planning a workshop in 2015 in the Milan area; partners interested from the cluster projects can attend.

## 6.3 Dissemination

Cluster dissemination actions were also discussed, namely, the newsletter, the video, the portal, and two journal papers.

A newsletter about the cluster is being produced every three months.

- **Action.** Edward Curry (WATERNOMICS)tosolicit more contributions for the newsletter.**Deadline:**by December.

The Cluster members have agreed on the final script for the video, which will be ready in the next weeks. Once the first version of the video is produced it will be shared among the Cluster. When the video is finished, a roll-up banner can be produced out if its contents.

- **Action.** Albert Rodriguez (URBANWATER) to share the first version of the video among the Cluster projects. **Deadline:** when the video is ready.

The portal should be updated taking into account the groups proposed. Edward Curry will send an email to the dissemination leaders of the projects to review the table with the groups and subgroups. Then, the dissemination leaders must check whether the groups are meaningful for their projects (i.e., if they could include their results in any of the groups). Once the groups are fixed, the Cluster deliverables and papers should be included into the portal.

- **Action.**Edward Curryto send an email to the dissemination leaders of the projects to review the table with the groups and subgroups.**Deadline:** ASAP.
- **Action.** Dissemination leaders to check whether the groups are meaningful for their projects. **No specific deadline discussed**.
- **Action.** Dissemination leaders toinclude the deliverables and papers of their projects in the portal. **No specific deadline discussed**.

It has been proposed to write a joint journal paper covering a review of the projects in the Cluster (challenges, trends, approaches, technologies used, dimensions covered, etc.).

- **Action.** Edward Curry to coordinate the writing of the journal review paper.**No specific deadline discussed**.

Since in one year the first round of 5 projects will have finished, it has also been proposed to write another journal paper with at least those 5 projects where a common issue is examined through the different approaches (e.g., DSS or user awareness).

- **Action.** Lydia Vamvakeridou-Lyroudiato coordinate the writing of the journal paper.**No specific deadline discussed**.

## 6.4 Links to other groups

Links to two other relevant groups have been identified. These groups are the SWAN Forum and the Control + Swan Action Group ofthe European Innovation Platform on Water. Contact with both groups has already been established and links with them will be strengthened.

## 6.5 Data exchange between projects

No progress is madein the topic of data exchange between projects. However, it is mentioned that collaboration between projects is encouraged. One example is the simulation data that are being produced in the iWIDGET project; those data are usually not disclosed by utilities and could be useful in different projects. How to interchange such data should be discussed inside the Cluster.

## 6.6 SmartH2O questionnaire

The SmartH2O project is planning to developa questionnaire on cost issues for the water utility and for selected users.

- **Action.** The SmartH2O project to distribute the cost issues questionnaire to all the projects. **No specific deadline discussed**.

# 7 Summary of Action Items

For convenience, a summary of the tasks and action items derived from the ICT4Water cluster meeting are listed here.

- **Action.** GrazynaWojcieszko to check whether the EC would accept the costs involved for any or for a group of existing projects in having some lawyers to check/write terms and conditions for data sharing across projects. If possible, then projects interested on this should get organised. **No specific deadline discussed.**
- **Action.** Dragan Savicto send an email to everyone reminding about the IAHR abstract deadline.**Deadline:** ASAP.
- **Action.** Projects planning to submit papers to IAHR to let Lydia Vamvakeriou-Lyroudiaknow about the papers, so they don't end up in other sessions.**No specific deadline discussed.**
- **Action.** Edward Curryto solicit more contributions for the newsletter.**Deadline:**by December.
- **Action.** Albert Rodriguez to share the first version of the video among the Cluster projects. **Deadline:** when the video is ready.
- **Action.**Edward Curryto send an email to the dissemination leaders of the projects to review the table with the groups and subgroups.**Deadline:** ASAP.
- **Action.** Dissemination leaders to check whether the groups are meaningful for their projects. **No specific deadline discussed**.
- **Action.** Dissemination leaders toinclude the deliverables and papers of their projects in the portal. **No specific deadline discussed**.
- **Action.** Edward Curryto coordinate the writing of the journal review paper.**No specific deadline discussed**.
- **Action.** LydiaVamvakeridou-Lyroudia to coordinate the writing of the journal paper.**No specific deadline discussed**.
- **Action.** The SmartH2O project to distribute the cost issues questionnaire to all the projects. **No specific deadline discussed**.

# 8 List of attendees to the ICT4Water Cluster session

| Attendee | Organisation | Project |
|---|---|---|
| Lydia Vamvakeridou-Lyroudia | UNEXE | iWIDGET |
| Chrysi Laspidou | CERTH | ISS-EWATUS |
| Quillon Harpham | HR Wallingford | iWIDGET |
| Roger Moore | HR Wallingford | iWIDGET |
| Andrea Emilio Rizzoli | SUPSI IDSIA | SmartH2O |
| Elenia Duce | D'Appollonia | WISDOM |
| Tim Farnham | Toshiba | IceWater |
| Athanasia Tsertou | ICCS | IceWater |
| Edward Curry | NUI Galway | Waternomics |
| Anna Kupfer | Bamberg University | DAIAD |
| Albert Rodríguez | ATEKNEA | UrbanWater |
| Andreas Abecker | Disy | WatERP |
| Wenyan Wu | Staffordshire University | WatERP |
| George Arampatzis | NTUA | WatERP |
| Pantelis Sopasakis | NTUA | EFFINET |
| Dragan Savic | UNEXE | iWIDGET |
| Oscar Corcho | Universidad Politécnica de Madrid | Rapporteur |