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Report on role of service provider in real-time information harvest



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Name of the report: Report on role of service provider in real-time information harvest

Key words: real-time information, role for service provider, enablers, methods, tools, information system, software, observations, sensors, open data, customer reporting, business opportunities, BU operations

Summary

The objectives of this deliverable comprise of three different goals. First of all, needs for real-time information harvesting (and also methods) is needed to be clarified. This way it becomes clear, why real-time information is relevant for service providers and customers. Second goal concentrates on discussing the role for the service provider in real-time information harvesting in flexible energy system. The last goal aims to bring forward the benefits and opportunities for service provider and also discuss the customer side benefits.

Real-time information needs can be rather diverse. Operators can be especially interested about the forecasted demand levels for energy or current load for energy network per area. Real-time information is also useful in monitoring the business operations and execution of work orders. Customers are informed frequently about the job statuses in order to keep them on track of the work performed.

Central enablers for real-time information harvesting are the infrastructure, technology, clearly defined processes and information systems/software. Different methods to gather real-time information include field work reporting, observation reporting (from field workers and consumers), utilization of network measuring sensors and open source data.

The service provider role in the future flexible energy systems includes the gathering of data/information from various sources (network measuring sensor data, open source data, web-based platforms, information systems) and delivering of the relevant data to interest groups. The information can provide new business opportunities (new services such as information products/packages for customers, network maintenance planning) and has the potential to improve customer reporting tremendously. Customers have more information up-to-date regarding the projects executed for them and service provider can also utilize the information itself to plan the network maintenance tasks and other operations, i.e. to be more self-steering and take more initiatives in searching for things that need to be worked with related to for example network construction, maintenance or fault repair.





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1. Preface

This report is part of the Flexible Energy Systems (FLEXe) program funded by Tekes – the Finnish Funding Agency for Technology and Innovation. More specifically, this report belongs to the Task 2.3 deliverables and is written from Empower’s perspective.

The FLEXe program consists of several industrial companies and research organizations. The goal of the program is to create concepts and raise discussion on how to plan, build, manage and use the future smart and flexible energy systems.

In addition to this deliverable, Empower participates to the FLEXe program also with two other deliverables, one related to the Task 2.2 and the other to 2.3 (as this one). This report at hand is very much related to the other deliverables, which discussed about “(2.2-7/2.2-10) Network monitoring and planning in practice” and “(2.3-10) New service business models”.





2. Introduction

Empower's core of the business consists of four different business operations: telecom network (TN), power network (PN), information management (IM) and industrial services (IN). The service offering expands also to Sweden and Baltic countries. Energy network related services include especially the network planning, construction and maintenance tasks for customers such as network operators. In same fashion, TN offers telecom network planning, construction and maintenance services. From energy network perspective, these services have an impact especially on the infrastructure creation for data gathering and warehousing. When continuing to the data analyzation phase, IM has great capabilities to produce valuable information of the gathered data.

This deliverable focuses to discuss on real-time information harvest and the role of service provider. It is closely related to Empower's other deliverable in task 2.3, called "Report on new service business models", and also task 2.2 deliverable "Report on network monitoring and planning in practice". Further, the task 2.2 deliverable also connects the deliverables by Lappeenranta University of Technology and Tampere University of Technology.

The term real-time data (RTD) refers to information that is delivered immediately after collection, so there is no delay in the timeliness. There are different ways to collect real-time information, which is discussed in later chapters. Gathering of real-time information is crucial especially in cases where the goal is to monitor the performance of the target and react to changes/problems as fast as possible. Real-time information is not valuable only to the user or in this case the service provider, but also to customers, who for example demand accurate information considering the work done for them. This has been a relevant topic in recent years also for Empower. The inability to receive timely data related to the undergoing jobs have created challenges in communication with the customers. Partly because of this reason, as part of the Flexe program activities, Empower started a significant development project to tackle the customer reporting challenges and also standardize the way the work is done across the nation and improve overall project/work management. In later chapter this topic is discussed more thoroughly and from real-time information harvesting point of view.



Real-time information gathering is very much related to the development of technology. Smart devices are enabling accurate and timely information gathering including e.g. consumption data and voltage levels in the energy system. Technology development plays a crucial role in the way the data is gathered and also the amount it is possible to gather. Also processes have an effect to the way the data is gathered. So processes and technology could be described as prerequisites for real-time data harvesting.



