Deliverable 9.2.1

User group feedback report 1

European Commission

OS4ES

D9.2.1 User group feedback report 1

Document Information

Programme	FP7-ICT-2013-11
Project acronym	OS4ES
Grant agreement number	619302
Number of the Deliverable	D9.2.1
WP/Task related	WP9
Type (distribution level)	PU
Start date of project	01/07/2014
Date of delivery	17/10/2015
Status and Version	Version 1.0
Number of pages	25 pages
Document Responsible	Andrea Schröder - FGH
Author(s)	Andrea Schröder - FGH
Reviewers	Birk Siegmund - T-Systems

Revision History

Version	Date	Author/Reviewer	Notes
0.1	09/09/2015	Andrea Schröder – FGH	Draft
0.2	12/10/2015	Birk Siegmund – MMS	1st review
0.3	16/10/2015	Wolfgang Renz – HUAS	Clarification of open issues
0.4	16/10/2015	Andrea Schröder – FGH	Final version considering reviewing comments from T-Systems and comments from HUAS

Executive Summary

This deliverable is the first report about the feedback received by the OS4ES User Group.

While

- the history of the OS4ES User Group,
- the list of current members and
- the interactions between OS4ES consortium and User Group

are detailed in deliverable D9.3.1, this deliverable concentrates on the feedback received by the User Group in the first 15 months of the project (July 2014 – September 2015).

Therefore it provides an overview of all activities initiated and conducted by the OS4ES consortium for the OS4ES User Group and lists the input and replies received during these activities (physical meetings, webinars and distribution of a questionnaire).

Table of contents

1 Introduction

This deliverable features the feedback of the OS4ES User Group (UG) received in the first 15 months since project start.

Section 1 provides an overview of the content of this deliverable.

Section 2 lists the feedback received at the first physical UG meeting in Hamburg, at the monthly webinars, in bilateral talks between project partners and UG members and in a questionnaire.

Section 3 summarizes the received feedback detailed in section 2 and concludes if the aims for setting up and having a User Group in the OS4ES project could be reached so far.

2 Feedback from the OS4ES User Group

Already in the stage of project proposal setup the consortium analyzed which companies might be interested in the OS4ES project and be potential customers of the project results. The massive interest of the approached companies resulted in the establishment of a preliminary OS4ES stakeholder Industrial User Group which at this point of time consisted of nine companies (see D9.3.1 Table 3).

Since the project start more User Group members could be attracted by means of the OS4ES website, participation in conferences, bilateral talks with existing business contacts of consortium partners and OS4ES publications. Currently the User Group has 23 members from 19 companies and institutions (see D9.3.1 Table 4).

A series of User Group meetings has been held since the project start. Details of the type of User Group Meeting, its scope and participating User Group members can be found in D9.3.1 Table 5.

This section concentrates on the feedback received during these meetings as well as in bilateral contacts between OS4ES consortium members and members of the OS4ES User Group. Furthermore, the steps taken by the OS4ES consortium upon the feedback of the User Group are described.

The following pages of this section list the User Group activities have been conducted in the period of 1st July 2014 until 30th September 2015.

21.11.2014 (Webinar):
Introduction to OS4ES, Report on D1.1 and identification of benefits for UG members

The UG stresses the importance of concise requirements for communication upon which the communication protocol will be chosen out of various communication protocol candidates. Some requirements such as control signal or file and transfer time are mentioned as indispensable. The consortium takes the suggested requirements into account when working on this task (T2.1).

The need for controllable loads is brought forth. This aspect is considered in the definition of use cases in WP1 and hence in all other relevant work based on it.

It becomes clear that security issues are very important to the UG as insecure systems will not be acceptable and only trusted systems will be successful in the energy market. As the OS4ES consortium considers security issues right from the start when the architecture of the OS4ES is set up and also later on in the various implementation steps this concern is addressed throughout the project.

One User Group member proposes to think about a certification of the test scenarios, because

- on one hand not much additional effort of getting a test specification certified is assumed,
- on the other hand a certified OS4ES platform could attract more users in the energy market.

The consortium will take this aspect into consideration when the prototype is ready and include it in the exploitation plan.

