Platone

PLATFORM FOR OPERATION
OF DISTRIBUTION NETWORKS

Platone

PLATform for Operation of distribution NEtworks

D6.4 v1.0

Periodic report on lessons-learned

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Abstract

This deliverable reports on the lessons learned through the field trials activities of Platone during the first year of project activities. The lessons are divided into two subjects, standards, which is the major topic of WP6 and other topics, including regulatory issues which is the minor theme of WP6.

Keyword list

lessons-learned, standards, regulation, legislation, data privacy

Executive Summary

The Platone project's principal topic is the three demonstrations that are going to take place in Italy, Greece and Germany. The main theme of the project which is partial or complete utilization of the Platone platform set a stage where a variety of solutions, approaches and concepts will be implemented or invoked during the development and field trial of the use cases. A common denominator in projects such as Platone, is the instances where valuable knowledge is gained through problems occurring. Such lessons learned via the process developing and implementing are important to keep track of and present to the community. Thus, an extra value is added to projects like Platone, because they can serve as source on valuable information for future projects that try similar approaches.

One of the most interesting topics where useful lessons can be learned is the topic of standardization. It is no secret that the smart grid ecosystem is still a work in progress where new developments occur every year. The standardization community is doing good work trying to keep up and it is just as dynamic as the field of electric power itself. However, there are also cases where the standardization ecosystem is not covering an approach. Furthermore, there are instances where the practical application of standards raises practical issues worth mentioning. It is, therefore, better for the feedback loop on the topic to be closed and that pioneering projects like Platone report on their experiences. Similar dynamics develop in other topics such as legislation and regulation, which also can teach valuable lessons when crossing paths with a practical application such as Platone.

With the motivation of keeping a record of the valuable experience gathered by the demo leaders and other partners through the process of developing the Platone demonstrations, Platone will produce an annual report on the lessons-learned. Aligning with the major and minor topics of WP6, the focus is on standardization mainly and secondly, legislation and other subjects, secondly. The demo leaders report on the experience gained from developing the demos with regards to the aforementioned topics.

Reporting is done separately for each demo and is thematically divided, too. The demo leaders report the main lessons learned and document most of their experiences so far. The Italian demo highlights the creation of five internal project development streams. The Greek demo outlines that the development process of D6.2 helped them gain a valuable insight on Blockchain standards. The German demo identifies the lack of a universal standard on battery technology as a significant observation.

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Table of Contents

Executive Summary **3**
Authors and Reviewers **4**
1 Introduction **6**
1.1 Task 6.2.3 6
1.2 Objectives of the Work Reported in this Deliverable 6
1.3 Outline of the Deliverable 6
1.4 How to Read this Document 6
2 Italian Demo **8**
2.1 Lessons-learned on standards 8
2.2 Lessons-learned on other subjects 8
3 Greek Demo **10**
3.1 Lessons-learned on standards 10
3.2 Lessons-learned on other subjects 10
4 German Demo **11**
4.1 Lessons-learned on standards 11
4.2 Lessons-learned on other subjects 12
5 Conclusion **13**
6 List of References **14**
7 List of Abbreviations **15**

1 Introduction

The project “PLATform for Operation of distribution Networks – Platone - aims to develop an architecture for testing and implementing a data acquisitions system based on a two-layer approach (an access layer and a service layer).that will allow greater stakeholder involvement and will enable an efficient and smart network management. The tools used for this purpose will be based on platforms able to receive data from different sources, such as weather forecasting systems or distributed smart devices spread all over the urban area. These platforms, by talking to each other and exchanging data, will allow collecting and elaborating information useful for DSOs, Transmission System Operators (TSOs), customers and Aggregators. In particular, the DSO will invest in a standard, open, non-discriminating, economic dispute settlement blockchain-based infrastructure, to give to both the customers and to the aggregator the possibility to more easily become flexibility market players. This solution will see the DSO evolve into a new form: a market enabler for end users and a smarter observer of the distribution network. By defining this innovative two-layer architecture, Platone removes technical barriers to the achievement of a carbon-free society by 2050 [1], creating the ecosystem for new market mechanisms for a rapid roll out among DSOs and for a large involvement of customers in the active management of grids and in the flexibility markets. The Platone platform will be tested in three European trials in Greece, Germany and Italy and within the Distributed Energy Management Initiative (DEMI) in Canada. The Platone consortium aims to go for a commercial exploitation of the results after the project is finished. Within the H2020 programme “A single, smart European electricity grid” Platone addresses the topic “Flexibility and retail market options for the distribution grid”.