The core contents of this deliverable is divided into five chapters. Preface and introduction lead the reader to the subject and provides the basic background information regarding the areas of interest. Chapter 3 continues with central objectives and target setting for this deliverable. Chapter 4 discusses the real-time information harvest and thus is the core chapter of this report. Here the sub chapters focus on the needs for real-time information, enablers and methods for real-time information harvesting, and role of the service provider regarding this topic. Chapter 6 draws conclusions and also discusses the effects that real-time information harvesting has to service provider's business.





3. Objectives

Three objectives could be defined for this report. First of all, the need for and ways to harvest real-time information have to be clarified. It is important to identify, in which areas the real-time information gives advantage or enables improvements. When needs are brought up, the ways and techniques to harvest that useful data are discussed. This context also includes the discussion about enablers for real-time information harvesting.

The second goal comprises the reflection of service provider's roles in real-time information harvesting. We are discussing the service provider's role/tasks/opportunities in the flexible energy system, which have also a close connection to the real-time information harvesting. The role in information gathering includes the following questions: How the service provider gathers the real-time information? In which processes? How the real-time information is used? To whom is it delivered?

Lastly, the purpose is to discuss also about the importance of real-time information. Relevant questions include e.g. what are the benefits/opportunities for service provider? What kind of benefits exist for the customer?

When these previously mentioned goals are achieved, it becomes more visible, what is the role for Empower in flexible energy system and how real-time information harvesting affects to the business and different interest groups. In addition, the discussion clarifies the importance of for example information systems, software and mobile devices from real-time information gathering point of view. These enablers affect essentially to the delivery processes and to the field operations.





4. Real-time information harvest

This chapter focuses on bringing up the needs, enablers and methods for real-time information. This forms the basis for the discussion on the role of service provider in flexible energy network and especially from the real-time information harvesting point of view.

4.1 Needs for real-time information

There are various needs for real-time information from energy network operations point of view. First of all, it is essential to be able to monitor and forecast accurately the demand for energy. Accurate consumption information is valuable, because the goal is to match or balance the production of energy with the demand. In order to reliably achieve this, real-time information on demand levels are needed.

Another central area, where real-time information is needed, is the operation of the energy network. The uninterrupted operation of the network requires real-time information, so that it is continuously transparent, how the different components of the network are functioning and where and when the possible faults are occurring. Real-time information enables fast reactions and measures when faults are appearing. Further, the faster the needed measures, the shorter the overall lead-time for network maintenance activities. Fast reacting to network faults is a secondary objective though. The most important goal is to collect real-time information that is utilized in proactive maintenance activities, i.e. before the faults occur. In this context a valid source for real-time information gathering are the physical observations on the field. Examples of valid observations include e.g. fallen trees on power lines or weak electricity pylons. These observations could be reported either by Empower field workers or even by consumers. The capturing of these observations require certain enablers and methods, which are discussed in the later sub chapters.

Real-time information gathering is important also from customer communication perspective. Customers demand continuous information regarding the work done for them: What is the schedule of the work performed? Are there any changes in sight? What is the current status of the project? For service provider being able to offer accurate and timely information for customers is a competitive advantage.



4.2 Enablers for real-time information harvesting

To be able to collect real-time information, several factors need to be in order, before the information gathering is possible. First of all, real-time information



gathering requires naturally reliable and functional telecom network, which can comprise of fixed or mobile network. This is the basic infrastructure that is a necessity for information gathering regarding for example the functionality of the energy network.

The second enabler is advanced technology that is utilized to capture/store the data, as well as send it forward to a data warehouse. Network measuring devices handle the capturing or measuring of the data related to for example network load levels or trigger notifications regarding network faults. An important aspect is also how the reporting is performed on the field. Related to this matter, mobile devices are crucial enablers for sending the data or information quickly from field to either straight to customer or internal data warehouse/information system.

When gathering information from the field, the infrastructure and technology are not sufficient factors to ensure successful collection of information. In addition, also specified processes are needed to be determined: through which phases the information is collected from field workers? Which steps are included, when information is collected from consumers? Defined processes form the framework for successful information gathering.

The fourth and also incredibly crucial factor are information systems and software. In recent times Empower has put significant weight and focus on IT system development, as part of the development actions. Project management and vehicle management system are examples of the recent IT systems that have been taken into use. The purpose is to enable Empower to monitor the field work in real-time and also report the statuses of different work orders to customers accurately and timely. Information systems receive the data from the field and record it to a database. Then this data is possible to view in the system, process it to information and further deliver the information to appropriate interest group.

