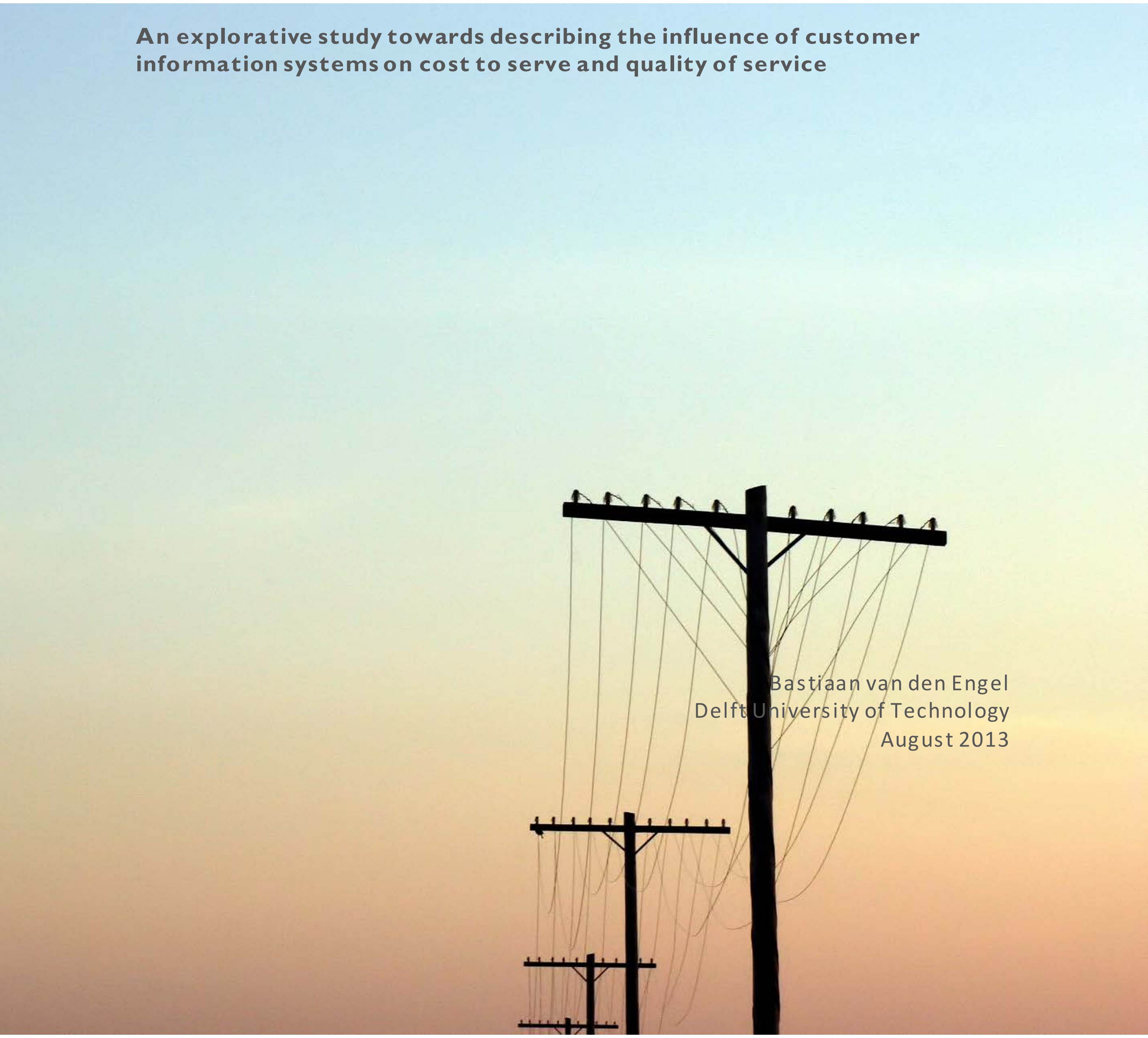
# THE POTENTIAL FOR CUSTOMER INFORMATION SYSTEMS TO REDUCE THE COST TO SERVE OF ELECTRICITY SUPPLIERS

**An explorative study towards describing the influence of customer information systems on cost to serve and quality of service**



Bastiaan van den Engel
Delft University of Technology
August 2013

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## An explorative study towards describing the influence of customer information systems on cost to serve and quality of service

SPM9510 Master Graduation Thesis

Systems Engineering, Policy Analysis and Management
Delft University of Technology

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# PREFACE

This thesis marks the end of my graduation for the study Systems Engineering, Policy Analysis and Management (SEPAM) at the Delft University of Technology. For my graduation project I did an internship at Ferranti Computer Systems N.V. Antwerp.

The choice for Ferranti was a clear and easy choice, during my master the emphasis has been on both production and market mechanism of electricity production. I felt that the consumption side of the electricity supply chain was always a little bit underexposed and this internship gave me the opportunity to gain deeper knowledge of this part of the supply chain. Also the fact that I got to interview many experts of the consumer side of the supply chain made it very interesting for me. Despite the fact that, the unwillingness of the participants in the interviews to present data, was a major setback for my research I still learnt a lot from the interviews. Unfortunately not much of the things I have learnt during the interviews could be used in my thesis, however, I am sure that I shall use these lessons later on in my career.

During my thesis project the distribution of roles of my graduation committee became clearer to me and I would like to thank the committee as a group for the perfect way each role was fulfilled. First, I would like to thank Johan Crols for sharing his great sector specific knowledge as well as his guidance at Ferranti, his knowledge really helped me to substantiate my research. Secondly, I would like to thank Mark de Bruijne for helping me safeguarding the quality and academic perspective of my research, by really digging into the material with me and discussing the consequences of each gained insight. Thirdly, I would like to thank Zofia Lukszo, Zofia was there to combine the content of the research with the human side of performing research. Zofia learnt me a lot on how to communicate with potential interview participants, as well as she able to stimulate me and find joy in the performance of my research. And last but not least I wish to thank Margot Weijnen for keeping a complete overview of my thesis project.

The process of writing a thesis has been thought-provoking and of course a great learning experience. Not only did I learn a lot about the energy supply sector and how to carry out research, but I also learnt a lot about myself. And these lessons will be very valuable for my future.

I hope you enjoy reading this thesis.

Bastiaan van den Engel

August 2013

## EXECUTIVE SUMMARY


The liberalization of the electricity market in the Netherlands and Belgium has shifted the balance between energy providers and its customers. Since research has shown that customers are price sensitive (Energiekamer, 2012) (Overgaauw & Harkink, 2010), the energy supply companies are incentivized to reduce their cost. In order to reduce the expenses incurred by the energy suppliers it is useful to focus on key cost components. For retail utility suppliers Cost to Serve [CtS] and Cost to Acquire [CtA] are those key cost components, especially on the retail market where a single customer can yield a very low gross margin per year (CapGemini, 2011). In this research the focus is on the reduction of Cost to Serve in the business to consumer segment.

One known way of reducing the CtS is the implementation of a customer information system [CIS]. Ferranti Computer Systems n.v. is one of the main suppliers of these CIS, with regard to the utility sector, the utility specific CIS offered by Ferranti is called MECOMS™. However, a CIS implementation does not only influence the CtS it also has an impact on the quality of service [QOS], focusing on CtS and not taking QOS into account would be inadequate. The initial goal of this research was to create a generic model that describes the influence of a CIS on CtS and QOS, for B2C energy supply companies in Belgium and the Netherlands. In order to construct such a model it appeared that in-depth financial as well as quality level data was required, however, the energy companies which agreed to join in this research proved unwilling to present this data. The unwillingness to share data has led to a new research question (the original research questions can be found in paragraph 1.2 while the redefined research questions can be found in paragraph 6.3.2):

*Which steps are required for an energy supplier, to make an in-depth consideration for a CIS implementation?*

Along with a new series of sub-questions, by answering these sub-questions the main research question could be answered:

1. What information is required to describe the impact of a CIS on the factors driving the CtS and QOS?
2. How can CtS be defined in a way that is accepted by both the industry and the literature?
3. How is quality currently defined by energy supply companies and how is this quality measured?
4. In what way can processes, contributing to the CtS, be identified as suitable to be executed by a CIS?

### Conclusions

*What information is required to describe the impact of a CIS on the factors driving the CtS and QOS?*

The literature review pointed out that there are knowledge gaps, which has to be filled in order to be able to describe to the impact of a CIS on the factors driving the CtS and QOS. The expert interviews are used to collect this required information.

- Processes which are included in the CtS definition
- The total CtS
- How is quality defined and measured
- Customers experience with CIS implementations

*How can CtS be defined in a way that is accepted by both the industry and the literature?*

The interviews pointed out that currently none of the participating companies have a structured way to allocate cost to the CtS, all companies allocate all their cost to one of the following segments; commodity cost, cost to acquire, cost to serve or margin. After interviewing all of the eight companies it appeared that the main processes for each company are quite alike. Figure I shows the flow-scheme of this general and abstract way of running operations at an energy supplier.

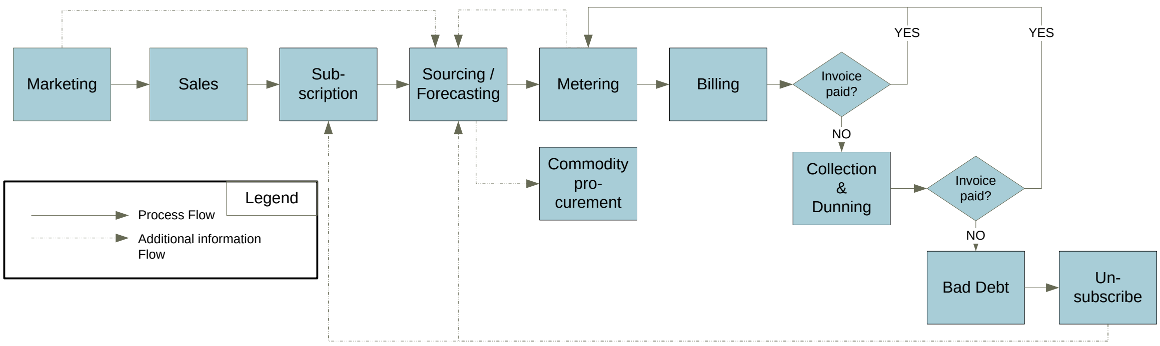


**Figure I Flow-scheme of general and abstract operations at energy suppliers**

In order to decide which of the above depicted processes should be allocated to CtS the CtS selection framework is applied (this framework is presented in paragraph 7.1). This framework provides a consistent and transparent way to allocate processes to the CtS. The application of the framework on the sub-processes of the processes shown above, has led to the allocation of the following processes to CtS; subscription, metering, billing, collection & dunning and bad debt are the processes that contribute to the CtS. The fact that no definition of CtS is found in current literature combined with the idea that the electricity supply companies currently allocate processes to the CtS based on intuition. It is expected that the transparency and consistency of the CtS selection framework, defined CtS in such a way that it is accepted by both the industry and the academic literature.

*How is quality currently defined by energy supply companies and how is this quality level measured?*

The interviews pointed out that none of the participating companies have a definition of quality. Instead quality is translated to a series of key performance indicators [KPIs]. However the KPIs used by the companies are more an indication of customer satisfaction than a measurement of the quality level. Although quality and customer satisfaction are highly correlated it is advised to measure these definitions separately (Dabholkar, Shepherd, & Thorpe, 2000). Currently quality is not well defined and not measured, however, the companies are controlled according customer satisfaction indicators.

*In what way can processes, contributing to the CtS, be identified as suitable to be performed by a CIS?*

Even though the BPMS selection framework is not applied in cooperation with one of the participating companies, the framework is applied (by a way of exercise) on the sub-processes which are identified by the experts from the electricity supply companies and insights from Ferranti. Due to the fact that no existent company data could be used to collect the required information for the BPMS selection framework, it is not possible to see how the framework performs in the real world as well as it is not known how difficult it is to answer all the questions. However, the outcomes of the application of the framework are very plausible. This plausibility, combined with the fact that the BPMS selection framework provides a prioritization of which processes should be automated, make the BPMS selection framework a highly valued framework in this research. This led to the conclusion that the BPMS selection framework is well suited to identify the suitability of sub-processes (which are allocated to CtS).

*Which steps are required for an energy supplier, to make an in-depth consideration for a CIS implementation?*

Based on the insights gained from answering the sub-questions it is possible to answer the adapted main research question. This question is answered in the form of a roadmap (the roadmap is presented in paragraph 9.1). The roadmap describes how companies van both define and measure their CtS and QOS besides it identifies which sub-processes can be performed by a CIS. Target values for the CtS and QOS can be set after which the potential of a CIS can be calculated. The comparison between the potential and the investment in the CIS should allow investors to be able to decide whether or not to invest in a CIS.

### Conclusions based on research questions

This research has shown that currently most energy supply companies allocate processes to CtS based on intuition, as well as quality is defined as a set of customer satisfaction indicators. Based on these definitions of quality of service and CtS it is impossible to make a rational decision on investing in a CIS implementation. To rationalize the decision making the CtS selection framework, the BPMS selection framework and the five dimensions of quality are introduced in the roadmap discussed above. Due to the lack of data the roadmap could not be tested on its practical applicability for energy supply companies. Despite the fact that both the CtS selection framework and the BPMS selection framework could not be tested with real data it is expected that due to the transparency and consistency both frameworks will be appreciated by the energy supply companies. Due to time constraints and the lack of willingness of energy supply companies during the first series of interviews, the level of appreciation of the frameworks is not examined at the side of the energy supply companies.