In WP6 the emphasis is mainly on the standardization and legislative side of the project. WP6 assists the demo leaders in their implementation by analysing the standardization ecosystem and the regulatory framework, provides suggestions and support and records their efforts to assist future similar projects. It is this last point that the series of annual deliverables on lessons-learned wants to address.

1.1 Task 6.2.3

Task 6.2.3 aims at concentrating feedback from the Demo leaders regarding their activities that are affected by standards and the standardization ecosystem in general and legislative and regulatory topics additionally. This task includes a report on lessons-learned every year. This annual lessons-learned reports have an open format that allows for the Demo leaders to record their valuable experience that came as a result of the project activities on the aforementioned topics.

1.2 Objectives of the Work Reported in this Deliverable

The objective of the work reported in this deliverable is to concentrate the any valuable experience and lessons obtained by the demo leaders during the 1st year of the project. As already mentioned, the demo leaders are encouraged to report their experience on standardization first. This means that any issues that come up while the development process is under-way that are related to standards are relevant for reporting. The same applies for other topics the demo leaders might have valuable experience to share including the regulatory and legislative framework. The goal is again to have a platform to record how they encountered and handled any interesting problems or observations.

1.3 Outline of the Deliverable

Section 2 discusses the lessons-learned for the Italian field trial. Sections 3 and 4 includes the corresponding experiences of the Greek and German development efforts, respectively. Section 5 concludes this report.

1.4 How to Read this Document

This document aims to record the experiences the demo leaders gained during the first year of the projects from the work on the implementation of the demonstrations of Platone. The focus is on standardization, the major theme of WP6, but legislation and regulation are discussed, also. The reader

is not required to have any specific knowledge but reading D6.1, D6.2, D6.8, D6.9 are advised since they are referenced in this document [7][8][9][10].

2 Italian Demo

The following subsections report the lessons learned from the Italian demo in the first year of the project.

2.1 Lessons-learned on standards

During the first year of the project, the Italian Demo has designed the system architecture, defining the main components and actors involved. The demo's objective is to test a local flexibility market to solve distribution's congestions and voltage issues, but also to support the TSO in the use of the resources connected in medium and in low voltage to solve its issues (like congestions and voltage violations). Hence, it has been supposed a possible local market model that use a market-based procurement, to engage the flexibility resource through the Aggregator.

The efforts are been focussed primarily on the requirements of the overall design of the system and after on the specific components and their functionalities. The steps follow a timeline defined for the implementation of activities within WP3, starting from the design, definition and development of the Architecture, together with the description of the Italian demo use cases and preliminary KPIs, within five internal project streams (one for every platform). More detail will be defined with the technical specification of the platforms, foreseen in D3.3 [3] in M18.

D6.1 [7] reported on the main Smart Grid protocols and standards (that could be used in the Italian demo. Furthermore, in D6.2 [8] the Italian demo has provided a list of main standards applicable in its trial. A first definition of standard used for the data exchanged has been made and is reported on in the communications layer of the SGAM analysis of the Italian UCs in D1.1 [2].

Concerning the Platforms and the Blockchain technology, currently the Italian demo is defining the tools and software implemented in them. In the next period the technologies to be adopted and the standards to be used will be defined and reported on in D3.3 [3] in M18. Hence, for the implementation of the trial we will adopt the standards and protocols used for traditional DSO's applications (e.g. SCADA, AMI, GIS) and some non-standard solutions for the involvement of the new components and devices, like Market Platform, BlockChain Platform, Light Node and flexibility resources.

In conclusion, during this first year of the project in which the architecture has been designed and the use cases have been defined, the Italian demo recognises has gained significant knowledge about the components, actor and functionalities, which gives it a basis to define the right standards and protocols.

2.2 Lessons-learned on other subjects

During the first year of the project, the Italian demo has explored the topic of the flexibility services market. Starting from the current Italian ancillary service market, that involves only the TSO, a complementary marketplace has been hypothesized, to provide local services (like congestion and voltage management). This has required a careful evaluation of the regulations, laws and of the service products marketed to date.