Senertec offers to provide combined heat and power devices for testing and Phoenix will try to provide some IEC 61850 products for OS4ES. The OS4ES consortium will think about this offer when the lab and field tests start.

It is suggested to get into contact with regulators and present them our ideas. First some tests will be done at Stedin in order to see which tests are beneficial for the market. Although, by experience, regulatory bodies are mostly 2 years behind the process state of the art, the OS4ES consortium will search the dialog with regulators.

28.01.2015 (Physical Meeting in Hamburg, Germany): Presentation of the results of D1.1 and D2.1 & impact of the UG

The UG regards the following use cases as most important:

- Volt/VAr balancing and
- demand response.

It is proposed to start with the use cases, which involve a balance responsible. The OS4ES consortium will consider that in their decision, which use cases to implement in the OS4ES project. Furthermore the OS4ES consortium will set up a questionnaire in which the UG members can fill in the use cases they deem crucial for today's and future energy market scenarios.

Germany is setting up a Green Book and information in D1.1 could make a valuable contribution to it. It has been proposed by the UG to have a look at the German Green Book on the new energy law and check, if the OS4ES use cases match with the concepts of the Green Book. The OS4ES consortium responds that, on the level of detail described there, the innovative use cases are in focus of the Green Book. A more detailed statement should be possible after the White Book announced for summer 2015 is published.

Questions regarding time constraints in D2.1 and the registry concept are asked by the UG and answered by OS4ES partners. The User group feels that there should be one authorized registry for accounting and billing. Next to this, commercial registries could exist for other services. The OS4ES consortium refers to the OS4ES system architecture that assigns the technological functions of DER system registration, search and matching to the OS4ES system components (including the registry) while the business logic and administration

including billing is to be implemented in stakeholders applications on top of the OS4ES platform. In particular, not all operational data relevant for billing need to be logged in the OS4ES system while that very well fulfills its technical requirements.

20.02.2015 and 24.04.2015 (Webinar):
Sequence diagrams of the use cases Volt/VAr, Dwelling information exchange, Primary Control annotated with communication requirements and presentation of the use cases "Marketization of balance group management" and "Demand response"

The questions raised by the UG regarding the presented use cases (Volt/VAr, frequency control, dwelling information exchange, demand response, marketization of balance group management) are answered by the OS4ES consortium.

27.04. 2015 (Questionnaire):
Relevance of use cases

A questionnaire (see Annex A) has been sent to the User Group with the focus of getting feedback on the relevance of the use cases described in D1.1. Unfortunately only one member of the UG filled in the questionnaire and sent it back to the consortium. Some UG members gave feedback in web meetings and the physical meeting, so that a well-grounded decision on the use cases to develop for the OS4ES project could be taken.

07.05.2015 (Webinar with user group members of SIEMENS):
Register and Search service

The discussion following FGH's presentation of the register service for the OS4ES project has as result, that the current approach is feasible and that no new ACSI service "Register" is needed in IEC 61850-7-2. What needs to be provided by IEC 61850 in future, though, and what already has been planned to be done (IEC 61850-8-2) is to allow for a server-side "Associate" for registration. Currently the associate service is only dedicated to clients.

For the search service SIEMENS proposes to use a new, dedicated ACSI service with which SQL statements can be sent to the registry. In the SQL statements also semantic information of IEC 61850-7-3 and 7-4 could be used.

The OS4ES consortium disregards the two variants for the search service proposed so far and goes for the variant proposed by SIEMENS.

22.05.2015 (Webinar):
Registry and Energy Services

In the discussion after HUAS' presentations on D4.1 and its subsequent results recently obtained in a Hamburg workshop together with IT4, the UG proposes to have a look at the German DAM (Data Access Manager) and to consider the concepts in the OS4ES Registry.

The OS4ES consortium states that it is aware of this document. However, the current concept described in the draft accessible to the public is not yet elaborated in such detail as necessary for future implementation. The OS4ES consortium expects the OS4ES Registry to be compatible with the challenges and requirements outlined in the DAM concept.

It is furthermore suggested that the registry structure should be a copy of the physical grid. So the DER system would be listed in the registry level where it is connected. OS4ES consortium: The logical structure of the OS4ES registry supports a (hierarchical) zone concept that allows for an efficient DER system search. The physical structure of registry instances, their distribution and replication depends on its final deployment and configuration. In the OS4ES lab and field test this will be very simple. If adopted by authorities the distributed registry can and will be configured and deployed so as to obey regulation conditions including security and privacy concerns.