### Recommendations for Ferranti

Based on the conclusions it is recommended that Ferranti takes the initiative in changing the way energy supply companies approach their process optimization. As the interviews pointed out that the customer information systems just grow organically in the energy supply companies and CIS parts are added or updated when bottlenecks are identified. There is a huge potential for Ferranti when they approach the energy supply companies with the systematic roadmap presented above and help these companies improve their service level while reducing their CtS. Currently Ferranti tells its customers how their system helps in reducing costs and improving customer satisfaction, however customer satisfaction is not the same is quality of service and when Ferranti can demonstrate that MECOMS™ can not only improve customer satisfaction but the much broader quality of service, MECOMS ™ can use this ability as a sales point. Nonetheless, in order for Ferranti to be able to apply the roadmap some of the steps described in the roadmap need to worked out in more detail first.

### Suggestions for future research

Ferranti is recommended to use the roadmap, presented as answer to the research question, to communicate with its customers. It is advised to first test the suitability of both frameworks in a test case. Also the required resources (from a time perspective) to apply the BPMS selection framework are unknown, the duration of the application of the roadmap is crucial for the applicability of the roadmap. If it takes too much time to implement the roadmap it will void the benefits of the roadmap.

Prior to the expert interviews it was expected that the energy supply companies had a definition of quality of service as well as the fact that they would measure this quality. Developing a definition of quality suitable for the energy supply industry is outside the scope of this research. Nonetheless in order to be able to draw conclusions upon the relations between CtS, QOS and CIS it is necessary to have a definition as well as data of QOS. Literature on quality scales has led to the conclusion that the quality should be measured on different dimensions (Parasuraman, Zeithaml, & Berry, 1988). It is advised to do further research to create a definition of QOS based on the five dimensions of quality of Jaiswal (Jaiswal, 2008). As depicted in figure 4-3 (paragraph 4.4), currently QOS is indicated by customer satisfaction which is mostly measured in net promoter score. This research advises to indicate QOS based on; assurance, empathy, tangibles, reliability and responsiveness. However further research is required to define measurable indicators of these five dimensions of quality.

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# NOMENCLATURE

| | |
|---|---|
| CtS | Cost to Serve, is the addition of cost of all processes contributing to the service provision of existing customers |
| QOS | Quality of service, is the total service level of all processes allocated to the CtS |
| CIS | Customer information system, a CIS can best be defined as a software package that supports utility companies in selling and billing their products, as well as delivers the appropriate customer service. |
| CtA | Cost to acquire, is addition of cost of all processes contributing to acquiring new customers. |
| Electricity price | The electricity price consists of many components. In this research the electricity price is defined as addition of commodity price, CtA, CtS and profit margin. Taxes and transport fees are not taken into account (because these prices cannot be influenced by electricity supply companies) |
| BPMS | Business process management system, is any system able to perform business processes automatically. A CIS is actually a type of BPMS. |
| Component cost of company operations | Component cost of company operations, are those cost which are incurred by processes, however, these cost cannot be directly linked to these processes. Examples are housing or overhead cost. |

# 1 INTRODUCTION

## 1.1 BACKGROUND

When talking about energy companies, people mostly think about power plants which produce electricity which is then transported through a high voltage network after which the electricity is distributed via a low voltage distribution network to the consumers. For years that idea would have been correct, however, since the deregulation of the European electricity and gas sectors a lot is changed. From a physical perspective of the electricity supply chain, there are now three types of players in the energy sector; energy producers, energy transporters and energy suppliers. In this research the focus will be on the energy suppliers, to be more specific the suppliers of electricity. The supply of heat and gas is not included in the scope of this research. Electricity suppliers, which include gas supply in their portfolio are a part of this research, however, only from the electricity supply perspective.

In view of the deregulation and privatization trend in Europe, the Belgian and Dutch electricity sectors are liberalized between 2002 and 2005 (Energie Nederland & Netbeheer Nederland, 2011). The idea behind liberalization was that it would create competition, which puts pressure on the main companies to provide better services and reduce prices which in the end will be beneficial for the end consumers (Milroy & Li, 2001).

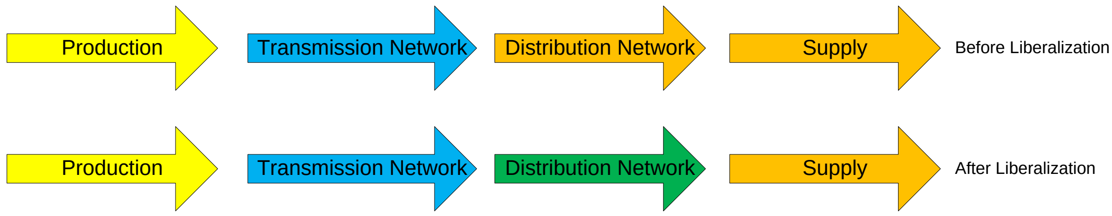



**Figure 1-1 Graphical simplified representation of the effects of liberalization of the electricity sector**

(Vries, Correljé, & Knops, 2010)

The figure (figure 1-1) above depicts the past and current physical set-up of the Dutch and Belgium electricity sector. Before the liberalization (however, after the Elektriciteitswet of 1989) the transmission network (which is one of the two natural monopolies in the electricity value chain) was owned and controlled by one central and state owned organization called Samenwerkende elektriciteitsproductiebedrijven [Sep] (Vries & Knops, 2001). Besides fulfilling the function of the transmission of electricity Sep also controlled the dispatch of electricity and aimed for a nationwide cost minimization (Vries & Knops, 2001). The other natural monopoly, the distribution network, was owned by the supply companies. Since there were no parallel distribution networks consumers were unable to switch between providers. However, since the liberalization of the electricity sector the distribution companies are unbundled from the supply companies, this allows customers to switch between suppliers, which changed the relation between suppliers and consumers (Milroy & Li, 2001) (other effects of liberalization are discussed in more detail in Chapter 2). The ability to switch between suppliers has created a market where consumers can assess their supplier on different pillars and select their supplier on the performance of the suppliers on these pillars.

When looking at the position of energy suppliers in the energy market, these companies can distinguish themselves on three pillars. For electricity these pillars are; price, environmental sustainability and the quality of the provided service [QOS]. The figure below (figure 1-2) gives a graphical representation of these market pillars. Sustainability is excluded from the scope of this research because the systems currently available in the energy supply value chain are not able to influence the degree of sustainability of generation or consumption. Only the trade-off between price and the quality of the service is addressed. The competitive market created by the liberalization, forces the energy supply companies to choose their position between these three pillars (Jamasb & Pollitt, 2005).

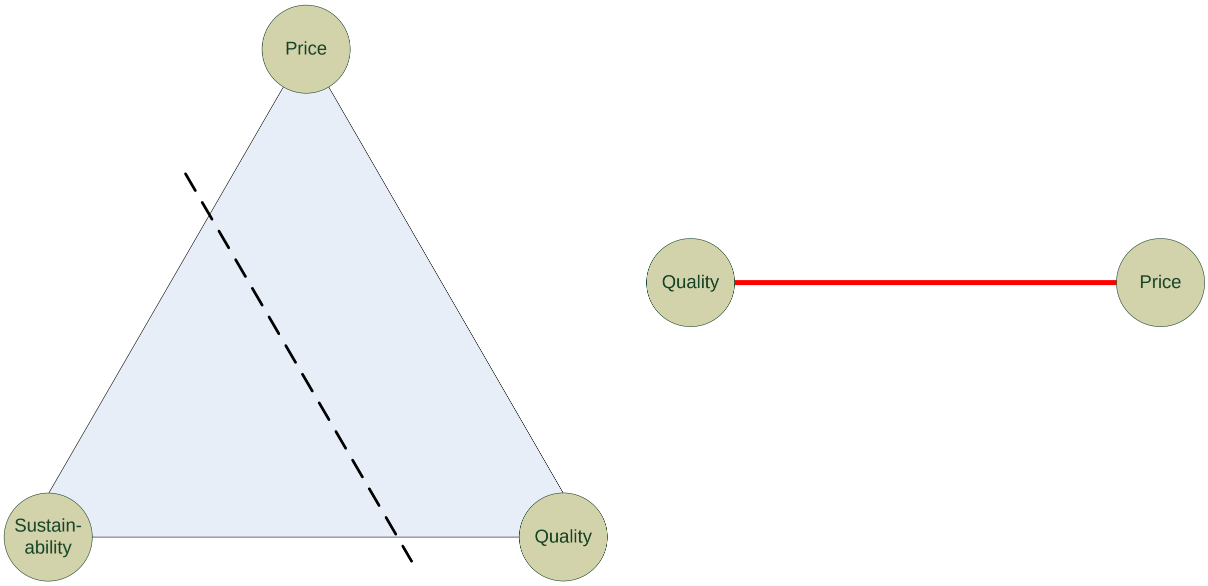



**Figure 1-2 The three market pillars of the electricity market, this research focusses on two of these market pillars**

When companies decide to compete on price (research has shown that customers are price sensitive (Energiekamer, 2012) (Overgaauw & Harkink, 2010)), they are incentivized to reduce their cost. In order to reduce the expenses incurred by the energy suppliers it is useful to focus on key cost components. For retail utility suppliers Cost to Serve [CtS] and Cost to Acquire [CtA] are those key cost components of retail utilities, especially on the retail market where a single customer can yield a very low gross margin per year (CapGemini, 2011). In this research the focus is on Cost to Serve, the reason for the focus on CtS will be described in the next paragraph. CtS is defined in several different ways, one of the most commonly used definitions in the business to consumer segment is total annual cost to provide the service of electricity delivery divided by the number of connections, which in short gives €/ connection per year. In this research the term CtS is always €/ connection per year. However, it would be inadequate to only focus on price, the liberalization of both the electricity and gas sector offers the possibility for consumers to switch between energy providers. This possibility has changed the balance between suppliers and consumers (Milroy & Li, 2001). What in turn might influence the choices made by the suppliers in the trade-off between CtS and the quality of the provided service. Due to the effect of quality on consumer choices, it is important not to only focus on the reduction of costs but also to pay attention to the quality of the service.

One known way of reducing the CtS is the implementation of a customer information system [CIS] (Bitner, Brown, & Meuter, 2000). Ferranti Computer Systems n.v. is one of the main suppliers of these CIS with regard to the utility sector. The utility specific CIS offered by Ferranti is called MECOMS™, which is discussed in more detail in Chapter 3. A CIS is in a very broad sense a software package that supports utility companies in selling and billing their products, as well as delivers the appropriate customer service.

### 1.1.1 INTRODUCTION TO COST TO SERVE

As already addressed shortly in the previous paragraph Cost to Serve [CtS] is a summation of the costs which occur during the provision of service. Insight in the CtS allows companies to monitor their costs and therewith, manage their pricing strategy and profitability (Freeman, Haaz, Lizzola, & Seiersen, 2000). It is, however, not strictly described which processes fall under the denominator “provided service”. For processes such as billing it is quite clear that they can be attributed to the provision of service for customers. Nonetheless for processes some this is less clear. An example of this unclear distinction is marketing, one can reason that marketing is used to gain new customers (which would be cost to acquire) and as a result marketing does not contribute to the CtS, however one can also reason that marketing actions can have a retaining effect on customers and for that reason marketing (at least partially) belongs to CtS. As Kone and Karwan put it, identifying CTS is one of the most challenging problems in management due to the diversity in business activities (Kone & Karwan, 2011). Despite the fact that it is difficult to define CtS and therewith allocate cost to CtS, it is interesting to focus on CtS due to the relative large contribution of CtS to the total energy price.

In the Netherlands the average energy cost for an average household is about € 153,- per month (both gas and electricity) which per year sums up to € 1836,- (Nibud, 2013). However, when only electricity is taken into account, the average annual costs for electricity are €672,- per average household (Nibud, 2013). With an assumed CtS around € 60,- per year (or € 120,- per customer in case of a gas and electricity connection), makes the CtS account for about 6,5% of the annual expenses on energy. In case one only looks at the cost of supply of electricity (36% of total price electricity bill) without taxes (20% of total price electricity bill) and transport (44% of total price electricity bill) CtS accounts for about 24% of the costs of electricity (Mainenergie, 2012). According to the ACM (the Dutch competition authority, former NMA) the energy price is the motivator to switch provider in 65% of the cases (Energiekamer, 2012). This is a good indicator for the price-sensitiveness of consumers. The price-sensitiveness combined with the relative high share of the CtS on the total cost that can be influenced by the energy suppliers, makes CtS an interesting area of improvement for energy suppliers. Since CtS is an interesting area for improvement the question rises; how do the energy supply companies define their CtS?

In order to come up with a definition of CtS which is accepted by the electricity suppliers in the Netherlands and Belgium, this research attempts to define CtS based on insights from experts of the energy supply companies themselves and current literature on CtS. To be able to work with the term Cost to Serve a more generic figure of the electricity price as a whole is presented below in figure 1-3.

