

Asset Management Software Implementation Challenges for Electricity Companies

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Abstract- Electricity markets across Europe have changed significantly over the last years as market liberalization, changing power generation dynamics, privatization and structural change have replaced the state in which European energy was before. The European Commission expects that the internal European Market should run as one market without restrictions on the individual borders. The change continues with ongoing moves for further market liberalization and competition with a number of major European energy businesses. To be ready for such alternation, businesses need to redesign their existing business processes using ICT solutions as an important enabling factor. Current article analyzes the main challenges of implementation phase of Asset Management software. The challenges are analyzed in example of Estonian power utility Eesti Energia locating in Republic of Estonia, which Distribution and Transmission Network companies are currently implementing Asset Management software within project called VHT. The project's 1st phase go live date is the 1st of June, 2009.

I. INTRODUCTION

To compete successfully in today's energy market, organizations need concurrently to manage effectively and efficiently the design, manufacturing, distribution, service and recycling activities of their products and services to their customers. Companies are looking for the solution in order to reduce the working capital within their supply chain. Velocity, visibility, scalability, innovation and cost govern competitive advantage for organizations viewing the entire world as their market. This demands for a more intelligent way of working, which has determined the need to digitize their processes. Businesses are more dependent on ICT systems, what means that ICT requirements transformed from business requirements must be handled in more contemporary way. Otherwise an ICT will function as a bottleneck restraining needed business changes.

The results presented in current article are identified basing on company Eesti Energia AS (EE) [1] locating in Republic of Estonia, which is a state-owned company engaged in the production, sale, and transmission of electric and thermal power. The main raw material for energy production – oil shale – is extracted from mines owned by the company. Eesti Energia is also involved in the construction and maintenance of energy systems.

Last year, EE Distribution Network Company and EE Transmission Network Company restarted their asset management software renovation project with go-live date of its 1st phase on the 1st of June, 2009. The author of the current

article is related to the VHT project as project manager. VHT project implementation is presumption for several others EE projects such as Meter Data Management, Customer Care and Billing system renovation projects [2] to prepare for market liberalization in Estonia.

The current article is structured as follows: the II paragraph will focus on VHT project main implementation challenges and III paragraph describes one set of solutions for these challenges.

II. CHALLENGES

Very broadly, the VHT project implementation phase challenges could be divided into the four groups: external influences, organizational challenges, processes challenges and challenges related to data and legacy systems.

A. External influences

The sovereign external influence is related to electricity market liberalization. In theory, industries and private households are able to freely choose their energy supplier according to EU directives in 2004 and 2007.

Though the discussion in September 2007 have focused on the third legislative package published by the European Commission, not all issues had solution – including electricity trading market development, market coupling, lack of access to infrastructure, lack of or delayed investment, lack of market transparency that is preventing new entrants from assessing the scope for profitable entry, security of supply, supply competition, different forms of unbundling, tariff design, charging methodology, renewable energy and the environment – so a single European energy market is still far from reality.

The EU Commission's 'third energy package' provides two options for the businesses in Member States in order to separate gas and electricity production from supply provision. These options are ownership unbundling and Independent System Operator (ISO).

The EU Commission's preferred option is that companies controlling both energy generation and transmission would be obliged to sell part of their assets. Investors would be able to keep their participation in the dismantled groups via a system of 'share-splitting', whereby two new shares are offered for each existing share.

The ISO option is a compromise whereby businesses involved in energy production and supply would be allowed to retain their network assets, but would lose control over the

way they are managed, with commercial and investment decisions left to ISO, to be designated by national governments. The designation of ISO will have to receive prior approval from the EU Commission to ensure a sufficient level of independence.

According to [3] and [4], the lack of coherence in the powers and remits of National Energy Regulators was identified as one of the biggest obstacle towards a well-functioning EU energy market. The third liberalizations package aims to resolve this by harmonizing and strengthening the powers and duties of National Energy Regulators so that they will be able to issue binding decisions on companies and impose penalties on those that fail to comply ensuring that all National Energy Regulators are truly independent from industry interests and government intervention. This means that they will have authority over their own budgets and that strict rules apply for management appointments and mandating all National Energy Regulators with a binding requirement to cooperate with each other [5].