Moreover, the description of the use cases, according to IEC-62559, and the SGAM analysis have supported the Italian demo in identifying all the characteristics necessary for a correct representation of the use cases. The SGAM layers also represent a reference for some future activities (like data exchange and business model).

The deepening of the legislative and regulatory framework was necessary not only for technological design, system development activities and administrative aspects (sub-contracting), but also for related activities which foresee the involvement of customers.

The need to trace a clear path regarding the communication of users' consumption data between project partners was highlighted, in order to ensure full compliance with privacy regulations (EU Regulation 2016/679 and Legislative Decree no. 196 of 30 June 2003, which was modified and integrated by Legislative Decree no. 101 of 10 August 2018) and antitrust provisions (Italian Law no. 287, 10 October 1990).

Specifically, the identified potential risk concerned the need, during the pilot testing phase, to communicate and exchange among the Italian demo partners information relating to users' consumption

data directly linkable to personal data, with consequent impacts on privacy-related aspects. This kind of data are already available to the DSO (areti) based on the existing energy transport contract (already in place) with users served by the network managed by areti. It was observed that, without identifying a dedicated prevention strategy, this situation could have caused another potential risk of non-compliance with unbundling and antitrust provisions during the pilot testing execution. This risk concerned the possible exchange between DSO and Aggregator of information that could have been considered as commercially sensitive, with an involuntary undue advantage in favour to the Aggregator. In prevention to these potential risks and misunderstanding of effective aims within the project, dedicated discussion tables and focus boards involving the Legal & Compliance and Regulatory Functions of Acea Energia and areti, together with the Privacy Responsible of Acea S.p.A. were activated. This focus led to the definition of an internal governance document which defines the methods and the conduct rules for managing users' personal data exchange during the pilot implementation and during customer-engagement activities and is reflected in the Platone data management plan [11] and also [12].

3 Greek Demo

The following section reports the lessons learned from the Greek demo in the first year of the project.

3.1 Lessons-learned on standards

During the first year of the project, the Greek demo explored the potential of the Platone architecture that was being developed in parallel, and considered how it can utilise it effectively and appropriately considering the Greek DSO needs and particulars. Also, HEDNO with NTUA elaborated the use cases for the Greek trial and defined suitable Key Performance Indicators to measure the effectiveness of the methodologies developed. The above tasks identified the actors of the use cases as well as the components to be used, both of which have implications on standards and protocols to be employed.

D6.1 [7] provided a thorough initial analysis of the standards ecosystem around Platone, and allowed the Greek demo to achieve a deeper understanding of the existing wide spectrum of available standards in the smart grid technology. Then, the Greek demo prepared input for D6.2 [8], which is released in parallel with this deliverable. That was a significant exercise that made us reflect, not only on the standards and protocols already used per technical area, e.g. SCADA, DMS, AMI, but also on standards that could be theoretically applicable to the use cases defined, like for example standards regarding demand response from customers/producers who are under a contract with an aggregator. It should be noted that standards and protocols regarding Blockchain were of great interest considering the novelty and challenges of the technology.

Investigation of standards has been an important learning process for the Greek demo and built a solid background for future work. In addition, HEDNO appreciated the importance of following the standards and how this will provide a robust framework for the demo implementation. The analysis of D6.2 is expected to be revisited in the course of the next stages of the project and by the effort of continuously improving on the demo development, more experience is to be gained.

3.2 Lessons-learned on other subjects

D6.8 [9] presented the results of a detailed study on the main characteristics of the distribution grids in Europe and on the national and European legislative and regulatory framework concerning the innovative solutions developed in Platone. Taking that into account, the Greek demo reviewed and concluded on the laws and specific articles that are applicable to the demo at this stage of the project, and discussed some regulatory gaps related to the use cases developed. This analysis, included in the D6.9 [10] “Report on solutions and recommendations for the roll-out of the designed solutions” which is released in parallel with the current deliverable, was a valuable learning opportunity and allowed the Greek demo to acquire broad knowledge on the subject. A major point that emerged was the requirement for a more detailed national regulatory framework regarding the role and limitations of the “Aggregator”, which is a key actor in the Greek demo. Also, the legislation gap in both European and national guidelines for the implementation of Blockchain technology in the energy sector became evident.