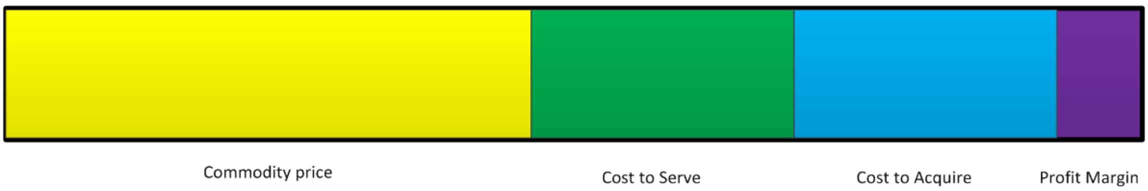



**Figure 1-3 Composition of the energy price before transport and tax**

If one looks at the consumer price of electricity and leave taxes and transport costs out of the equation, the electricity price consists of four categories, knowing:

- Commodity price (the wholesale electricity price)
- Cost to Serve
- Cost to Acquire
- Profit Margin

It is important to stress that all costs which are endured by an energy supply company are assigned to one of the four categories addressed in figure 1-3.

### 1.1.2 PROBLEM STATEMENT

As stated before, energy suppliers are looking for ways to reduce their expenses in order to compete with other energy supply companies. Since consumers are free to select their energy supplier, the energy supply companies have to choose their position in the market in such a way that their profitability is optimized and continuity is safeguarded.

However, no matter what a company's vision on their market position is, a reduction of costs without negatively influencing the factors sustainability and the quality of service is always welcome. Since it is assumed that in the current market customer information systems [CIS] are able to reduce the CtS without reducing the level of sustainability and the quality of the service, it is interesting to research the effect of a customer information system implementation on costs. Given that energy suppliers have no generation activities anymore, the only way they can influence sustainability is by buying sustainable or non-sustainable energy. And since a CIS has no known influence on the type of energy that is bought, the effect of a CIS implementation on the level of sustainability is left out of this research. However, the fact that a relation between the use of a CIS and the quality of service exists (Finn, 2011) therefore quality of service has to be taken into account.

The only known studies with the purpose of reducing CtS in the utility sectors are benchmarking studies (CapGemini, 2011) (Beek, 2009). During benchmarking studies companies operating in the same sector compare their CtS and try to draw lessons from each other. This approach might indeed lead to a reduction of the CtS, however, since every company is different it is not likely that copying only some of the best practices of another company leads to an optimum between CtS and the quality of the service. In order to find the optimum between CtS and QOS this study attempts to construct a generic model to calculate the possible CtS reduction and the influence on QOS.

In this research the processes that drive the CtS are identified, after which the potential of a CIS to reduce the costs of these processes is explored. This potential is estimated by a model that describes the relation between the CtS and the quality of the provided service based on the processes and their interrelationships. This allows for the energy supply companies to select only the processes that are relevant to their business and set their own desired level of the quality of provided service. The figure below (figure 1-4) shows a graphical representation of the effect, of the lack of insight in the interaction between processes, on QOS and CtS and the possibility to describe this relation.

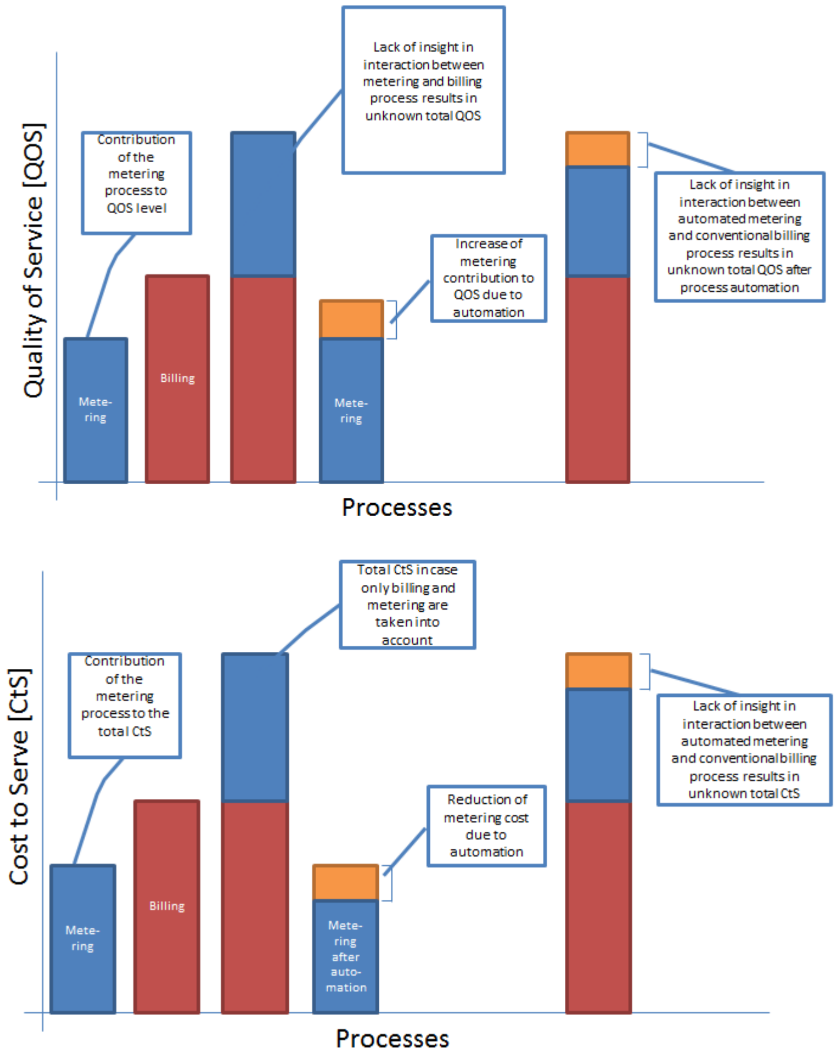



**Figure 1-4 Block diagrams which represent the lack of insight on the impact of a CIS on QOS and CtS.**

When for example the research points out that the CtS is made up out of two processes, knowing; metering and billing and the interaction (the way one process influences another) between these processes is known the total CtS can be calculated by adding the cost of both processes. However, to be able to calculate the total CtS after the automation of the metering process by a CIS, it is not known what the effect of this CIS implementation will be on billing and therefore the new total CtS cannot be calculated without taking the interaction between metering and billing into account. Data from the different energy supply companies should provide insight to establish the interaction effects between these processes.
For the quality level the same difficulties arise. First insight needs to be acquired in the contribution of each process to the QOS, then the interaction between each process and the effects of this interaction on the QOS. When both the direct and the indirect effects of each process are known the total QOS level can be calculated. However, when for example the metering process is automated by a CIS the interaction effect of this automation between metering and billing is unknown. The lack of insight in interaction effects makes it impossible to calculate the total QOS without insight in the interactions between the processes.

In order to be able to construct such a model, insights in the processes driving the CtS are needed as well as insights on the influence of these processes on QOS. Aside from the influence of the CtS driving processes on QOS also the way energy supply companies measure their QOS has to be researched. A standardized way of representing QOS, should allow for the comparison of QOS level between companies. To be able to construct and validate this model real data of energy supply companies is needed. In the previous years the profitability of customers in the business to business segment was so high that CtS did not play a significant role in this segment and therefore no data will be available (Vermeiden, 2012). Due to the fact that these data is not available for the business to business [B2B] segment of energy supply companies, (Vermeiden, 2012), only the behavior for the business to consumer [B2C] segment is investigated.

For the number of companies to be large enough, to do statistical analysis on the accuracy of the model's predictions, it is decided to include energy supply companies from both Belgium and the Netherlands. The Belgium and Dutch markets are quite similar from a rules and regulation perspective and therefore suitable to be used together in order to have sufficient companies involved in the research. The details of the Belgium and Dutch market are discussed in paragraph 2.1. One might think that, in order to get more companies involved, it seems possible to not only look at the CtS of energy utility companies but for example also include telecom providers in the research. However, it is expected that the characteristics of the energy utility market are so specific that this market cannot be compared in with other markets. These energy utility specific characteristics are discussed in paragraph 3.2.

## 1.2 RESEARCH OBJECTIVE AND RESEARCH QUESTION

The goal of this study is to provide a tool, which can be used to calculate the return on investment for investors in customer information system implementations in the energy supply industry. In order to do so a generic model has to be constructed that is able to calculate the possible reduction of the CtS as well as the influence on QOS. This reduction of the CtS can then be set out against the investment in the CIS.

With the aim of constructing a generic model that describes the relation between the processes that induce the CtS and the QOS, scientific theories are needed to help define: Cost to Serve, Quality of Service and identify the processes behind the service. The scientific relevance is found in the fact that proven theories will be tested for their relevance in the utility sector.

This study looks at the possibilities to reduce the Cost to Serve for energy-suppliers in the Netherlands and Belgium without reducing the quality of the services. This research will provide a generic tool as an addition to the annually repeated benchmarking studies (by Accenture and CapGemini) to reduce the CtS in the utility sector, driven by a CIS implementation. The main research question of this research is:

"*How are customer information systems able to reduce the cost to serve for the suppliers of electricity without reduction of the quality of the service-level?*"

The research is performed by the use of desk research and interviews with experts of the energy utility industry. With insights of this desk research and interviews the main cost drivers for CtS are identified. These key drivers are used to construct a generic CtS model for the energy supply industry. This model is then, after validation, used to identify to what extent a CIS can influence the key drivers and therewith its influence on CtS and the quality of the service. This output can then be used to calculate the ROI of a CIS implementation. Based on this knowledge it is then possible to advice energy suppliers with their unique company characteristics whether or not to invest in the implementation of a CIS

To be able to answer the main research question the following sub-questions have to be answered first:

1. What information is required to describe the impact of a CIS on the factors driving the CtS and QOS?
2. How can CtS be defined in a way that is accepted by both the industry and the literature?
3. How is quality currently defined by energy supply companies and how is this quality measured?
4. How to decide which company characteristics correlate to the cost to serve and to what extend do they correlate?
5. What is known of cost to serve as a function over time?
6. What kind of model does describe the cost to serve for electricity suppliers?

## 1.3 RESEARCH METHOD

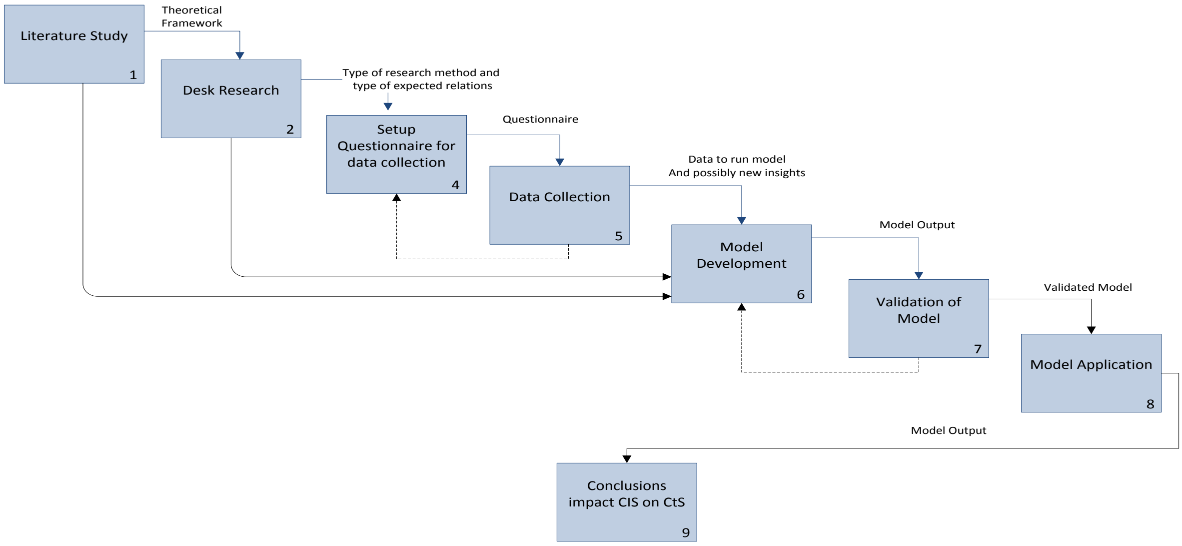



**Figure 1-5 Flow-scheme of the activities planned to complete the research**

The research method is depicted in figure 1-5. Desk research has to provide insights in the type of relations which can be expected between CtS, QOS and CIS. These expected relations influence the types of questions posed in the interviews. The data and the insights obtained during the interviews are used to develop a generic model that describes the relations between CtS, QOS and CIS. After the construction of the model it will be validated based on the data provided by the participating energy supply companies. When the model has proven to describe the relations between CtS, QOS and CIS well it can be used to measure the impact of a CIS on CtS and QOS. When the impact is known a return on investment [ROI] can be calculated. The model and the ROI calculation will serve as a basis for the conclusions and recommendations for Ferranti and will also be used to check whether the established theories on cost allocation can also be used to define the CtS in the utility sector. Due to unexpected outcomes of the interviews the steps described in the figure above (figure 1-5) are changed during the interviews. Paragraph 6.3.2 addresses the redefined research approach.