Lastly, in order to collect valuable information from the field across the nation, a geographically dispersed field organization is a strength. Empower as a service provider has great capabilities to collect "human knowledge" across Finland due to the diversely scattered business units.

Together these previously mentioned factors create an environment, where real-time information harvesting is possible. When one link fails, information gathering becomes either difficult or impossible.



4.3 Methods to harvest real-time information

In deliverable 2.2-7/2.2-10 there was discussion, how network monitoring is greatly affected by the network measuring devices (such as advanced AMR) and open data. These data sources can be utilized in real-time information harvesting. Measuring sensors collect data real-time from the energy network and then send it forward through telecom network to a data warehouse. This



can be seen as one method for real-time information harvesting. From data warehouse the data can be processed centrally and combined with data from open source, which is another source and method for real-time information gathering. Weather data and forecasts are good examples of real-time open source data.

Field workers and consumers receive real-time information continuously, when they observe the surroundings around them. This is why the gathering the information from person's observations is important and valuable. There can be different methods to collect that information depending on whether we are talking about field workers or consumers. Field workers can report their findings at the same time when they are reporting the work orders. The work reporting is discussed soon in the next paragraph. For consumers there could be a web-based platform, where it is possible to record observations regarding the functionality of the energy network (faults, risks, etc.). This way the consumers are able to access to the portal for example with their mobile phones or tablets and report the observation on the go as soon as they notice the fault or risk. Then the service provider can maintain the portal and analyze the reported information. Based on the analyzation, for example further maintenance actions could be planned and network operator contacted/informed with suggested actions.

Work order reporting related to the delivery processes is especially important also from the real-time information gathering point of view. Empower Finland is taking currently a new project management system into use, starting with Telecom Network business and followed by Power Network. With the help of this information system, the field workers are able to report the performed work in real-time with their mobile phones or tablets on a web-based platform, which is connected to the core module of the project management system. In addition, it is also possible to report the observations from the environment related to for example network components or add comments/feedback received from end customers. Before this year, this kind of reporting on Empower Finland was possible only for short-time tasks, but now through the new system this expands also to project type of work. So in Empower's delivery processes information systems and mobile devices are central factors in collecting information and delivering it further to interest groups.

4.4 Role for the service provider

From Empower's point of view, the role of the service provider in the flexible energy systems and as a real-time information harvester is relatively clear. Empower as a service provider has the capabilities to create the conditions for real-time information harvesting, storing, analyzing/handling and delivering to interest groups.



There are various ways how the service provider executes this role. In last sub chapter we talked about the methods for information harvesting and how



closely the real-time information harvesting is related to the actual field work or delivery processes. The point is that these are not separate processes, but delivery processes include the process of collecting real-time information. So when we talk about the role of Empower as a service provider in the flexible energy system, the role also includes the information gatherer and provider perspective.

When moving towards the flexible energy system, service providers have a significant responsibility in constructing the infrastructure, where energy and telecom networks are closely connected. The infrastructure construction includes many areal and technology intensive construction projects. In these construction projects the real-time information is related especially to the statuses of various regional work orders. Being a geographically comprehensive service provider, Empower has the capabilities to provide “nationwide” information regarding the network functionality. Also long history in energy and telecom network installation and maintenance tasks results in expertise that can be utilized in data analyzation to filter the critical information that is needed to be collected and distribute to interest groups.

Real-time information plays a central part also in network maintenance planning and fault repair services. Network measuring sensor information can be used to locate faults and provide information of the various components of the energy network. This information together with open data sources can be utilized also in network maintenance plan creation.

New technology brings new advanced devices, and these devices have better capabilities to gather more real-time information and perform it more accurately. Part of service provider’s core business is to replace the old devices in the network with new ones. The new technology brings also new possibilities for service provider. It is not anymore only about construction of networks and maintenance activities, but the growing amount of collected information raises possibilities for new services. Empower has great capabilities to collect data from various sources (such as network measurement data and open source data), analyze it centrally and create information products that can be utilized by customers or internally for example for proactive maintenance activities.

Measuring sensors can also give valuable information regarding the functionalities of different devices and components of the network, which can then be further analyzed to make life-cycle assessments for those different components. Further, this life-cycle analyzation affects to maintenance planning, investment planning and also creates discussion and possible action points for component development needs.