Various comprehension questions were asked by the UG members and answered by the responsible consortium partner.

10.07.2015 (Webinar):
Data model of DER systems and registry

Beside some questions regarding the general understanding of the UML data model the user group members proposed to take the data objects average power of a battery and start time into account in the UML model. The necessity of these two data objects is seen by the consortium. Hence, they are entered in the next version of the data model.

Out of the discussion the idea to model an interruptible load profile came to the mind of the responsible consortium partner for the data model and was hence implemented as an additional data object in the OS4ES data model.

21.08.2015 (Webinar):
Interface to utilize the existing telecom infrastructure

Feedback of the UG consisted in questions asked to the presented content (Generic interface to utilize existing telecom infrastructure).

18.09.2015 (Webinar):
Prototyping DER management applications that integrate network operation algorithms and middleware services

The UG proposes to use a state machine for handling the various activities shown in the presentation slides for the Use Case “Flexibility”. The presenter replies that the purpose of the utilization of activity diagrams is just to illustrate the test case definition. The consortium will of course include applications state machines in D5.3 which will contain the whole applications design.

Besides, it is discussed if the term Virtual Power Plants (VPP) should be employed for OS4ES purposes. In OS4ES a VPP is defined as an aggregation of services and not as an aggregation of DER systems. The UG clearly states that a new name should be used instead of VPP as this term has a clear definition (aggregation of DER systems). Several terms are proposed by UG members. The OS4ES consortium will consider these proposed terms when thinking about a new name.

3 Conclusion

As laid out in the Description of Work [2] the intention of having an OS4ES User Group was

1. to disseminate the OS4ES project contents to a group of experts from the industry, research institutions, supply companies, manufacturers and telecommunication providers, who in turn act as multiplicators of the OS4ES project within their companies and to the outside;
2. to have an advisory body commenting the work and the achievements of the OS4ES consortium and provide important practical advice;
3. to stimulate discussion and exchange of knowledge among different user and developers groups, helping to extract expert knowledge to be used within the project.

The first objective, the dissemination of OS4ES project scope and results, has been fully reached. In various web meetings, one physical meeting and bilateral talks with members of the User Group presentations of the project scope and project results have been given. The presentations, deliverables and minutes of the meetings are available for download on the User Group website so that also UG members who missed a meeting are kept updated. The convenor of the German standardisation body DKE AK 952.0.17, an OS4ES UG member, asked the OS4ES consortium to give a presentation on the OS4ES project in the next meeting. So, we can also state the multiplier effect.

The second aim has been partially achieved. The OS4ES consortium expected more feedback on deliverables and especially on the questionnaire (see Annex A). The reason the consortium identified the UG for not having been able to provide more input is mainly seen in a lack of time. In their daily business UG members can hardly afford the time to read the various and comprehensive OS4ES deliverables and provide detailed feedback on them. So the comments received are mainly based on the presentations given during web meetings, physical meetings and bilateral talks. Nevertheless, the following feedback and practical advice has been received:

- a proposal to certify the OS4ES test scenarios;
- identification of relevant use cases for the OS4ES project;
- enhancement of the data model.

The third objective has been largely reached. The UG members coming from different businesses stimulated discussions in the various meetings on the following aspects:

- security of the OS4ES platform;
- contact regulators;
- concepts and architecture of the OS4ES registry;
- using a state machine for handling the processing sequence of use cases;
- finding a new name for the aggregation of services replacing the currently used term “VPP” in the OS4ES project.

Besides, they provided their expert knowledge on a lot of project issues, e.g.:

- communication requirements
- register and search services mapped to IEC 61850
- offering devices for the lab and field tests

Although not all objectives could be fully reached the received input from the User Group has been very valuable. The OS4ES consortium is lucky to have such an interested group of experts who invest their scarce time to contribute to this research project.

It is planned to have a second physical User Group meeting at the end of this year or early next year to present the latest OS4ES results and to stimulate discussion on some of the open issues of the current and future work.