## 1.4 STRUCTURE OF THE REPORT

The following structure is maintained. Chapter 2 provides an overview of the current energy market in Belgium and the Netherlands. Chapter 3 will further elaborate the concept of a customer information system and its characteristics which are specifically attributed to the utility sector. In chapter four a literature overview of cost to serve as well as quality of service is presented. In the succeeding chapter the selection of a suitable theoretical framework to identify the key processes and their interrelations is described. In sixth chapter the interviews with the energy supply companies are elaborated. With the insights from the literature and the interviews a selection framework to come up with a definition of Cost to Serve is presented in chapter seven. In Chapter 8 a framework to assess to suitability of processes to be automated is presented and tested on the processes identified in Chapter 7. Chapter 9 presents the conclusions based on this research as well as recommendations for Ferranti and suggestions for future research. The final chapter reflects on the theory used in this research and the research approach, as well as discussing the research in the light of the issues faced by the energy supply companies in the Netherlands and Belgium.

# 2 OVERVIEW OF THE CURRENT ENERGY MARKET IN BELGIUM AND THE NETHERLANDS

In this chapter the European energy market is discussed, the focus is on Belgium and the Netherlands. The physical and economic aspects of the electricity and gas sectors are described as well as some juridical aspects in order to be able to explain the differences between the Netherlands and Belgium.

Due to fact that the gas and electricity market are quite similar (except for some short-term flexibility options in the gas infrastructure) this chapter will meanly focus on the electricity sector.

## 2.1 THE CONSUMPTION SIDE OF THE ENERGY SUPPLY CHAIN

In the previous chapter some of the effects of the liberalization of the electricity sector are shortly discussed. In this paragraph the implications of the liberalization are discussed more in-depth on both a physical and an institutional level.

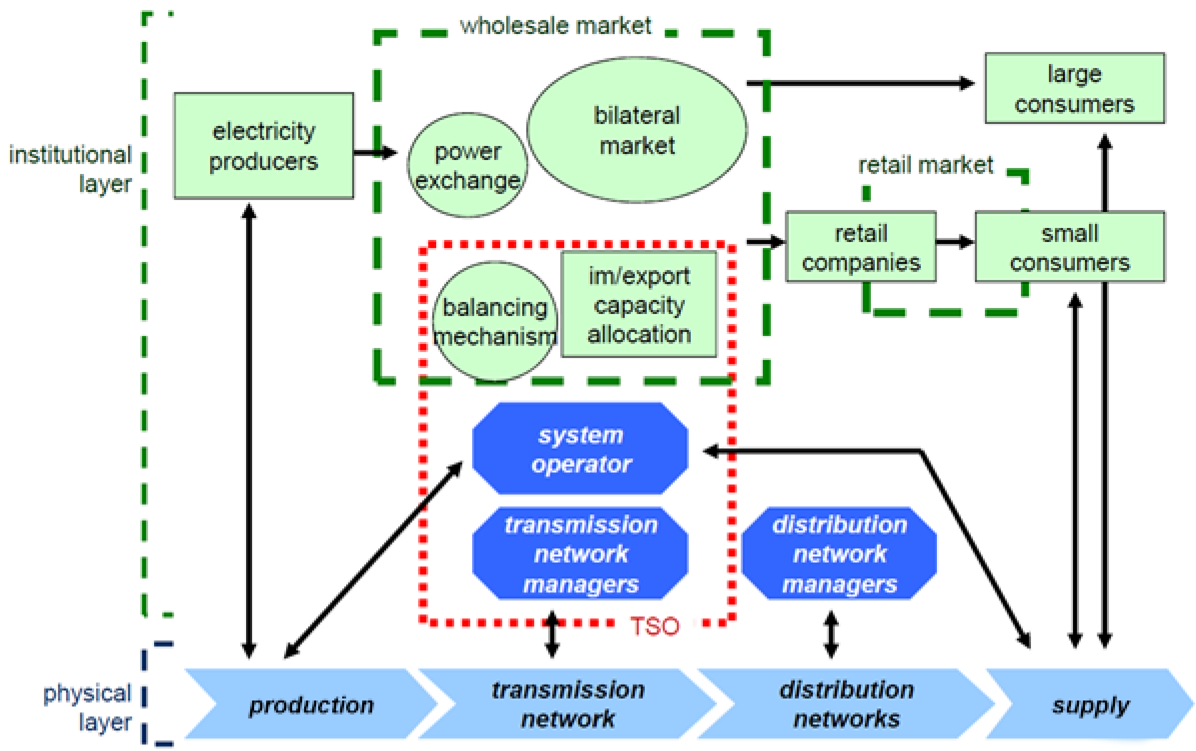



Figure 2-1 Institutional and physical layout of the liberalized Dutch electricity market (Vries, Correljé, & Knops, 2010)

Although the physical layer is not affected by the liberalization (as can be seen when comparing figure 2-1 with figure 2-2), the physical layer will be addressed shortly as well as the aspects around the electricity sector that are noticed by the consumers (the so called load side). The black arrows represent the communication lines between the different involved actors. Despite the fact that the word liberalization might suggest that there is less regulation in the liberalized electricity market, more strict regulation is needed to control the operation of the electricity market (Vries, Correljé, & Knops, 2010). Prior to the liberalization the SEP controlled which production plants produced what amount of energy and sold this energy to the supply companies via the transmission network (owned by SEP) and via the distribution network (owned by the supply companies).

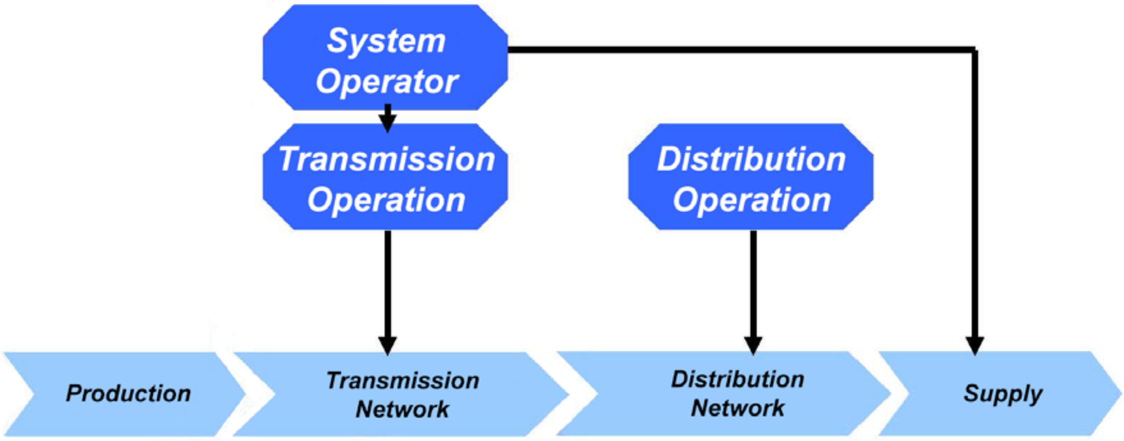



Figure 2-2 Institutional and physical layout prior to the liberalization (Vries, Correljé, & Knops, 2010)

Electricity is produced by generation companies like Eneco, Nuon (owned by Vattenfall), Electrabel (owned by GDF Suez) and many other companies. Due to the cost intensity of the power-generation plants (high sunk costs) there are not many new players in the generation market since the liberalization. In Belgium and the Netherlands the most electricity is generated by: Coal fired plants, gas fired plants and nuclear plants (Verbong & Geels, 2007). The increasing environmental awareness has led to an increase in more sustainable de-central generation plants like solar and wind-power, although their contribution to the total energy production is still only around 5% (CBS, 2011).

This high voltage (30 kV – 380 kV) power is then transported via a transmission network to local distribution networks. Since the high voltage network is a natural monopoly it is owned by the state, in the Netherlands this is done by TenneT and in Belgium it is done by Elia. Since both Tennet and Elia operate without competition they are both under control by competition authorities. The organization which is watching over Tennet is called Autoriteit Consument & Markt [ACM] (formerly called De Energiekamer) and the organization watching over Elia is CREG (Consentec, 2012) (CREG, 2013).

The high voltage transmission networks are connected with the distribution networks via transformers. Before the liberalization the distribution networks were owned by the generation companies and therefore, the consumers were not able to switch between providers. Since the liberalization these distribution networks are separate legal entities which should allow all electricity suppliers to make use of their network (Verbong & Geels, 2007). Some of the known Dutch distribution network operators are Liander, Stedin and Enexis. Some of the known Belgium distribution network operators are Infrax, ORES and EANDIS. These distribution network operators are responsible for the metering, but this often outsourced to the energy suppliers. Since the liberalization costumers are charged separately for their use of the network, these costs are called transportation costs.

One difference between the Netherlands and Belgium, which could be of great importance when comparing the CtS between energy suppliers from both countries, is the fact that in the Netherlands the transportation costs are billed to the customer together with the invoices for electricity consumption. In Belgium however, the transportation and distribution costs are billed to the energy supplier, the energy supplier then charges the consumer not only for the consumed electricity but also the transportation cost. In general there does not seem to be a big difference between these two financial constructions, however, when a consumer does not pay its invoice (a bad debtor) the difference comes to light. In the Dutch scenario of a bad debtor both the energy supplier and the network operator have to take their loss, however, in the Belgium scenario there is no loss for the network operator. The network operator still gets paid by the energy supplier and therefore all the loss is with the energy supplier. This is something that has to be taken into account in the CtS model when bad debt costs are studied.

All this is driven by energy supply companies. These companies often have B2B and B2C divisions, as already explained in Chapter 1 this research will only take B2C into account. The table below (table 2-1) presents a list of most known energy suppliers in the Netherlands and Belgium. The table also provides insight in the market segment each of these companies operate B2C, B2B or both and the types of energy they supply (electricity and/or gas).The number of customers of these companies varies between 15.000 and over 4 million.

**Table 2-1 Overview of most known energy suppliers in the Netherlands and Belgium (Based on NMA and CREG) (This list is non-exhaustive)**

| Energy suppliers in the Netherlands | | B2C and/or B2B | Electricity and/or gas | Energy suppliers in Belgium | | B2C and/or B2B | Electricity and/or gas |
|---|---|---|---|---|---|---|---|
| 1 | Anode | Both | E+G | 1 | Belpower | Both | Electricity |
| 2 | Atoomstroom | Both | E+G | 2 | Ebem | Both | E+G |
| 3 | Budget Energie | Both | E+G | 3 | Ecopower | B2C | Electricity |
| 4 | De Vastenlastenbond | B2C | E+G | 4 | Electrabel | Both | E+G |
| 5 | Delta | Both | E+G | 5 | Elegant | B2C | E+G |
| 6 | Dong Energy | Both | E+G | 6 | Eneco | Both | E+G |
| 7 | E.on Benelux | Both | E+G | 7 | Energie 2030 | Both | Electricity |
| 8 | Electrabel | Both | E+G | 8 | ENI | Both | E+G |
| 9 | Eneco | Both | E+G | 9 | Essent BE | Both | E+G |
| 10 | Energiedirect.nl | Both | E+G | 10 | Lampiris | Both | E+G |
| 11 | Essent | Both | E+G | 11 | Luminus | Both | E+G |
| 12 | Greenchoice | Both | E+G | 12 | Octa+ | B2C | E+G |
| 13 | Homestroom | Both | E+G | 13 | Wase Wind | Both | Electricity |
| 14 | Innova Energie | Both | E+G | 14 | Watz | B2C | Electricity |
| 15 | MAIN energie | Both | E+G | | | | |
| 16 | Nederlandse Energie Maatschappij | Both | E+G | | | | |
| 17 | Noord-Hollandse Energie Coörperatie | Both | E+G | | | | |
| 18 | Nuon | Both | E+G | | | | |
| 19 | ONEforONE | B2C | E+G | | | | |
| 20 | Oxxio | Both | E+G | | | | |
| 21 | Qwint | Both | E+G | | | | |
| 22 | Robin Energie | Both | E+G | | | | |
| 23 | United Consumers | B2C | E+G | | | | |
| 24 | Windunie | B2C | E+G | | | | |
| 25 | WoonEnergie | B2C | E+G | | | | |

In the Netherlands all companies provide both electricity and gas while in Belgium five out of fourteen companies solely supply electricity. This difference is taken into account in the research due the fact that the solely electricity supplying companies are not able to offer their customers combined electricity and gas contracts. An important note when talking about CtS is the fact that there are two types of contracts for consumers.

1. Single-fuel contracts, where a consumer has a contract for gas and a separate contract for the supply of electricity at different energy supply companies. This allows for the consumer to search separately for the best fitting contract for his gas consumption as well as his electricity consumption.

2. Bi-fuel contracts, as the name already suggests bi-fuel contracts are contracts where the supply of gas and electricity are covered by the same energy supplier.

There are some economies of scale when a bi-fuel contract is used. For example, the customer can be billed for both types of energy with one invoice. In order to be able to take both types of contracts into account when studying the Cost to Serve, it is therefore decided to look at the CtS per connection and not per contract.

## 2.2 THE GENERATION SIDE OF THE ENERGY SUPPLY CHAIN

The processes described above are those processes that take place at the consumption or load side of the electricity value chain. The next paragraph will shortly describe the processes that support these load side processes. The energy supply companies mentioned in table 2-1 purchase all the energy for their customers at a wholesale market, as can be seen in figure 2-1.