To conclude chapter 4, Ways to gather real-time information and application targets. Figure 1 describes from Empower point of view, what is the role for the service provider in real-time information harvesting. It presents the methods/sources and tools to collect the real-time information, and also the





application target, where that information is used and where it is considered beneficial.

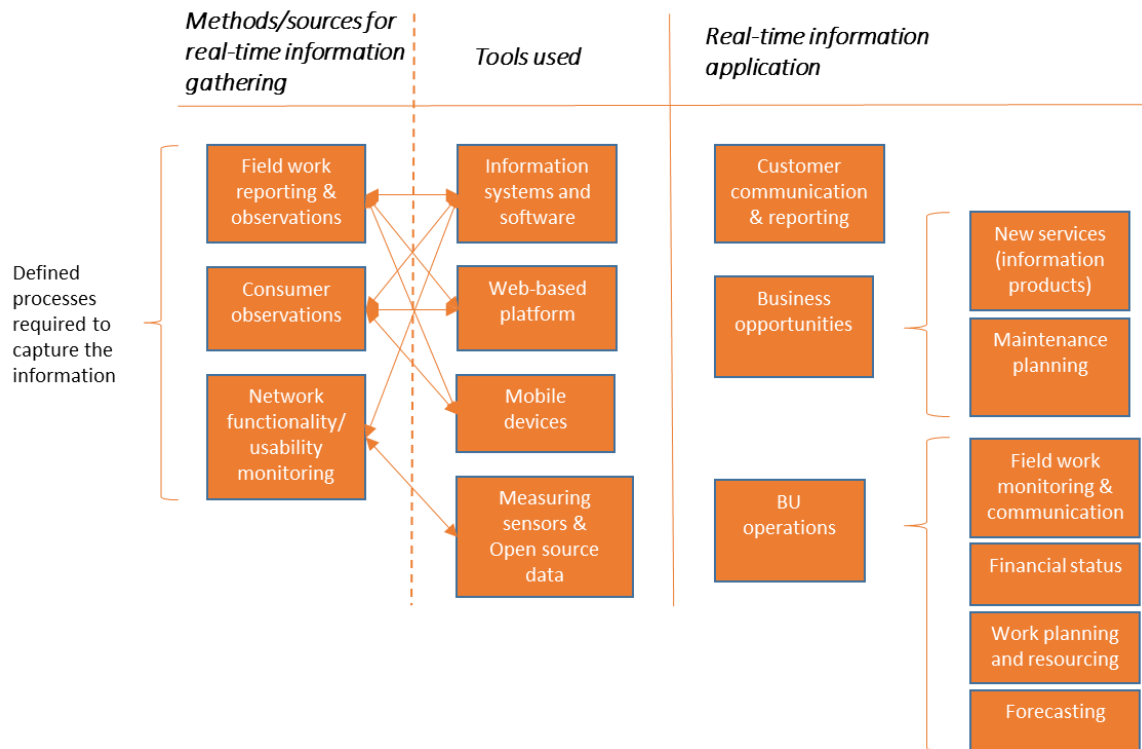


Figure 1. Ways to gather real-time information and application targets.

Real-time information can and will be used especially in customer reporting. Information regarding the progress of the jobs and also plans for how to execute the various work orders in each job is of great interest for customers. Real-time information production and delivery regarding the job statuses and situation on the field is one of the most crucial tasks for service provider.

Real-time information utilization can also create new business opportunities in the form of new information products, which is driven by the increasing amount of data gathering related to open source data and functionality of the energy network. Also with the increasing gathering of information from various sources, service providers could have better capabilities to take more responsibility for example in network maintenance planning activities. Another important application target is the business unit operations including field work monitoring and communication, financial status reporting, work planning and resourcing, and forecasting. When services performed are reported in project management information system module, it provides also valuable information for field work monitoring purposes, work planning and resourcing: how is our jobs progressing on the field / what are the statuses of the jobs? What are the resource needs for jobs this week? Are we able to complete them in time? Can we dispatch more work orders for field workers or are we working on full capacity already?





Real-time reporting of the jobs also give real-time information regarding the financial statuses of the jobs. After each day we have accurate figures regarding the revenue and cost value of the performed tasks. These numbers can then be further utilized to forecast future financial figures, when certain trend factor is applied. It is also possible to evaluate accurately the future short time invoicing levels, when we know the work orders that are in the system waiting to be performed. In able to have accurate information regarding the orderstock value, real-time reporting of the work statuses is crucial.