References

[1] D9.3.1 First draft of the dissemination and exploitation plan

[2] Grant Agreement Annex I – “Description of Work”

Annex A

Use Case Validation

Questionnaire

European Commission

Dear Sir or Madam,

The following questionnaire aims to gather your impression about the OS4ES project, its objective and the proposed solution. It makes special attention on chapter 5, Use Cases, of Deliverable D1.1.

Please answer the questions according to your thoughts about the future services that DER could offer to the Smart Grid actors, and the way to provide them. Answers will be treated anonymous and will be used only in aggregated form in the OS4ES project.

When you finish the questionnaire, please send it to the following e-mail address: contact@os4es.eu

Thank you very much for your time. If you are interested, the overview of results of this questionnaire will be published on OS4ES Web site.

1. Information aboutyourcompany

Company name: _____ Country: _____

1.1 Please specify the number of employees of your company.			
☐ Less than 10	☐ From 10 to 49	☐ From 50 to 249	☐ More than 249

1.2 Nature/Type of your company.			
☐ Regulator	☐ Supplier/ Retailer	☐ Transmission System Operator	☐ Distributed Generation
☐ Distribution System Operator	☐ Aggregator	☐ Equipment manufacturer	☐ Other (Specify) _____

1.3 Your Position / Role in your company			
☐ Company manager	☐ Electrical project manager	☐ Information Technologies Administrator	☐ Other (Specify) _____

1.4 Please, rate your current knowledge about smart distribution grids.				
☐ No experience	☐ Low expertise	☐ Medium expertise	☐ High expertise	☐ Strong expertise

2. Objectiveofthequestionnaire

At the first stage of the project, and following the technology driven design —see D1.1 Section 2 Methodology— thirteen use cases considered of interest by the partners of the consortium have been defined with the purpose of leading to the definition of the requirements of the OS4ES system. The ulterior objective of this questionnaire is that the OS4ES User Group collaborates in the definition of the final use cases to be tested and validated within the project.

The requirements derived from the complete set of use cases have been assessed and taken into account when designing the OS4ES system. However, just a subset of these use cases will be selected for being implemented in the frame of the project in order to validate the OS4ES system.

The selection of the use cases used for validation will be done using criteria as the testability (both in the project lab and field tests) or other business related criteria. At this last point is where the knowledge of the OS4ES User Group is requested, with the intention of assessing how interesting would be each use case in terms of business opportunities, contribution to electric system stability and security of supply, etc.

The thirteen pre-selected use cases are listed below:

- Certified Energy Markets
- Energy Management using VPP
- Dwelling Information Exchange
- Marketizationof Balance Group Management
- Frequency Control – Primary Control
- Frequency Control – Secondary Control
- Frequency Control – Tertiary Control
- Volt / VAR Control – Dynamic
- Volt / VAR Control – Static
- Volt / VAROptimization
- Dynamic Virtual Power Plant
- Demand Response
- Demand Response Management of EVs

Use cases have been grouped in terms of business cases, depending on the service that they provide to the electric system. From this prospective, we kindly request you, as an OS4ES User Group member, to provide us feedback assessing how interesting you see the utilization of the OS4ES system in the scope of the following business cases.

3. OS4ES Business Cases

The Business Cases describe different challenges known in utilities. In the near future, given the smart grid paradigm, these challenges could be tackled also from the DER systems management perspective. A common characteristic of them all is the provision of flexibility services.

Flexibility is the ability to deviate from an initial intended energy demand (or supply). This deviation can either imply a change in time, amount of energy, amount of power, location or a combination of these. Flexibility can be achieved by scheduled generation and / or demand modification. The modification can be done in time (production or load shifting) or in power (for instance, peak shaving). DERs, Prosumers and EVs are emerging stakeholders / technologies that will play a major role in this scenario, as they hold both the capability of demand and generation. But they are not directly addressed by the TSO / DSO because of their limited resources, so flexibility providers and flexibility aggregators will have to play a major role, as they will provide aggregated offers of flexibility based either on consumption or production pattern modification.

These business cases tackle two major fields:

Grid operation services

- **Congestion management**: Active power limitation (by means of both generation and consumption) so that the distribution grid is operated within safe power ranges
- **Frequency/voltage control**: Active/reactive power provision as ancillary service

Energy market services

- **Re-scheduling**: Active power scheduling and dispatching capability of VPPs
- **Imbalance management**: Short-term DER production control for imbalance minimization

These business cases involve the use cases defined by the OS4ES consortium, and which are described in ***D1.1 Annex C Detailed Use Case Descriptions***.