A part of the electricity is bought in long-term bi-lateral (max 1 year) contracts while another part is bought at a shorter-term power exchange (day-ahead). But since electricity cannot be stored production and demand always have to be in balance. The majority of this balancing is done by forecasting of the consumers demand by energy suppliers. Nevertheless the forecasting will not always be 100% accurate, in order to keep the network in balance there is a third market component called balancing market or balancing mechanism. The balancing market is a live market where the system operator (TenneT in the Netherlands and Elia in Belgium) maintains the physical balance. If either an electricity producer or an energy supply company deviates from its forecasted production or demand it is balanced by producing either more or less electricity on the balancing market. But the prices on the balancing market are higher than on the normal power exchange and these price differences are paid by the organization that deviates from its forecast as well as the imbalance penalties which have to be paid. This financial liability is an incentive for the organizations involved to accurately forecast.

## 2.3 MAIN FINDINGS OF THE OVERVIEW OF THE CURRENT ENERGY MARKET

Looking back on the overview of the current energy market while taking CtS and QOS into account the following points are considered as the most relevant findings.

With regard to Cost to Serve:

- Costs have become more important since the liberalization of the electricity market.
- The transportation costs are billed differently in Belgium and the Netherlands, this has to be taken into account when comparing the CtS.
- There are Single-fuel contracts as well as Bi-fuel contracts, this difference makes expressing the CtS as cost/connection better comparable than cost/contract.
- The energy supply companies vary a lot in size (between 15.000 and 4 million) perhaps it is necessary to make several categories, for predicting the influence of a CIS implementation on CtS, based on the size of the organization.

With regard to the QOS:

- The fact that electricity suppliers are the last organization in the electricity value chain (see figure 2-1). This complete value chain contributes to the quality experience of the customer, however, the relation between actual quality and perceived quality might be blurred. This has to be taken into account when the influence of a CIS on QOS is studied.

# 3 CUSTOMER INFORMATION SYSTEMS

In the previous chapters the motivation for energy supply companies to reduce their CtS is presented. In this chapter the potential of business process automation, in specific the potential of a CIS, to reduce the CtS will be addressed. First business process automation and in specific Customer Information Systems are discussed. After which the reasons for special requirements for a CIS in the utility sector are elaborated. And finally MECOMS (the utility CIS designed and created by Ferranti) is presented in order to grasp the possibilities a CIS has to influence the processes which contribute to the CtS.

## 3.1 BUSINESS PROCESS AUTOMATION AND CUSTOMER INFORMATION SYSTEMS

This paragraph addresses the motivation for the usage of business process automation [BPA] and in more detail the application of Customer Information Systems.

BPA is an approach organizations use to reduce their cost by automating processes. This automation allows the organization to restructure their workforce deployment and therewith optimize the organizations efficiency. The first step in BPA is identifying the processes that are suitable for automation. In this study the identification of the suitable processes is done by the use of a BPA selection framework by Gerhardson and Akerlund which is presented in Chapter 8. In this research only the processes that either have a significant contribution to the CtS or the QOS (or both) are taken into account in the BPA selection framework, this is due to the time constraint of this research.
The second step is identifying a suitable BPA system. In this study the impact of customer information systems specifically designed for energy supply companies is investigated and therefore, the selection of a suitable BPA system is an unnecessary step.

As already addressed this study investigates the impact of a customer information system [CIS] on the cost to serve and the quality of the service for energy supply companies. Since CIS are a specific part of BPA systems CIS will by elaborated shortly.

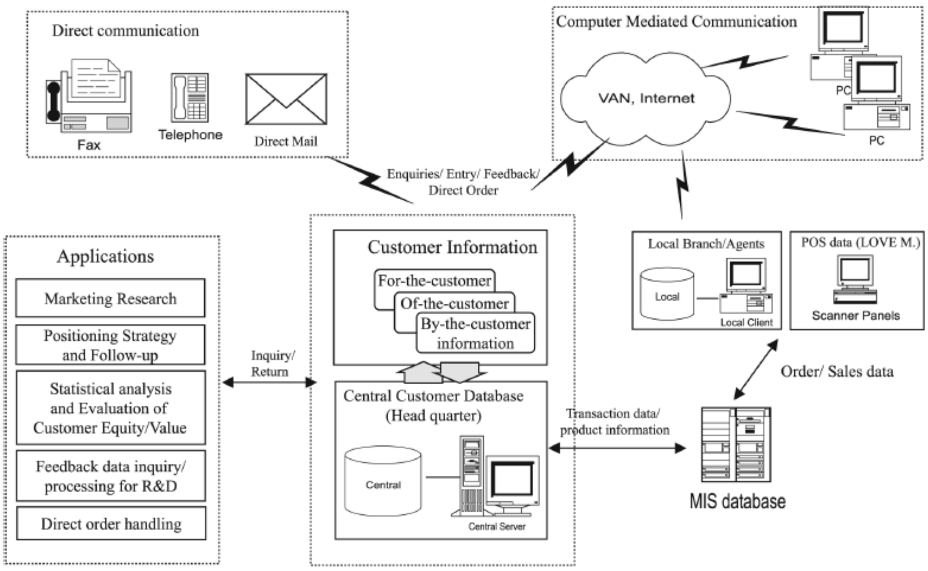



Figure 3-1 Layout of a general CIS, with marketing and strategy applications (Park & Kim, 2003)

The picture above (figure 3-1) shows the layout of a general CIS as defined by Chung-Hoon Park and Young-Gul Kim (Park & Kim, 2003). They see a CIS more from a marketing perspective, where a CIS consists of a database, several digital communication channels and some applications that combine the data into marketing information. In this study a CIS is seen from a customer service perspective and marketing (which is just one of the other domains covered by a CIS) is not taken into account, however the general layout of the CIS will remain the same only the applications will be more service oriented instead of marketing (examples of these service oriented applications can be found in paragraph 3.4). According to the Carnegie Mellon Software Engineering Institute a CIS can best be defined as any combination of information technology and people's activities using that technology to support operations, management, and decision-making. The basic function of CIS is that it is able to process all kinds of data from different types of information formats and combines this information in such a way that the information can be read and used throughout the organization and performance indicators should be monitored with the CIS in order to control the organization. In order to be able to react quickly to changes in the organization and its environment it is desirable that the CIS is able to generate the data required for the KPIs accurate and prompt. Often CIS also offer the possibility to graphically represent the KPIs which makes internal communication much easier.

## 3.2 SPECIFIC UTILITY FEATURES OF CIS

Managing large amounts of customer data through a CIS is common in many industries. And the layout of a CIS often has the same general characteristics as depicted in figure 3-1 where data is collected in a database and several applications make the data suitable for several processes required by the sector the CIS is designed for. The suppliers (mainly Ferranti, Oracle Utilities and SAP IS-U) of CIS for the utility sector claim that their CISs are specifically designed for the utility sectors. In this paragraph the specific characteristics of the energy utility market are presented. And the implications for the CIS and the processes behind the CtS are discussed to elaborate whether the CIS indeed has to be tailor made for the energy utility sector.

As already shortly addressed in Paragraph 2.1, the liberalization of the energy sector has not only changed the relation between the network operator and the electricity supplier but also the communication between these two layers. Due to the fact that not only the energy supply company but also the network operator is involved in the billing process (which possibly have different software packages which communicate in different digital languages) and the fact that the conventional meters can only be read out manually, the billing process is very complex when for example compared with telecom industry. If the metering process was to be done by a CIS it is important that the CIS is able to read the data of both organizations and also make this data interchangeable.

Also the fact that the production and demand of electricity always have to be in balance (Vries, Correljé, & Knops, 2010), makes forecasting an important process, this in comparison to other industries where companies always have some levels of stock or overcapacity which can guarantee the functioning of the network. The cost incurred by forecasting are often attributed to Cost to Serve. Some CIS offer the possibility to collect consumption data of consumers and therewith help making forecasts. This forecasting application is made specifically for the utility sector.

In line with this forecasting is also the phased billing of customers. Customers pay a monthly tariff based on the type and size of their house and the composition of the household. Instead of a monthly tariff which is per month adjusted to the actual consumption. In order to prevent that customers are dissatisfied by a strong variation in their actual consumption and their monthly tariff (either they have to pay extra at the end of the year or they have paid too much every month and get a refund) it is important to forecast the actual annual consumption very accurately. This forecasting application is also a complication of a CIS that is only seen in the utility industry.

As discussed in paragraph 2.2 the liberalized electricity market requires more regulation than the un-liberalized market. This regulation is influenced by the political field and therefore not really stable, this requires the CIS to be flexible as well. A good example of this political influence is the fact that the EU has put forward the idea that consumers should pay the true amount of they consumed the previous month instead of the phased monthly tariff. There are not many other industries where politicians tell the companies how to bill their consumers. This interference by the government requires a flexible CIS structure and is therefore, not often seen in other industries.

Another influence of regulation on CIS with regard to the energy sector can be seen in case of defaulting payers. These bad debtors are supposed to be cut off of their energy supply. However, rules in the Netherlands and Belgium prescribe that when the outside temperature falls below $0^{o}C$ the bad debtors have to be reconnected to the network in order to protect themselves against the cold (Consuwijzer, 2012). This cutting of and reconnecting is a costly operation which is also only seen in the energy sector.

One more important aspect that should be taken into account has economic grounds. The energy utility sector is an industry of high volumes and low margins. This combined with the competition which originates from the liberalization of the energy sector in the Netherlands and Belgium. Makes companies search for cost reduction in every aspect of their business processes, in comparison to high margin markets where the cost per consumer are less relevant.

## 3.3 UTILITY SPECIFIC CIS SUPPLIERS

There are three main suppliers of utility specific customer information systems, knowing: SAP, Oracle and Ferranti (Crols, 2012). In general these customer information systems are similar, when looking at their websites they all ascribe the same benefits to their CIS. Oracle for example writes that they can adapt to Changing Business Conditions, improve Customer Satisfaction and increase Operational Efficiency. Whereas Ferranti states that with implementing their CIS one will receive the following benefits, a system that can easily adapt to the changing environment, simplify operations and increase efficiency. The similarity in their benefits and also the applications these companies offer show that in such a niche market the end products don not seem to differ that much (however when studied in detail technical and operational difference are present). The main difference, between the customer information systems each of these organizations offer, is due to the different types of contracts they offer, the technical backbone of the CIS as well as the flexibility of the CIS to adapt to changes in the environment.

## 3.4 MECOMS BY FERRANTI COMPUTER SYSTEMS

In the previous paragraph the three main CIS suppliers for the utility industry are introduced. As paragraph 3.3 pointed out there are no big differences between the CISs when looking at the application level of the CISs. Therefore, only one CIS will be discussed more in depth and since this study is performed in cooperation with Ferranti, Ferranti's CIS called MECOMS will be discussed more in depth.

Ferranti Computer Systems N.V. as we know it descents from Ferranti International PLC a multinational electrical engineering company which went bankrupt in 1993. Traditionally Ferranti has been a producer of electricity meters and power transformers. From this hardware production Ferranti became a more service oriented software supplier. The core focus of Ferranti is to map out business processes and design an automation strategy, together with its customers, which leads to process improvements. This helps Ferranti's customers reach their goal of improved efficiency, cost savings as well as an increased quality level.

All the energy suppliers presented in table 2-1 are potential customers of Ferranti. There are several reasons for the energy suppliers to contact Ferranti to discuss the possibilities of a new CIS implementation. However, the three main reasons for an energy supplier's interest in a new CIS are:

1. The current CIS is not flexible enough to cope with changes in its environment. For example a market evolution seen in the Netherlands is that energy suppliers want to vertically integrate in the market by leasing certain energy-hardware products to its customers.

2 The CIS is too old and not working efficient enough compared to the more modern available CIS, which makes the operational cost of the processes performed by the old CIS unnecessary high.

3 A specific functionality (for example metering of smart meters) is missing in their current CIS and it is not possible to add the single module, required to perform this functionality, due to the inflexible nature of their current CIS.

The process from sales to implementation can best be described as following. Mostly the potential customer experiences one of the problems descried above. After one of the problems is noticed the energy supply companies screen the CIS market to see which systems are available to solve their problem. Depending on the scale of the study performed by the energy supplier Ferranti helps with more accurately defining the problem and investigates if MECOMS™ is able to solve this problem. If Ferranti thinks that MECOMS™ is able to solve the problem a project approach and a quotation are worked out. When the customer is convinced that Ferranti is able to help the organization to reach these goals they can seal the deal and start implementing the CIS. The duration of this implementation (which depends on the scope of the implementation) ranges somewhere between several weeks up to one year (Crols, 2012). On average, the implementation phase needs to be supported by the same amount of personnel by the energy supplier as Ferranti allocates to its project, in order to make the implementation as smooth and efficient as possible. However, the time made available by the energy supplier varies a lot and is very highly dependent on the scope of the implementation as well as the willingness and ability of the energy supply company to invest such an amount of time in the implementation phase. There are also many cases known where this is outsourced to either Ferranti or other organizations, which significantly changes the ratio between input from the energy supply company and Ferranti.

In response to the business model of the utility sector (electricity, gas and water) Ferranti created a customer information system [CIS] called MECOMS™. MECOMS™ consists of several modules; performance management, customer management, meter data management, interaction management and enterprise asset management. This modular design makes MECOMS™ a flexible system, this flexibility allows for customers to only procure the modules that enhance their value proposition. Figure 3-2 gives a visual representation of the five modules which together form the MECOMS™ CIS. Below the function of each module will be described shortly.