The Greek demo also recognises that during this first year of the project gained significant knowledge via the use cases definition process [2]. The project wide agreed approach to follow the Use Case Methodology as described in IEC 62559 provided a standardised format for the use cases of the project and at the same time a good comprehension and appreciation of the standard itself and the Smart Grid Architecture Model (SGAM).

4 German Demo

The following section reports the lessons learned from the German demo in the first year of the project.

4.1 Lessons-learned on standards

Over the course of the first year of the project, the activities of the German demo were focused on the development of a concept for the architecture of the field test design, the Energy Management System (EMS) called Avacon Local Flex Controller (ALF-C) and its integration into the Platone framework and connection to physical assets in the grid. As a result, a suitable system architecture has been designed that fully meets the requirements for the implementation of the planned use cases 1 to 4 in the field test phase. A concept for the technical design of the field test has been described in D5.1 [5]. Within the document hardware and software components, communication and IT components are specified. The concept has been further developed and expanded in the following months. Additionally, the integration of the ALF-C into the Platone framework has been designed, describing the architecture enabling the connection between the physical assets in the field via the DSO Technical Platform and Blockchain Access Platform.

In the following step the use cases for the German demo project had been specified further and described in detail in D5.2 [6]. A detailed concept and description of use cases had been developed by making use of IEC-62559 standards. As part of the deliverable Avacon has outlined motivation of integration of future energy communities into DSO's future grid operation strategies, has defined key performance indicators to measure the effectiveness of the architecture and strategies and described expected results and their impact on future operations. The requirements from the use case descriptions were taken into account when finalizing the overall architecture and interfaces. In the course of the elaboration, a first draft of the data streams for communication between the various systems of the IT infrastructure had been created.

For the connection of physical assets to the ALF-C and the identification of suitable standards, it became clear that standards being used by the vendors of battery storage systems are not unified and often contain an element of either vendor-specificity or make use of obscure protocols that are not widely used. In case of household batteries, it turned out that the manufacturers considered do not offer any interface for a direct connection of external devices. Instead, batteries are equipped with integrated sensors and controllers that can be accessed only by the vendor via proprietary back ends. In some cases, vendors offer an API enabling an indirect link to the batteries via the vendors cloud for measurement and controlling purposes. The standard used for the backend interface differs between vendors, see [8]. Many manufacturers are handling information on used standards as a secret. First details are only provided within a procurements process after the provision of a request for information including a detailed description of technical and functional requirements. Further information on standards are provided, after the completion of order and the procurement process. In others cases manufacturers provide details on used standards after signing a non-disclosure agreement.

It is not clear why details on backend solutions in some cases are kept as secret. It might be because of several reasons:

1. A public description of the standards and functionalities used for the backend interface may allow competitors to have conclusions on how, the manner and to what extent vendors might have access of storage located in households for steering in order to participate in electricity and control reserve markets and to manage one's own balancing group.
2. The backend connection in most cases is a service that is provided against payment and therefore is a business case for the manufacturer. The revenues to be created have potential to be higher than the sales of batteries. In most cases only local installers and distributors have exclusive rights for the B-2-C sales for a delimited region and profit most from sales. Thus, specific inquiries about backend solutions and standards used are interpreted by the vendor as a potential interest of a customer for a sales business, the details of which are communicated in a joint discussion. These discussions also give manufacturers the opportunity to identify requirements from customers and thus new business areas.

With the help of the investigations of standards and experience gained Avacon were able to gain initial knowledge on the connectivity to household storages.

It should be noted that the topic of connecting batteries to a central control instance, such as the ALF-C or any other EMS, presents an opportunity to define and establish standards that make the connection, control and monitoring of these devices. The current situation presents a significant barrier to the wide-spread integration of batteries into flexibility concepts that are independent of vendor, e.g. by an aggregator or citizen energy community. Opportunities to improve the current situation are the establishment and industry-wide acceptance and deployment of a protocol for the control and monitoring of batteries (e.g. via forthcoming extensions of IEC 61850) as well as a standard to connect these devices (e.g. REST API provided by the vendor).