3.1 Grid operation business cases

In terms of grid operation system stability is a feature that has to be guaranteed by the system operators, TSOs and DSOs. Two main areas crop up as fundamental for the near future: congestion management and grid reliability.

3.1.1 Congestion management

Grid congestion events arise when there is a punctual overload of certain elements in the distribution grid, typically distribution feeders or transformers working over their rated active power.

The classical procedure of DSOs to overcome this problem was to size the distribution network depending on the peak demand, wasting the power system capabilities for long operating periods. When DERs began their expansion DSOs did not have any mechanism to control either their production or the demand in the distribution grid, so severe restrictions were imposed to new DER installations based on worst case scenario (usually maximum DER production with minimum demand and the contrary). Smart Grid technologies can postpone or even prevent network expansion, so their cost efficiency are strong incentives that are forcing the DSOs to tackle the issue of security of supply using innovative manners. Therefore DSOs are increasingly taking an active role in grid management as the paradigm of electric network is moving towards a decentralized production scheme, and technologies that provide flexibility, either for controlling production or demand, are on the verge of reality.

Examples of technologies that could provide flexibility services for grid congestion services are:

- Demand Response (DR) , see ***D1.1 Annex C12 Demand Response.***
- EV Smart Charging, see***D1.1 Annex C13 Demand Response Management of EVs.***
- Virtual Power Plants (VPPs), see***D1.1 Annex C2 Energy Management using VPP.***

3.1.2 Frequency/voltage control

Two network variables are considered, frequency and voltage. They have to be within limits in order to maintain the system stability and with the purpose of providing electricity with the necessary quality of supply. Both frequency and voltage control based ancillary services are, nowadays, services mainly provided by central producers or BRPs.

As the network paradigm evolves an increasing decentralization, DER systems are expected to become an important actor, technically capable of providing this kind of services in a cost efficient and flexible manner.

The TSO would use frequency control services and also optimize the grid operation and restore the static voltage control reserves.

Frequency control

Given the advanced degree of interconnections in the current European electric network, the spatial scope of frequency control services tends to become a global issue. In the current situation the TSOs are responsible for the procurement of frequency control
In case of disturbances TSOs tackle the problem using reserve services provided exclusively by central production plants, which are divided into primary, secondary and tertiary services, depending on activation times of the reserves. At the end, this need of reserves surcharges the electricity price that end users will pay. The provision of these services in a more cost-efficient manner becomes a challenge.

Primary control serves for rapidly (in Europe: within 30 seconds) balancing an imbalance between generation and consumption with the aim of reconstituting a stable network frequency, see ***D1.1 Annex C5. Frequency Control – Primary Control.***

The objective of secondary control is to restore the system frequency to its nominal value and to restore the energy exchanged between the control areas via transmission system interconnections to the agreed set point values of the exchange programs so that the activated primary control is available as reserve again, see ***D1.1 Annex C6. Frequency Control – Secondary Control.***

The TSOs shall deploy minute reserve power in the event of large extended imbalances between generation and consumption and/or for the restoration of a sufficient secondary control band, see **D1.1 Annex C7. Frequency Control – Tertiary Control.**

Voltage control

Similarly to frequency control, nowadays the provision of voltage control services uses to be basically self-procured by the DSO/TSO, who installs its own equipment for voltage support. The investment and operation costs of this equipment are diluted in the network access tariffs. But the voltage support provided by these resources could be also requested by the TSO/DSO to the parties connected to the grid as part of the network connection conditions. Therefore voltage control capacity available could exceed what would be needed, resulting in a new voltage support portfolio where DERs could play an important role.

The objective of voltage control is to maintain an optimal operation of the electricity network, while providing the customers with a voltage quality according to some pre-established margins for a variety of nominal load patterns. Voltage support is mainly a local service, as the transport of reactive power over long distances is impractical. Therefore the role of the DSO is very relevant both in dynamic and static voltage control.