**Figure 3-2 Visual representation of the five MECOMS™ modules**

## PERFORMANCE MANAGEMENT

Performance management is a module used to transform raw data into indicators for efficiency and productivity. For example the number of customers calling with complaints can be monitored as well as the time it took to solve the issues encountered by these customers. These indicators are represented in such an intuitive way that they can be understood by the entire organization and managers can use them to direct their processes. The module also contains other functionality to optimize the user's performance, like a workflow engine which can further automate the MECOMS™ processes, or role centers offering an intuitive approach to use the system. These web-based screens provide a unified view with all relevant work cues, navigation, links, Kpi's and graphics, so managers can quickly asses their unit's performance

## CUSTOMER MANAGEMENT

The customer management module helps to streamline the following processes: create and follow up new marketing campaigns, create new contracts (fixed or flexible pricing), make up invoices, sending invoices, administrate customer payments and deal with late or non-paying customers. The customer management module also makes it possible to assess the creditworthiness of every customer, this becoming more and more important since defaulting payers often switch energy suppliers in order to prevent disconnection from the grid. Finally, the module also contains activity management and other specific functionalities to maximally enable agents in front office / contact center environments

## METER DATA MANAGEMENT

The meter data management module helps streamlining the process of reading of the meters installed at the consumers. Whether it are conventional meters, MECOMS™ organizes the entire Manual Meter Reading process. MECOMS™ wireless portable terminal solutions for meter readers enable meter reading responsible companies to receive their meter readings within the same day. Or smart grid meters, it provides two-way communication with smart meters and is able to processes large volumes of smart metering data via the Smart Metering Communication Bus.

### INTERACTION MANAGEMENT

The interaction management module does not only take care of the interaction between energy suppliers and its customers but also between energy suppliers and other market players. Interfacing with different systems is required to exchange messages, to update information and to account for all business processes in a multi-player market.

Many utility processes require some sort of customer communication. For example: a request to repair a malfunctioning meter, a customer complaint about billing or a letter from the marketing department with a commercial offer. Since these processes cross organizational boundaries, MECOMS™ integrates all customer contacts to ensure every communication is in sync.

### ENTERPRISE ASSET MANAGEMENT

The enterprise asset management module is less relevant for energy suppliers in deregulated markets since energy suppliers do not own network critical hardware in a deregulated market. But many energy suppliers offer things like solar panels or high efficiency central heating boilers, as a strategy to climb up the value chain. These assets can be managed with this module. When a technician works on an asset, he can access all the information above from a single screen. Furthermore, any information provided by the technician about for example the solar panel's condition is fed into the Conditional Monitoring module. This will allow the creation of automated actions based on pre-defined situations.

Ferranti states that combining these modules in the MECOMS™ package leads to the reduction of cost to serve, more efficient business and superior business insight. Ferranti claims improvement, they want to substantiate, in order to independent substantiate insight in processes is needed. Most current literature focusses on benchmarks of the CtS of the utility companies and not on the processes that incur the costs. Insight in these processes is hard to acquire because there is no standard set of processes. Every utility company organizes their processes to provide the utility to its customers in a different way.

## 3.5 MAIN FINDINGS OF THE OVERVIEW OF THE CUSTOMER INFORMATION SYSTEMS

The main finding after studying the market of customer information systems for energy supply companies are presented in this paragraph.

- There are three main suppliers of utility specific customer information systems, knowing: SAP, Oracle and Ferranti.
- The main difference, between the discovered customer information systems, is due to the different types of contracts they offer, the technical backbone of the CIS as well as the flexibility of the CIS to adapt to changes in the environment.
- Customer information systems for energy supply companies differ from other customer information systems due to the characteristics of the energy market. Some of the characteristics that cause this distinction are:
    - The production and demand of electricity always have to be in balance
    - Forecasting is based on the type and size of their house and the composition of the household
    - Since many parties are involved in electricity production and supply, data of more than one party has to be collected to send a correct invoice.

# 4 LITERATURE OVERVIEW OF UTILITY SERVICE PROCESSES AND ITS INDICATORS

In paragraph 1.1.1 the term Cost to Serve is shortly explained, to constitute a working definition of the term which is used during the research. In this chapter the definitions used in the current literature are presented. The insights from this literature study will be used to whether or not change the used working definition of CtS and as input for the questions posed in the interviews with the experts of the energy supply industry.
Three different search engines have been used in the search for relevant scientific literature, Scopus, Google Scholar and SciennceDirect. Many search terms have been used, the five terms that delivered the most relevant literature are: “Cost to serve” reduction; Customer information system(s) “cost to serve”; energy companies "quality of service"; Customer information system(s) “utility sector”; quality management service industry.
Scopus and ScienceDirect suggest other possible relevant literature when one opens one of the documents on their website. This suggestion function has proven to be real added value to the literature study.

## 4.1 WHY FOCUS ON COST TO SERVE

As has been described in Chapter 2 and Chapter 3, CtS with regard to the Energy Utility industry has specific characteristics. When one only looks at the value of a certain CtS (for example the cost to provide service to a subscriber of a telephone subscription) one might think that this is suitable to compare with the CtS of the energy utility sector. However, the processes driving these CtS differ so much that it makes no sense to compare these figures (see also paragraph 3.5). In order to find useful literature that is based on other industries, it is necessary that this literature looks at CtS on a process level and not only at the end-value of CtS. Nonetheless, since no literature that describes the CtS on a process level in sectors which have similar characteristics to the energy supply sector is found, it is decided not to make a comparison between the energy supply sector and other sectors.

However, an important cost driver that can be found in the CtS of the energy utility industry (CapGemini, 2011) as well as in the CtS of other industries is Call Center [CC] cost. These call center costs are well founded in literature (Gans, Koole, & Mandelbaum, 2003), nonetheless other processes behind CtS are hard to find (Gensler, Leeflang, & Skiera, 2012).

The fact that there is so little known about CtS in the energy utility industry makes it, from a scientific point of view, an interesting subject. This combined with the fact that CtS accounts for about 20% (see figure 1-3 page 8) of the costs of energy suppliers, makes the CtS of energy supply companies an interesting and relevant research domain.

## 4.2 COST TO SERVE IN THE UTILITY SECTORS

The previous paragraph already addressed that from a scientific perspective little has been recorded about Cost to Serve with regard to the utility sectors. Therefore, this paragraph will address the CtS of the utility sectors from a more operational perspective. One of the most authoritative publishers of CtS studies is the Capgemini B2C Utilities Retail Benchmark (Crols, 2012). This benchmarking study is performed every two years, last edition (2011) 38 energy suppliers from 17 European countries participated in their benchmarking study. Out of these 31 participating companies 17 operate in a competitive market and 14 operate in a non-competitive market. This paragraph elaborates on the findings of the 2011 edition as well as a comparison between the 2009 and 2011 editions. Due to the fact that the Capgemini B2C Utilities Retail Benchmark looks at 17 European countries (CapGemini, 2011), which have to some extend differing rules and regulations, not all conclusions based on this benchmarking study are relevant for this Belgium/Dutch research.

The key findings of the benchmarking study are presented below:

- In a competitive market (mostly churn) and size are key factors, CtS is higher for retailers in competition.
  - Small retailers in competitive markets manage to combine effective operational processes (few contacts) with low overhead, low IT costs based on non-SAP solution and low bad debts.
- Large retailers without competition combine economy of scale with favorable situation where customers have no option to switch between supplier (no churn, simple IT).
- Almost all returning participants have an increased CtS between 2009 and 2010
  - The global average is lower thanks to efficient small retailers and large incumbents with low competition
- Bad debt situations are very diverse:
  - Some have reduced their bad debts while most of others still suffer from the effects of economic crisis
  - All retailers with high bad debts have low costs on billing, payment and collection processes

The CtS per company is depicted in the graph below, the company names are made blank due to the sensitivity of the data, this anonymization reduces the value of the Capgemini report because it is harder to point out which conclusions apply to the Netherlands and Belgium. The CtS is given in € per contract and corrected for purchasing power parity [PPP]. PPP is a way to neutralize the price differences per country, since all participating companies operate in the Euro zone, the price of a specific bundle of goods or services that can be purchased in each country is compared. The price difference for this bundle of goods or services results in a factor per country, with this factor the CtS per company in these countries is corrected (Lafrance & Schembri, 2002).

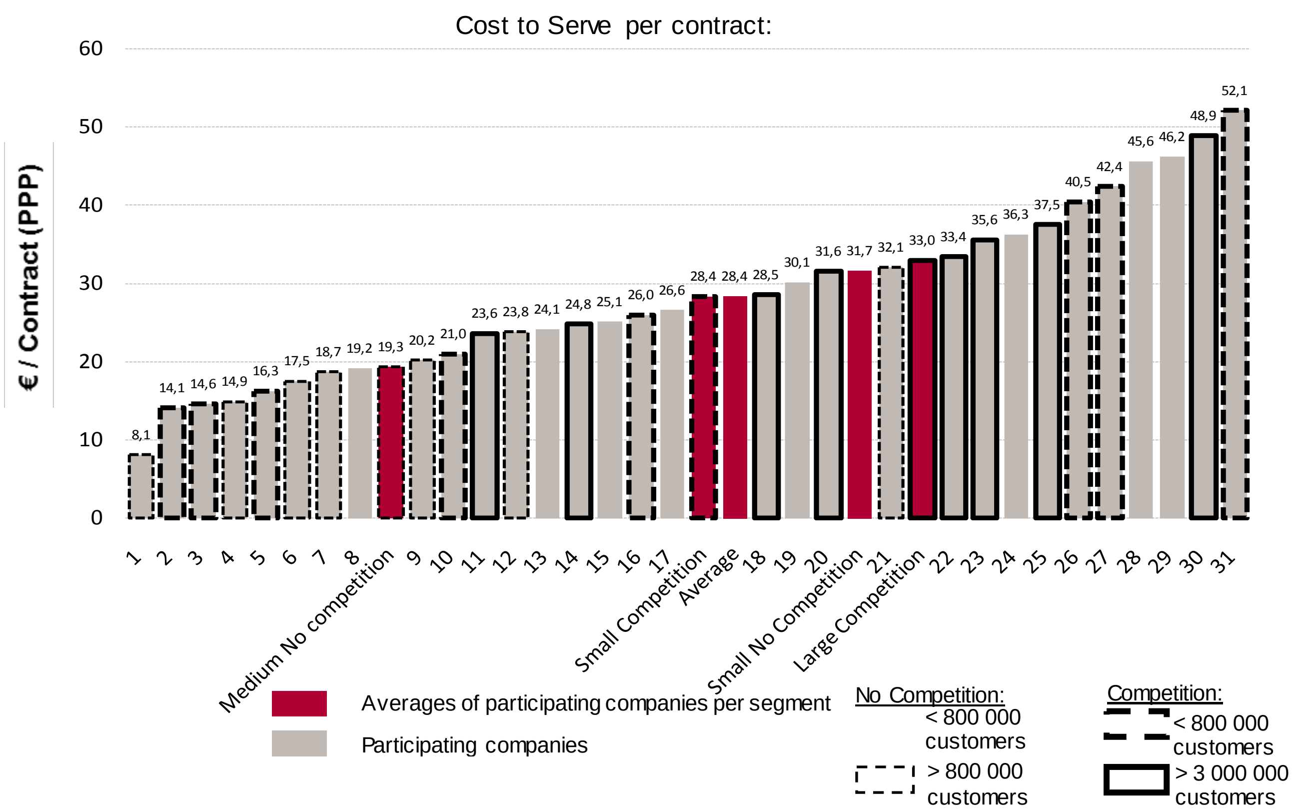



Figure 4-1 The cost to serve per contract of Europe wide participants of the CapGemini utility benchmark

Based on figure 4-1 (CapGemini, 2011) presented above the following conclusions can be drawn:

- On average the companies in the non-competitive market have smaller consumer bases than companies operating in competition hence the non-competitive segments between larger or smaller than 800.000 and the competitive segments till 800.000 and above 3.000.000.
- Retailers in non-competitive market have a lower CtS than retailers in a competitive market (€ 30,7 is the average CtS for companies in a competitive market while the CtS is €25,9 in a non-competitive market) .
  - In a non-competitive market larger companies (€19,3) have a lower CtS than smaller (€31,7) companies →sign of economy of scale
- Among retailers in competition
  - The larger companies (€33,0) have a higher CtS than the smaller companies (€28,4) →no signs of economy of scale
  - The smaller companies with relative low CtS have moderate churn rate and a quite stable situation for many years
- CtS seems to have decreased compared to last edition (passing from €32,1 to €28,4)
  - However, many new participants with low CtS (thanks to situation of non-competition or efficiency) are added
  - Companies which participated in both editions of the CapGemini benchmarking study, on average suffer from an increase of almost 7% in their CtS

## 4.3 CUSTOMER INFORMATION SYSTEMS AND THE UTILITY SERVICE PROCESSES

The awareness that customer information systems can fulfill a role on the boundary between organizations and their environment has increased since the 1990's (Ruyter & Zuurbier, 1993)

In fact customer information systems fulfill two functions. They allow for companies to easily handle customer data, but they also enable the creation of an online customer portal. Most literature on CIS is about the effect of CIS implementations on customer behavior and online use and not in intercompany changes. But also the studies concerning consumer behavior can be useful in this research.