From Asset Management software implementation point of view above explained situation is quite complicate. Firstly, when Transmission Network will be separated from EE, the future status of this company is unclear which means low commitment for software implementation. Secondly, liberalized market means determined market participants roles and responsibilities, agreed business processes, messages with agreed classificatory. If these rules are not determined, it is hard design business processes, set up the software and to assure needed interfaces, as baseline software may need unwanted customizations.

B. Organizational challenges

According to market liberalization challenges, the electricity utility in these circumstances could be analyzed as a Virtual Organization (VO) [6,7], with all related problems. Some of them are covered by [8].

As known, the main concept of VO is that the necessary companies are initially recruited among the partners and are employed as subcontractors for the necessary tasks by the focal player in his role as the general project manager. In case the needed competencies are not represented in the partner network or they are not of the sufficiently high quality, the external companies will be asked to participate.

In context of market liberalization, concurrently with VHT project, EE has changed their retail domain companies' structures, forming new companies as service providers for Distribution Network company. Such structural changes shifted some initial functionality of Asset Management project into the other companies, keeping same time project functional scope fixed, but extending number of end users and changing determined business processes.

Though, such a structural change has caused situation where companies are not ready to move on with similar implementation speed, even if they have a common goal. There are several reasons – insufficient resources or competences, unclear business processes, different or

unformed organizational culture, uncommon semantics, ingravescent economical situation etc.

Moreover, the companies recruited outside of the partner networks, may have unexpected problems with co-operations.

The second challenge related with software implementation project, which covers several companies is supporting organization after project go live. The main questions remain when the software is common, which competence should companies internally have and how to change and improve business processes after go live?

The third challenge is related to end user's attitude – it is the question how to explain to the end users the need to use common software and set up realistic expectations. The common understanding is that new software is just new additional obligation or vice versa the new software solves all existing problems – so the expectations are too high.

C. Human factor

As in every project, the most important precondition for successful project is motivated team and overall positive attitude. There have been cases where head of departments are not optimistic with new way of working. In described circumstances pessimistic attitude will expand very quickly to the department sectors and further. Such a situation is quite hard to improve afterwards. To avoid above mentioned situation it is important to assist management to be optimistic and to publish only deliberated messages.

The second challenge is project team. As known, company with optimized business processes has also optimized amount personnel. Organization, to upgrade its business processes incl. implementing new software, need some personnel to perform that job. In optimized processes, it means that some of project team members cannot be freed from everyday duties, which means poor commitment for implemented changes.

The third challenge is how to guide end user more easier to adapt new working principles – e.g. if current work was based on MS Word and MS Excel or on paper and new asset management solutions will demand usage of mobile devices, then its quite a “technical shock”, which could influence the software in an implementation unpleasant way.

There are a lot of other challenges, but our existing practice says that these are most important.

D. Business processes

In the situation, where business process comes through different companies which are supported by common software, the biggest challenge is how to change and optimize it in quickly changing business environment. That is common challenge for any VO-s. The challenge is in the context of business processes even broader, because each company attempts, aims to optimize its own business procedures in context of its business goals which in some parts overlap with VO common interests. It should be taken into account that the companies, belonging to the VO, may be at a different maturity levels.

E. Data and Legacy systems

Energy business is very conservative. Existing routines are covered by existing legacy ICT solutions, which mostly are not integrated. That has caused a situation where information wholeness is missing with all related issues such as duplicated information, unsynchronized semantics, high integration costs, different ICT architectures/technologies, etc. Each legacy system in companies has its business application administrators, known by end users.

Implementation new software demands businesses to rethink which information is needed to support business processes and to collect it for business analyzes.

During analyzes may appear that all needed information will not fit into implemented software and some additional information is needed to collect to work with new solutions.

Such differences may cause unexpected resistances during the implementations, because it needs new way of thinking and to develop new habits.

III. POSSIBLE SOLUTIONS

Even if during the VHT project there were several big challenges, all of them have found some solutions / workarounds. In many situations the solution relays on better communication and on additional business analyzes between different parties.

A. Roles and responsibilities in liberalized markets

As explained above, the European Commission expects that the internal European Market should run as one market without restrictions on the individual borders. Such a deregulated European energy market consists of several different business process areas operated by a number of parties with different roles and responsibilities. Each of these business process areas has their own business experts with an in-depth knowledge of the business process within their area. To set up common electronic data exchange standards for these different business process areas, requires a common methodology to assure that standards are set in a harmonized way.