The voltage control can be performed at different levels and time scales. To avoid system instability during short-term disturbances (voltage dips/swells) it is required to have fast-acting controls. This control scheme is usually called Dynamic Voltage Control. (DVC) but can also be named as Primary Voltage Control (PVC), see ***D1.1 Annex C8. Volt / Var Control – Dynamic.***

During continuous generation-load imbalances which can create longer voltage events, such as over-voltages or under-voltages, a slower control to recover voltage levels in the nodes is required (Static Voltage Control, SVC), see ***D1.1 Annex C9. Volt / Var Control – Static.***

The last step in voltage control would involve the economic aspects related to voltage control. Volt/Var optimization tries to improve the power flows between the system elements to reduce, to the extent, the power losses linked with the reactive power, see ***D1.1 Annex C10 Volt / Var Optimization.***

3.2 Energy market business cases

Energy services intend to enhance the economic revenues associated to the integration of smart resources in market structures. In the scope of OS4ES these resources could be DERs, consumers or prosumers. In the context of the OS4ES actor / roles definition, the flexibility provider offers these resources in the spot electricity markets.

At first instance, retailers buy and sell energy in day-ahead spot markets but are able to offer flexibility services later on adapting the role of flexibility providers. Traders base their market transactions in production and demand forecasts, generally assuming that the producers and consumers are not able to provide flexibility services. Therefore traders tend to limit their participation to day-ahead or hour-ahead energy markets, which limits their business diversity. But in the future it is foreseen that innovative market structures will be created and the services offered by flexibility providers will have to adapt accordingly to the new markets requirements, see ***D1.1 Annex C1. Certified Markets***.

BRPs hold the responsibility of guaranteeing that the real production matches the scheduled generation contracted in the market. Therefore the system of balancing responsibility imposes imbalance risks to BRPs, who have to pay high energy prices/penalties in case of imbalances. The risk of BRPs offering DER based energy depends on both the predictability and the controllability of their portfolio. Flexibility could be interesting for the BRP, since this could compensate their imbalance when it is cheaper than the imbalance penalties, see ***D1.1 Annex C4. Marketization of Balance Group Management***.

DERs can contribute to services like re-dispatching and imbalance management by means of several technologies. VPPs and EMSs are promising examples:

VPPs

DER systems can be aggregated in VPPs with the goal to participate in large scale electricity markets as flexible producers. VPPs dispatch their energy initially in day-ahead spot markets, but are able to reschedule their active power production schedule based on request of the TSO or a BRP, depending on the specific country market structure. DER systems grouped in VPPs can be used as a dynamic system capable of reacting to short-term production deviations, lowering the risk of high imbalance prices. The flexibility of the VPPs permits the participation of the VPPs in imbalance reduction services demanded either by aggregators or BRPs (depending on the specific country market structures) participating in spot markets. In the past these VPP structures have been relatively static. Due to the rise of environmental dependent DERs, failures and errors in estimation of production capabilities may occur, so VPPs must adaptively compensate these failures by nominating new DER systems from their VPP pool. This innovative concept of dynamic VPPs, provides an intuitive mechanism for finding and claiming adequate DERs for spontaneous reorganization of VPPs, see **D1.1 Annex C11. Dynamic Virtual Power Plant.**

(Local) Energy Management Systems (EMSs)

Prosumers and customers would also contribute to re-dispatching capabilities by means of their user response. Strategies like dynamic pricing or environmental based incentives can encourage proactive users to (automatically) reshape their consumption patterns, so that rule-based EMSs execute predetermined actions, while staying within the comfort levels of the prosumer, that lead to energy re-scheduling, see ***D1.1 Annex C3. Dwelling Information Exchange.***

4. Your opinion

1.5	Which use cases do you think would be the most useful in terms of enhancement of the electric network management achieved by the OS4ES DER systems management? Please indicate 3, ordered in decreasing interest (the most interesting at the top), and describe shortly the reason(s) that led you to select each use case.

1.6	Which use cases do you think would be the most promising in terms of new business generation? Please indicate between 3, ordered in decreasing interest (the most promising at the top), and described shortly the reason(s) that lead you to select each use case, including the effect you would expect in your company business portfolio.

Thank you very much for your time and support.

If you wish to know more about the OS4ES, we kindly invite you to visit our website at http://www.os4es.eu/.