If a CIS is used to enable online use this CIS decreases the cost to serve a consumer request because fewer FTE's are needed to answer the request and therefore, the costs per transaction are much lower than with off-line channels (Schuuring, 2012). However, online channels also reduce the cost from a customer's perspective (e.g., no travel, no waits) and should improve overall customer efficiency by lowering the marginal cost of transactions (Bitner, Brown, & Meuter, 2000), this is of course under the assumption that customers substitute off-line requests with online requests. The reduction in marginal costs from the consumer's perspective may however, increase the total number of requests. This is due to the fact that consumers spend fewer resources on a single request (Toshinori Chikara, 1997) (Xue, Hitt, & Chen, 2011). And also the fact that consumers perceive more control over online information makes them consult the information more often (Xue, Hitt, & Chen, 2011).

Another important aspect that has to be taken into account is the expected valley of despair (the decrease of efficiency of the organization) due to the implementation of the CIS (Nikula, Jurvanen, Gotel, & Gause, 2010). Although on the long run a CIS implementation might be able to increase the efficiency of the organization, often on the short term the efficiency is decreased because the personnel that has to work with the new CIS first has to get acquainted with the new CIS. The picture below from Larson and Carnell (Larson & Carnell, 2010) depicts the valley of despair after a software implementation.

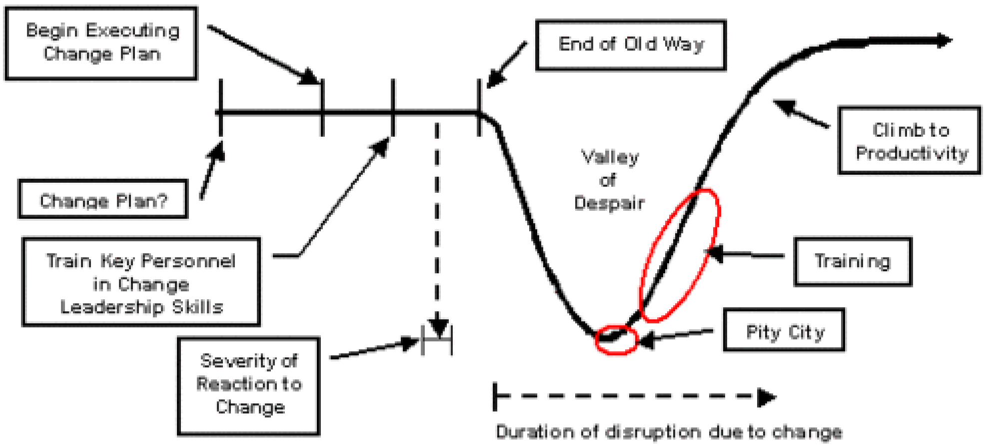



Figure 4-2 The valley of despair, which might be experienced when a CIS is implemented (Larson & Carnell, 2010)

Figure 4-2 shows the productivity of an organization, which after a change in the organization (in this research a CIS implementation) decreases due to the inexperience with the new way of working. When the personnel is used to the new way of working (after training) a higher level of productivity will be achieved. Based on this figure it can be concluded that investments in a CIS have to be based on a long term perspective.

## 4.4 QUALITY LEVELD AND MEASUREMENT IN THE UTILITY SERVICE PROCESSES

As already discussed in the introduction, customers do not only look at the price of electricity, they also take into account the quality of the service, which can also be influenced by the implementation of a CIS (Milroy & Li, 2001). While CtS is a result of internal processes, which is measured within the organization QOS is for a part based on the judgment of customers. Since customers are not part of the organization it is more difficult to get the customers involved in comprehensive quality level measurement (Reichheld, 2003). Another notion which has to be made when discussing QOS is the fact that electricity suppliers are the last organization in the electricity value chain (see figure 2-1). This complete value chain contributes to the quality experience of the customer, however, the relation between actual quality and perceived quality is blurred (Sullivan, Suddeth, Vardell, & Vojdani, 1996) since not all customers are aware of the fact that their electricity supplier is part of a more complex value chain.

The development of information technology makes customers to want faster, more convenient and efficient service at lower cost (Xue, Hitt, & Chen, 2011). Since the goal of this research is to make a model that describes the influence of a CIS implementation on CtS and QOS it is important to know how to measure the QOS. Online service quality has a significant influence on many important aspects of electronic commerce (e-commerce), these include consumer trust in an online organization (such as EnergieDirect) (Finn, 2011). Several studies have shown the positive relationship of customer satisfaction and service quality with customer loyalty (Parasuraman A., 2002).

The academic literature is not well founded in the direct relation between the execution of service processes, in the utility sector, by a CIS and the quality level of these services. However, as discussed earlier in paragraph 4.1, call centers play an important role when discussing CIS with regard to the energy sector and these call centers are well founded in the literature. Companies use call centers for establishing direct communication with their customers (Gans, Koole, & Mandelbaum, 2003). The primary objective of call center operations is customer care and achievement of high levels of customer satisfaction (Jaiswal, 2008). Call centers are increasingly playing a crucial role in customer relationship management. Most business organizations see call centers services as a potentially effective way of keeping customers happy and satisfied, and gaining competitive advantage (Jaiswal, 2008). In his paper Jaiswal argues that quality of service has five dimensions knowing reliability, responsiveness, assurance, empathy, and tangibility. The characteristics of these dimensions are presented in table 4-1.

Table 4-1 The five dimensions of quality of service by Jaiswal

| Dimension | Description |
|---|---|
| **Assurance** | Knowledge and courtesy of employees and their ability to transfer trust and certainty. |
| **Empathy** | Caring and individual attention to customers. |
| **Tangibles** | Appearance of physical facilities, equipment, personnel and written materials. |
| **Reliability** | The ability to perform the promised service reliable and accurately. |
| **Responsiveness** | Willingness to help customers and provide prompt service. |

These five dimensions can be used to arrive at measurable quality definition. The use of a multi-dimensional definition of quality makes it possible to take the interrelations between several processes into account. This is needed for the desired model to be able to predict the influence of a CIS implementation on the total QOS as well as the quality score per process. In order to measure quality along these dimensions it is not sufficient to ask customers if they are satisfied with the provided service. It is not possible to measure all these dimensions by posing one question at a consumer. Multiple questions are required to measure the multi-dimensional quality. It is not known which questions need to be asked to get the desired insight in the quality level, these questions are not presented by Jaiswal, however, in case of the measurement of empathy one can for example think of; did you feel like you were approached on a personal level when you had contact with your electricity supplier? This type of polar questions is easy to process and require little effort from the customers. However, there are more questions that tell something about the empathy level.

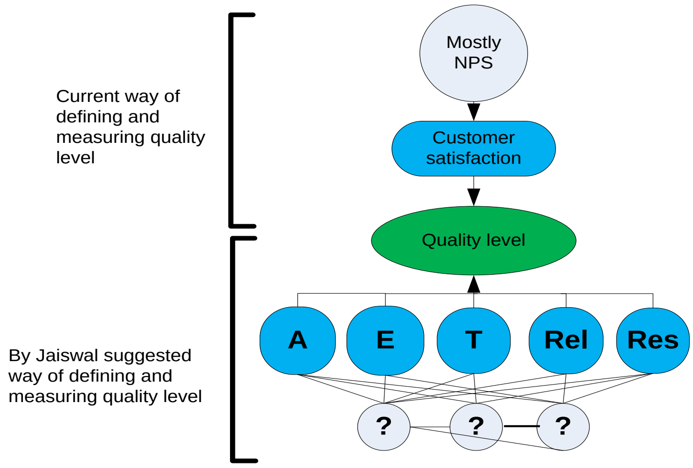



Figure 4-3 Representation of current and required way of defining and measuring quality level

Currently a common way to measure the customer satisfaction of service organizations is the Net Promoter Score [NPS] (Reichheld, 2003) as depicted figure 4-3. The NPS asks a customer how likely it is that they will recommend their service supplier to somebody else. The fact that the NPS is easy to collect and process is one of the main reasons the NPS is so widely used. Or as Reichheld puts it, “By substituting a single question for the complex black box of the typical customer satisfaction survey, companies can actually put consumer survey results to use and focus employees on the task of stimulating growth” (Reichheld, 2006).
However, customer satisfaction and service quality are two distinct, though highly correlated, constructs (Dabholkar, Shepherd, & Thorpe, 2000). In marketing literature several studies have found positive relationships of service quality and customer satisfaction with customer behavioral intentions (Anderson & Sullivan, 1993) (Parasuraman, Zeithaml, & Berry, 1988). Further, studies have also shown that customer

satisfaction mediates the effect of service quality on behavioral intentions (Gotlieb, Grewal, & Brown, 1994). It is recommended that customer satisfaction should be measured separately from service quality in order to understand how customers evaluate service performance (Brady & Robertson, 2001) (Dabholkar, Shepherd, & Thorpe, 2000).

Customers in the online environment interact with a more technical interface (Fassnacht & Koese, 2006). The absence of person-to-person interaction means that the traditional concepts and ways of measuring service quality, which emphasize the personal interaction of the conventional service encounter, are inadequate when applied to online service provision (Riel, Liljander, & Jurriëns, 2001). Customers in the online environment play a more prominent role in co-producing the delivered service than is the case in the traditional context (Fassnacht & Koese, 2006).

## 4.5 CONCLUSIONS BASED ON THE LITERATURE REVIEW

The literature review of three concepts which are the core elements of this research; cost to serve, quality of service and customer information systems, pointed out that there are quite some unknown factors when one wants to construct a model to model the influence of a CIS implementation on the CtS and QOS of an energy supplier.

The following gaps in the current literature with regard to the insights needed to construct the model came to light:

**Table 4-2 Gaps between the required information to construct the CtS model and the information found in the literature**

| Gaps with regard to the CtS | |
|---|---|
| 1 | Lack of a CtS definition for the energy supply sector |
| 2 | No insight in which processes are included in the CtS definition |
| 3 | No criteria to include or exclude processes from the CtS |
| 4 | No insight in the financial contribution of these processes to the CtS |
| 5 | An average of the total CtS in the energy supply industry |
| 6 | No literature found that compares CtS of different sectors (e.g. energy vs telecom) |

**Table 4-3 Gaps between the required information with regard to the QOS and the information found in the literature**

| Gaps with regard to the QOS | |
|---|---|
| 1 | Currently no clear definition of quality |
| 2 | No clear understanding of how the quality level is currently measured |
| 3 | No insight in the impact of each process (that is included in the CtS) on the quality level |
| 4 | No insight in the current quality level score |

**Table 4-4 Gaps between the required information concerning CIS experience and the information found in the literature**

| Gaps with regard to the effects of a CIS implementation | |
|---|---|
| 1 | No understanding in the influence of a CIS on CtS |
| 2 | No understanding in the influence of a CIS on QOS |
| 3 | No insight in the development of the valley of despair |

Although Reichheld states companies should purely focus on their NPS score (Reichheld, 2006), this research follows the line of reasoning of Dabholhar et al. (Dabholkar, Shepherd, & Thorpe, 2000) that the QOS should be measured separately in order to understand how customers evaluate the QOS. And the five dimensions of quality defined by (Jaiswal, 2008)(reliability, responsiveness, assurance, empathy, and tangibility) should serve as a guideline for the QOS definition used in this research.

Despite the fact that the concepts of CtS and QOS, with regard to the energy supply industry, are not very well founded in academic literature, there are some publications from a more practical point of view (for example the benchmark by CapGemini (CapGemini, 2011) and the benchmark by Accenture (Beek, 2009) which can be of great help during the conceptualization of the model. Both reports do not expose how they actually performed their research, which could be helpful to formulate questions for the expert interviews. However, the facts and figures presented in the reports help to get some feeling with the industry and to learn to order of magnitude of all facts and figures in the industry. This in combination with the fact that there is not much academic literature available has led to the decision to use this somewhat commercial data in the setup of the questionnaire.

In order to retrieve the required knowledge to complement the gaps, which are identified during the literature review, it is decided to perform interviews with experts in the energy supply industry. The knowledge obtained with the above executed literature review combined with the understandings from the interviews should enable the construction of the desired model.

# 5 ACCOUNTING FRAMEWORK

To be able to perform the interviews, to collect the data required to construct the model which describes the relation between CtS, QOS and CIS, a series of questions has to be prepared. This series of questions are combined in a questionnaire. The content of this questionnaire as well as the outcomes of the interviews are presented in the next chapter. However, the content of the questionnaire presumes that certain knowledge is available at the participants of the interviews. With regard to the CtS it is assumed that the participants know which processes are allocated to the CtS as well as the cost of these processes. The questions with regard to the CtS can best be answered if the participating companies use a type of cost accounting that gives insight in these processes. This chapter discusses on which type of cost accounting the questionnaire is based as well as it is the preferred type of cost accounting in case the participants would not be able to answer the questions due to lack of data during the interviews. The selected cost accounting framework together with insights from the literature overview and conventional knowledge from the people from Ferranti will lead to the setup of the questionnaire.

## 5.1 TYPES OF COST ACCOUNTING

Cost accounting is in essence collecting and analyzing cost information, in order for managers to optimize their cost efficiency (Vanderbeck, 2013). There are numerous types of cost accounting, for example; standard accounting, throughput accounting, activity based costing and lean accounting. These four types of accounting are shortly addressed in this paragraph after which the most preferable type is elaborated in more detail as well as the implications for the questionnaire.