Currently, there are several organizations working actively in described sphere – European Transmission System Operators (ETSO) [9], Union of Electricity Industry (EURELECTRIC) [10], European forum for energy Business Information eXchange (ebIX) [11] and European Federation of Energy Traders (EFET) [12]. There is a considerable cooperation between these organizations.

ETSO is the European association of Transmission System Operators (TSOs) within the field of electricity. The association involves all 25 EU Member States, as well as Norway and Switzerland. ETSO plays a key role in the development of the European electricity market and represents the TSOs in relation to the European Commission, the European regulators and other organizations. Questions of particular concern on ETSO are congestion management, harmonization of costs related to cross-border trade in

electricity, security of supply, etc. The cooperation between national TSOs on electricity takes place only on a voluntary basis.

EURELECTRIC is the association, which represents the common interests in the electricity industry at pan-European level, as well as in its affiliates and associates on several other continents. EURELECTRIC's mission is to contribute to the development and competitiveness of the electricity industry and to promote the role of electricity in the advancement of society. Within the European Union, EURELECTRIC represents the electricity industry in public affairs, especially in relation to the EU legislative institutions in order to promote the interests of its Members at the political level.

The EFET is designed to improve conditions for energy trading in Europe and provide an exchange for non-commercially sensitive information between organisations and members of the developing pan-European energy industry. EFET is complementary to the existing industry organisations in European organisations as it is solely dedicated to energy trading issues. EFET is a group of more than 80 energy-trading companies from 18 European countries dedicated to stimulate and promote energy trading throughout Europe.

ebIX forum counts 7 full members and more than 9 observing members. The purpose of ebIX is to advance, develop and standardize the use of electronic information exchange in the energy industry. The main focus is on interchanging administrative data for the internal European markets for electricity and gas. ebIX shall also cover the needs both for the wholesale market (upstream) and the retail market (downstream). ebIX will follow the rules of the European Union where applicable.

Today, the objective of ETSO, ebIX and to a certain extent EFET and EURELECTRIC is to model precisely these different business process areas and to define the appropriate electronic data interchange standards for these areas. Accordingly, this has led to the development of a methodology, which defines the rules how to work out business information models and the related technical documents for the specification of the exchange of electronic documents. The objective is to define and describe a methodology for running modeling projects in order to produce the standardized business information models for a defined business process area or part of a business process area within the energy market. The aim is to enable the project groups in national and international organizations to produce consistent descriptions for the implementation of information exchanges. Having a common methodology as the basis for the projects, it will make it possible to implement different business process areas in a harmonized way.

There is also European Regulators' Group for electricity and gas (ERGEG) who is working in this area [13]. ERGEG is an Advisory Group of independent national regulatory authorities to assist the European Commission in consolidating the Internal Market for electricity and gas.

We have to admit, the model is still not completed even the markets in Europe are liberalized. In the context of VHT project in order to minimize further need for Asset Management software customizations, we built up the service middleware to satisfy the further demands which may appear when EU Commissions and/or National Energy Regulators will determine the rules how to operate in new conditions.

Service Oriented Architecture (SOA) based approach was the only way to minimize such uncertainty in VHT implementation project. In our project we have selected product such as Oracle SOA Suite to meet these requirements (Fig. 1).

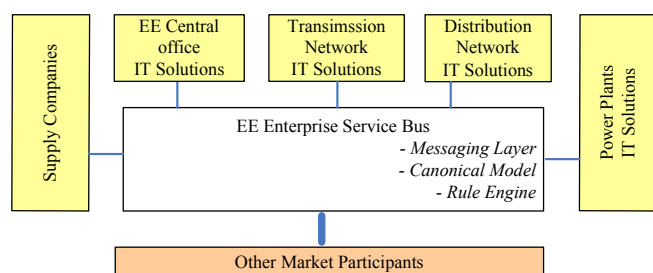


Fig. 1. Implemented integration principles

As the principal solution what our work group considers that EU Commission should take the lead for creating both harmonized electricity market roles and responsibility model, and through the directives suggest the Member States to implement the model. After that the National Energy Regulators will be the organizations which have guided way, how to build up an ontology in their country, which is adapted with local legislation. Such synchronization will guaranty more properly that all Member Sates will build up similar ontology, which also makes easier the ICT solution providers to offer ICT solution in order to support liberalized market operations.