Beyond the issue of connecting batteries to an EMS the installation of equipment to meter and monitor the network and customer behaviour should be highlighted as another area with room for improvement. WP5 use cases require measurements at the secondary substation and ideally at a few more locations within the test network. While a pre-production stage low cost PMU was available for testing, an integrated low-cost solution for the required current transformer (CT) and voltage transformer (VT) was not. In order to install measurements at the desired locations, the available PMU had to be paired individually with third-party CT and VT, which added several levels of complexity to the installation and cause prices for the entire metering point to escalate. It is recommended to continue the development of low-cost PMU and increase the efforts to describe and define standardized solutions for suitable CT and VT to make a seamless and cost-effective use of a larger number of PMU's a viable option.

4.2 Lessons-learned on other subjects

In the first-year project activities weren't only focused on the development of the IT architecture and the identification of standards, but also on keeping solutions and their implementation in line with regulatory and legislative aspects.

Since Avacon will implement a field test trial with private customer households participating in the project, customer-related data will be processed. To ensure full compliance with national and international regulations on privacy, the GDPR in particular, it was necessary to identify relevant regulation and develop an appropriate process for data handling, see the Platone data management plan [11] and also [12]. The developed process that is compliant with the German General Data Protection Regulation – „Datenschutzgrundverordnung", the Federal Data Protection Act as well as EU Regulation 2016/679 and Legislative Decree no. 196 of 30 June 2003, modified and integrated by Legislative Decree no. 101 of 10 August 2018) and company internal regulation such as Group Policy, Data Protection and Company Policy.

The developed process is described in the following:

- Avacon will only collect personal data collected from customers that are participating to the project.
- The principle of "data minimization" will be applied to ensure that no unnecessary copies of customer data will be created.
- Customer data will be provided by Avacon's Customers Management system via encrypted mails and if necessary, via paper consent form provided by customer via letter.
- Customer will have to sign an agreement for project membership, which also be send by letter.
- A spreadsheet list will be created collecting all data provided by the customers. The spread sheet will be stored encrypted on local systems and only be accessible for authorized members of Avacon's project team.
- Paper consent forms as well as confirmation of participations for the project membership will be kept in locked cupboards located in the office of Avacon Consent forms will be accessible only to the project leader. Spreadsheet lists and paper consent forms will be deleted/disposed at the end of the project, according to DIN 66399 data protection law.
- In Avacon's Customer Management systems a notification of customers' participation in the project will be stored."

5 Conclusion

This deliverable reported on the lesson learned by the Platone project field trials in the first year of the project. The issues raised were divided in two broad categories, standards-related lessons and lessons on regulation and legislation.

On the topic of standards, for the Italian demo the discussion focused on the complexities of creating the use cases and then with the assistance of D6.1 [7] and D6.2 [8] the deepening of the analysis on standards. The Greek demo section on standards, also, made the connection between the two exercises of creating use cases and the standards guidelines on D6.2 and highlights the usefulness of this exercises for deepening the understanding on how standards relate to the demo implementation. The German demo section on standards raised the very important issue of standards conformity between vendors of the same technology, in this case batteries, and how that can affect implementation.

As regards other topics, the Italian demo focused on legislative and regulatory aspects such as privacy and antitrust requirement that have to be fulfilled and how this is addressed. The Greek side pointed out how their involvement in D6.8 and D6.9 helped them broaden their understanding of the legislative and regulatory context in which the demo is deployed. Finally, the German demo sections reported on other topics a similar lesson to the Italian case, where the need for strict guidelines on data privacy led to the creation of processes, such as the Platone data management plan, that ensure such an objective within Platone activities.

6 List of References

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[12] “D10.2 POPD – Requirement No.2, Platone EU Horizon 2020 Project, 2019

7 List of Abbreviations

Abbreviation	Term
AMI	Advanced Metering Infrastructure
API	Application Program Interface
DMS	Distribution Management System
DSO	Distribution System Operator
HEDNO	Hellenic Electricity Distribution Network Operator
IEC	International and Electrotechnical Commission
IT	Information Technology
NTUA	National Technical University of Athens
PMU	Phasor Measurement Unit
RES	Renewable Energy Source
SCADA	Supervisory control and Data Acquisition
TSO	Transmission System Operator