Service provider's role as an information harvester and deliverer does not create efficiency only to the service provider's processes, but rather can have performance boost effects across the value chain. For example a job specific information can include performance indicators related to subcontractors or operators as well: contractor's lead-time in field work between two job statuses (job started – finished) or operator's delivery document processing time. The pieces of information can be collected from various points of the overall job execution process.





5. Conclusion

Key findings in this deliverable consist of the discussion on the needs, enablers and methods for real-time information harvesting, and reflecting this to the role of service provider in the flexible energy system and as a real-time information harvester. The needs to collect real-time information relate especially to the network monitoring aspect and customer requirements/needs. In order to act quickly to changes in the functionality of the network (or even proactively), real-time information is a must. Operators demand continuous information of the statuses of their projects, so that they can further inform the end customers.

Information systems, software, advanced technology, infrastructure and processes are the factors that enable the service provider to collect, store, manage and share information. They also define the methods that are used to gather the information. For Empower, real-time information collection from delivery processes is extremely important. Through clearly defined processes, sub-processes and tasks within, information is collected daily right after the work has been finished on the field. Field workers have the possibility to use their mobile devices to report performed activities, hours and make comments regarding the job. This information is moved over the telecom network to the project management system, which then can be analyzed further and shared with customer for example in the form of customer reports.

The effects of the fresh project management system for Empower has been clearly noticed already. One of the largest benefits from real-time information gathering is customer satisfaction. Customers appreciate the service provider's capabilities to report the work performed and statuses timely and accurately. Technology and system enabled information gathering also improves the operational efficiency of the service provider: information transferring and communication is faster, which shortens the overall lead-time for work orders. Improved communication and ability to report work orders in real-time improves the quality image of the service provider, which is positively reflected to the order book.

From customer point of view, if the service provider is able to gather and distribute real-time information effectively, it affects positively also to customer's communication forward to their own customers. In addition, service provider's quality of operation is naturally also visible in operator's operations. For example, delayed information regarding changes in work scope or schedule could create significant costs and lack of end customer trust on operator's side.



Role for service provider in the flexible energy system is mainly related to the significant infrastructural changes and technology intensive construction projects, which include real-time information gathering and sharing related to the delivery processes. However, real-time information doesn't limit only to the



delivery process or work related information gathering. Service providers have opportunities to take more responsible in combining various data sources and also utilizing observations not only from field workers, but also consumers. Thus, information gathering opens possibilities for service provider to take a new role in the energy system as a comprehensive service and information provider.

5.1 Lessons learned so far

Recently adopted project management system has shown improvements in work monitoring, but also created challenges for projectors and field workers. The challenges are related especially to the process compliance: are the projectors planning and managing the jobs as is described in the process description? Are the field workers reporting the work performed according to instructions and training? A compliance report was created to monitor the process compliance. All the data is gathered from the project management system itself. The data is processed and analyzed into information to give answers to questions such as: is the job accepted on time? Is the job planned on time? Does the planned job fit to our profit goals? There is still some work to be done on how to measure the work order reporting and how to get comprehensive information regarding the job status changes in a report form.

Naturally the functionality of the system itself affects a lot to the way the system is used in production. Bugs and lack of certain features hinder the users to manage the projects in a way it is planned. This sets pressure on system development and also raises questions whether the project and job management process in the system needs to be redefined either temporarily or permanently.

The system implementation has shown improvements in the amount of information that can be collected related to projects, but it has also given some lessons on how to manage these kind of system development projects. A key factor is that the project management team that runs the deployment of a new process and the supporting information system is well trained to use the system and its various functionalities. The members of the team must be involved closely in the system usage. When several people have a good knowledge about the system and capabilities to use it, the various project tasks can be delegated more freely. Also the quality of trainings for system users in production is directly related to the capabilities of project team members. System user training is a phase in the project that takes a lot of time and effort: some users can learn a lot by training themselves for example with eLearning courses, but some users need a significant amount of personal support so that they have the knowledge and capabilities to use the system as is defined in the process description.



Communication and involvement of different interest groups in the project is also one of the most crucial factors when analyzing the success of the project.



Line managers are one essential link when communicating the project status and project related instructions to the field for projectors and field workers. Managers must be closely connected to these kind of system development projects and their actions need to be in line with the goals of the project. Also customer involvement and communication is very important. Feedback and testing support from the customer side is very valuable when driving the project forward. The benefits of the system must be communicated clearly to the customer. This is especially important in those situations, when system related problems arise in production. Key account managers are in central position in communication between the service provider and the customer.