B. Human factor

As already described, the worst thing for the business critical projects is inappropriate attitude from management. Even if the project has some slight drawback during the implementation, the management messages must still be optimistic. The solution here is good communication plan, which covers all aspects - when, what, how and to whom needed information must be published. Then it is project manager's competence to act according to the communication plan.

The second problem is unmotivated project team. As described in section 2, in organization with optimized processes, team members assigned to the project mostly cannot be freed from everyday duties. To have a successful software implementation, the project must have the core team, which is only engaged with project and is set free from their others everyday duties. Availability of such a team must be planned and agreed with management before starting the project. The core team must include project managers, core business processes analysts and further application

administrators. All other project team members could join in case of need according to the project plan.

The third challenge is the resistance to change. It is assumable from end-users if something changes their already set of practices. The key element to minimize that risk is to have well configured software with high competence of trainers. In VHT project we train our trainers selected from company's end-users. Such persons know the business processes and will find quick contact with his/her co-workers. There are only needed additional trainings about training adult persons and about peculiarity of teaching IT systems.

As in most countries, companies are facing with problem of ageing employees. This means, the training materials must be prepared in very detailed level so that each end user could be able to learn afterward independently.

In our case we plan to train all end users during one month before go-live - in the first phase it means teaching 300 persons and in the second phase 700 persons. It also needed to plan some supplementary training after go live.

There are two things which need to be emphasized in end user trainings - firstly, even if it seems that additional work appears for individual end user, it must be communicated that the asset management software is a tool for teamwork and using the software it helps end user coworkers to perform their work more effectively; secondly, it must be showed what the end user by herself/himself will benefit from software.

If these two aspects are well analyzed and communicated, it will be much easier to guide the end users to use the new software and work in a new way with improved business processes.

C. Organization challenges and business processes

As described above, the companies belonging to EE can be viewed as VO, where each company acts as an independent legal entity with its own management with a common goal.

During the software implementation design phase in VHT project, business processes were mapped against software. As a result, there are a lot of processes which remain inside the company, but there are also a lot of processes which go through several companies. The example is the process "create new network connection for a customer", which is currently related to five different companies. It is quite easy to redesign the business processes during the project, because project organizational structure will cover competences from all involved companies. The main question is how to handle these processes afterward, when the project is finished.

According to our analyses, there are two possible options.

First option is that one of company's CEO, which has its process main responsibility, will take the lead and sign with other companies' CEO's involved in that business process Service Level Agreements (SLA).

Basing on SLA, these companies must develop their internal business processes with needed Key Performance Indicators (KPIs) to establish agreed requirements. In such a case, each company will have its internal process owners with

an analyst, who is responsible for achieving inside the company the needed KPI-s. Such an approach will guarantee overall process goals achievability, but in context of whole organization process silos still remaining (Fig.2).

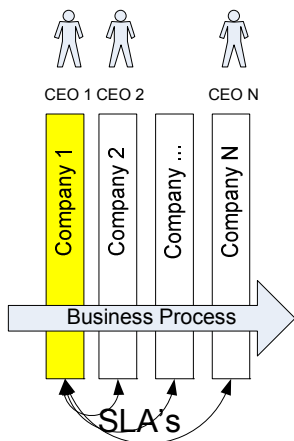


Fig. 2. Structure with leading company responsible for business process

The second option is to create an additional organizational unit or company - Process Excellence Center. Process Excellence Center should join companies' Vice Presidents responsible for certain business areas (process owners) and analyst, who will analyze the business processes through the all value chain. In such an approach, there is still need for the process analysts inside of each company to give the low level feedback about processes deficiency

Although such an approach will give the possibility to optimize all processes through the whole organization, it needs more effort to manage with all details (Fig 3).

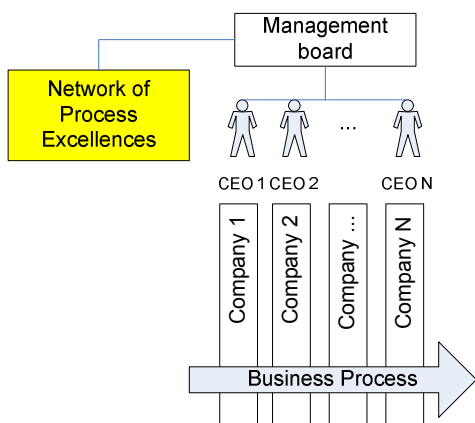


Fig. 3. Structure with Process Excellence Center

In addition, there is need not only organization, but also a tool, which will support processes modeling. Even if the business manages all quality management activities within MS Word and MS Visio, it is still quite obvious that such an approach is not sustainable in the case where organization has hundreds of processes and when process simulation is needed.

Implementing process modeling tool will make companies to work with their organizational maturity, since it is excellent opportunity to upgrade existing quality management system. Projects, redesigning more than 90 percent of existing processes demand very detail business analyses, which also cause the need to redesign existing KPI systems as more integrated information is available to improve business activity monitoring, and such modeling tools are create help doing that.

There are several products available in the market. The well known are Oracle, QPR, Casewise, Mega International, Telelogic, IBM, IDS Scheer etc. During the VHT project the IDS Scheer tool ARIS was started to implement in order to support process redesign phase through the software. The ARIS tool is currently also in implementation phase to support all EE retail domain companies' business processes.

D. Data and Legacy systems

One of the IT system implementation goals is also to simplify existing company ICT architecture and eliminate or integrate existing data sources. For example, during the VHT project the 300 different data sources were analyzed. Six of them will be integrated with new software, 20 of them didn't fit into the new asset management software and their usage remain same as earlier, all other data sources information must be loaded into the implemented system.

The main reason for large number of data sources was the fact that there wasn't centralized IT system for asset management, so every maintenance manager had its own IT application where all needed information for everyday activity was described in suitable way for certain employee but not for company as a whole.

To manage such a complexity it is reasonable to develop plans for system integrations and data migration.

A comprehensive Plan for Integration is needed so that issues such as system interfaces, data conversion, software configuration management, security and full integration testing were properly identified and scoped early in the implementation. An initial survey of the existing legacy systems will result in a preliminary interface planning and data conversion planning, which incorporates findings from the business processes analyzes reports identified during the processes redesign workshops. This will become the definitive plan. The plan will then be used as a scope document and as the basis for agreeing the necessary employees for all integration work essential to support the software implementation.

The Plan for Integration identifies all activities necessary to ensure that a rigorously tested system is placed into productive use. This includes activities essential to:

- address software configuration management;
- establish a long-term functional and technological software growth path;
- identify, construct and maintain the interface between implemented software components/modules and other systems, aiming to configure in anticipation of potential

future integrations, so that related issues were properly scoped and scheduled.

It is vital, that the plan had detail sources of data required to initially load the various legacy database tables with the historical data at the proper level of detail, accuracy and timeliness. This task recognizes data mapping requirements from existing applications which will be replaced by new software products, new data identification and creation, data redefinition, re-identification and/or consolidation (e.g., renumbering stock codes, consolidating vendors) and the differentiation of code tables, system administration data, security parameters and user data.

Finally, the plan should address to the complete test plan of the entire integrated system which should be established to ensure that all aspects of the production system are thoroughly tested in a production-like environment with all elements in place to ensure that the functional and performance requirements were satisfied.

The Plan for Data Migration identifies the scope of the conversion and source of all data required to load the various databases. This task includes data mapping requirements, new data identification and creation, definition of code table data, system administration data, security data and user data. The main targets are:

- create data conversion and migration that is as streamlined as possible;
- create dynamic classificatory maintenance processes/tools that are easy to maintain;
- create an architecture that supports rapid turnaround for testing cycles;
- utilize rapid deployment methods to reduce overall costs of this task.

Data migration by its very nature is simple to understand but complicated to realize because of abundance of detail that must be accurately attended to. In short, data migration is a process of extracting legacy data, converting existing data from the legacy system to forms required by the new software products covering the agreed criteria, then loading the extracted data into the various databases. The goal is to keep the data migration as simple as possible. In other words, the more complex the process is, the more costly it becomes.

IV. CONCLUSION

As liberalization and the introduction of competition become more widespread across Europe, this should lead to further efficiency gains, cost reductions and the potential for lower prices. A completely open European market will allow all consumers to benefit from the cheapest available sources of energy and will drive companies' costs down.

Electricity companies, all over the Europe, have launched several projects to change their existing ICT systems, to be more competitive in these new circumstances.

The current article focuses on some of the main challenges that these electricity companies could face in the software implementation phase, proposing some possible approach

how to increase the probability of successful software implementation project.

The current article is based on Asset Management project launched within EE for its Distribution Network Company and Transmission Network Company.

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