### STANDARD COST ACCOUNTING

Standard cost accounting is the most straightforward way of allocating cost to products. In standard cost accounting a company only differentiates between fixed and variable costs and divides the total cost by the amount of produced units (Vanderbeck, 2013). The fixed costs (for example rent, are equally divided over the different units produced without distinction of the types of units). Nowadays it is only used at companies with a mass production line, because in business fields with smaller production amounts or more complex units one might get a distorted view on unit cost (Vanderbeck, 2013).

### THROUGHPUT ACCOUNTING

Throughput accounting is a process that focusses on the identification of bottlenecks in the production process (Vanderbeck, 2013). This is done by looking at the variable cost per produced unit, throughput accounting is focused on the optimization of cashflow. Throughput accounting is more a management accounting method than a cost accounting method (Vanderbeck, 2013). It gives no complete insight in the process cost.

### ACTIVITY BASED COSTING

Activity based costing [ABC] describes a method to allocate direct and indirect cost to the activities which are required by services or products (Kaplan & Anderson, 2003). ABC provides more accuracy in cost accounting than the other techniques described in this chapter (Vanderbeck, 2013). ABC, describes 100% of each employee's time to the different activities performed inside an organization (surveys are a common for the assigning of activities by the employees themselves). The management then can determine the total cost spent on each activity by summing up the percentage of each worker's salary spent on that activity. While ABC may be able to identify the cost of each activity and resources into the ultimate product, the process could be costly and subject to errors.

## LEAN ACCOUNTING

An accounting perspective of lean principles suggests that firms combine techniques designed to minimize waste in work processes and to facilitate decision-making and control in a lean manufacturing environment. Lean accounting and control practices are defined as “a new method of managing a business that is built upon lean principles and lean methods” (Kennedy & Widener, 2008). As an organization becomes more mature with lean thinking and methods, they know that the joint methods of lean accounting in fact creates a lean management system intended to provide the planning, the operational and financial reporting, and the incentive to change, required to thrive the company's on-going lean transformation.

## 5.2 ACTIVITY BASED COSTING

Activity based costing [ABC] is chosen as the most preferable cost accounting method for the energy supply companies since it gives the most detail in the cost of each process performed by the employees of the energy supply companies. Despite the disadvantage that ABC might be a cumbersome method, the level of detail acquired through ABC is needed to identify which activities are performed in which process in order to be able to establish which processes should be allocated to CtS and which should be allocated to other cost segments.

Activity based costing [ABC] is type of cost accounting which is well suited for allocating the indirect costs of service processes. However, in comparison to other cost accounting techniques like throughput accounting and lean accounting ABC is expensive and difficult to implement (Flanagan, 2008). Despite these disadvantages it is chosen to investigate the suitability of ABC due to its performance in allocating the indirect costs of service processes. It is expected that ABC will be able to provide the most insight in the processes contributing to CtS as well as the contribution of each process to the total CtS. Activity based costing [ABC] is a cost accounting tool introduced in the 1980’s by Kaplan and Cooper. Activity based costing describes a method to allocate indirect cost to services or products (Kaplan & Anderson, 2003). There are known studies where ABC is used to allocate costs for Call Centers (Kipers & Antos, 2010). When ABC is implemented in an organization the costs of all activities are identified and these activities are then allocated to products or services. Allocating cost to a certain product or service becomes more difficult as the number of supporting staff and processes increase, while ABC should be able to allocate these costs more accurately than other accounting tools, because it looks at the activities driving the costs and not only the costs itself (Major & Hopper, 2005). The following steps are needed to be able to allocate the cost per produced item or service.

1. identify the key activities and relevant cost drivers
2. allocate time to activities
3. attribute staff salaries and other costs to activity cost pools
4. determine a cost per cost driver

This roadmap to implement ABC is well founded in literature, in this study the roadmap provided by Newman is used (Ellis-Newman, 2003).

Step 1: The first step in implementing ABC is to identify the key activities that are being performed in an organization. This is mostly done by interviewing staff were they are asked to identify the main tasks in which they are involved and to describe the steps they performed in carrying out each task. These descriptions are then used to identify the key activities. Once the key activities are found, the next step is to identify the cost drivers that cause the occurrence of each key activity.
In case of the service provision of energy suppliers one could think of an activity such as call center operation, but also more in depth as for example inbound calls regarding invoices. The cost drivers causing the handling of inbound calls regarding invoices are then for example the number of inbound calls regarding invoices.

Step 2: As key activities are identified the next step is to allocate the budget of the organization to these activities. The first step in this allocation process is to measure the duration of each activity. When during the measurement of the duration of these activities new activities come to light, if for example staff does some smaller tasks during the performance of the task that is currently measured, the activities might be refined by going back to step 1.
Looking back on the example used in step 1, one of the activities that should be measured is the time to handle an inbound call regarding invoices.

Step 3: When the duration of each activity is known it is time to attribute the organizations budget to the activities. This does not only concern direct cost like labor costs but also indirect cost such as the depreciation of IT-systems. This should be done with quite some level of detail. If one looks for example at the depreciation of housing one should look at the usage of square meters per department. If for example the call center uses half of all the organizations housing half the budget of depreciation of housing should be attributed to all the activities performed in the call center. After this is done the total amount attributed to the call center is divided by the time spend on each activity.

Step 4: The final step is to allocate costs to each cost driver. This is done by dividing the total cost for an activity by the cost driver volume.
As going back to the example of the inbound calls regarding invoices the total budget for inbound calls should be divided by the total number of inbound calls regarding invoices to identify the cost of the cost driver inbound calls regarding invoices.

If it turns out that participating companies have no insight in which cost contribute to the CtS ABC is advised as a framework to collect data needed to construct to CtS model. ABC prescribes how to monitor activities, however, it does not prescribe how to select these activities (Kont & Jantson, 2011).

Since ABC does not prescribe how activities can be identified this still has to be done be another framework, the lack of such an identification method in ABC makes it extra important to ask the participants in the interviews who and why they identify and differentiate several processes.

# 6 EXPERT INTERVIEWS

The literature study performed in Chapter 4 pointed out that the current literature is not adequate to set up the conceptual model. Therefore, it is decided to do field research in the form of expert interviews. In this chapter the insights derived from the interviews are presented. In total eight companies are interviewed out of the 14 companies that were addressed. In the first paragraph the goals of the interviews are discussed as well as the implications of these goals on the set-up of the questionnaire. The second paragraph addresses the key insights that are obtained during the interviews. The final paragraph discusses the conclusions based on the interviews. A copy of the questionnaire is attached in appendix 1, the way in which the questions are derived from literature on CtS and Ferranti's insights is also presented in this appendix.

## 6.1 REQUIRED INFORMATION TO DESCRIBE RELATION BETWEEN CIS, CTS AND QOS

The literature review demonstrated that it is not possible to construct a conceptual model that can represent the influence of a CIS on CtS and QOS based on literature alone, data behind the processes driving CtS and QOS is required. It is therefore, decided to use interviews with experts from the energy supply industry to complement the anomalies from the literature review. Not only the insights regarding CtS and quality level measurement are needed to construct the model, also data behind the CtS and the quality of service is needed from the industry. In order to work as efficient as possible both the insights as well as the data are discussed in the same interview. As already discussed earlier on there is no right or wrong regarding the inclusion or exclusion of processes in the CtS. Therefore more than one expert is interviewed to get an overall understanding of the industry, which should in the end contribute to the acceptance of the generic model.

In order to complement the anomalies, which came to light during the literature review, the issues presented in table 6-1 are addressed during the interviews.

Table 6-1 Overview of the anomalies which are addressed during the interviews

| Topic regarding the anomaly | Questions with regard to the anomaly |
|---|---|
| **1. Processes included in the CtS definition** | a. Why these processes are included or excluded<br>b. The relevance of these processes in relation to the CtS (how much does each activity contribute to the total CtS?) |
| **2. The total CtS** | a. How is this total CtS measured<br>b. How are cost allocated to CtS<br>c. What is the total CtS and how has the total CtS behaved since the liberalization of the electricity market |
| **3. The measurement of the quality level** | a. How is quality defined<br>b. How is the quality measured<br>c. What is the impact of each process (that is included in the CtS) on the quality<br>d. What is the current quality score |
| **4. CIS experience** | a. Reasons for a CIS implementation<br>b. Experience with CIS implementation<br>c. Prognoses before CIS implementation |

So as to inquire the points mentioned above it requires some prior knowledge of the operational processes of an energy supplier. If one does not know what general processes are performed at an energy supplier it is for example hard to ask why they exclude some processes. In order to gain this prior knowledge Johan Crols from Ferranti (Crols, 2012) as well as Wouter Vermeiden (Vermeiden, 2012) from Essent NL have helped to gain this basic understanding of the electricity supply industry.

The participant's motivations for excluding and including certain processes are expected to be useful to formulate a CtS definition that is widely accepted by the industry. After discussing which processes are to be included in the CtS the costs of each of these processes has to be discussed as well as the total CtS. This data is then used to calculate the contribution of each process on the total CtS. This contribution is a good indication of the significance of each process on the total CtS. And can be used to exclude processes that only have a minor influence on the total CtS. Although the cost of a process is indeed a good indication of the relevance of a process regarding the CtS another important aspect of each process is its influence on the QOS. Therefore, it is necessary to include the measurement of the quality of the provided service in the expert interviews as well. Insight in how the quality is measured and the impact of each process on the total quality has to be addressed during the expert interviews. This insight is needed to make a quantified index of the quality score of each company in order to be able to construct the model.

The fact that it is unknown which required information and in what format this required information is administered by the participating companies implies a set-up of the questionnaire that is flexible enough to anticipate on the unforeseen outcomes of the interviews. A theoretical framework that might be suitable for the setup of the questionnaire is grounded theory. Grounded theory [GT] is a very popular research method especially in qualitative research nonetheless it is also used in quantitative research. GT prescribes a method which starts with data collection, this data is then coded in order to structure the data and therewith better observe certain phenomena. These phenomena are then used to induce a theory. With GT the focus is on generating theoretical ideas from data rather than having these specified beforehand (Strauss & Corbin, 1998). Or as described by Straus and Glaser, "Grounded theory method does not aim for the "truth" but to conceptualize what is going on by using empirical research. In a way, grounded theory method resembles what many researchers do when retrospectively formulating new hypotheses to fit data. However, applying the grounded theory method, the researcher does not formulate the hypotheses in advance since preconceived hypotheses result in a theory that is ungrounded from the data" (Glaser & Strauss, 1967)

Unlike other theories GT encourages the idea that researchers start their research without any assumption or hypotheses. One just starts collecting data (by for example interviewing people who are familiar with the field that is being studied), and parallel to the collection of the data the data has to be analyzed. This data analysis begins to develop an understanding of things that the researcher might find interesting and that suggest further cases to investigate (Gibbs, 2010). This understanding is then used to select new samples for the research.
If for example the analyses of the data generates the presumption that age is of influence on your theory and so far only younger people have been interviewed the next group of interviewees should include some older people in order to be able to confirm this presumption.

GT is developed by B. Glaser and A. Strauss, but later on in their careers they disagreed on some aspects of GT so they each went on their own way. The reason for their separation had to do with the way of coding the data. The fact that this disagreement led to their separation indicates that coding is a very important aspect in GT. The different types of coding are presented in table 6-2.

Table 6-2 Comparison between the Straussian and Glaserian approach of grounded theory (Heath & Cowley, 2004)

| | Strauss and Corbin | Glaser |
|---|---|---|
| Initial coding | *Open coding*<br>Use of analytic technique | *Substantive coding*<br>Data dependent |
| Intermediate phase | *Axial coding*<br>Reduction and clustering of categories (paradigm model) | Continuous with previous phase<br>Comparisons, with focus on data, become more abstract, categories refitted, emerging frameworks |
| Final development | *Selective coding*<br>Detailed development of categories, selection of core, integration of categories | *Theoretical*<br>Refitting and refinement of categories which integrate around emerging core |
| Theory | Detailed and dense process fully described | Parsimony, scope and modifiability |

As can be concluded from the schematic comparison presented in the table above; the Glaserian approach is more strict or "academic" than the Straussian approach which is more pragmatic. The biggest distinction between the two approaches is that the Straussian approach allows the researcher to anticipate on the knowledge gained during the interview while the Glaserian approach prescribes that a researcher treats each interview as it is its first interview, without any presumptions.

Although GT is mostly used to process qualitative data it can also be used to process quantitative data. In the case of the CtS model GT could be an effective theory. It is hard to predict the difference in outcomes when either the Straussian or the Glaserian approach is used. However, due to the limited amount of experts which can be interviewed in this study, the Straussian approach is chosen. The Straussian approach allows for the content of the interviews to be adjusted based in the insights from the previous interviews. It is expected that this supports the narrowing of the scope during the series of expert interviews. Which by the end of the interviews should lead to an industry wide accepted definition of CtS, as well as the required data to construct a generic model to predict this CtS. If for example one of the participants in the interviews indicates that since the liberalization of the energy-sector their CtS has gone up (which is an interesting phenomenon) and this question was not included in the interviews, the Straussian approach allows for the inclusion of this question in the upcoming interviews. This might seem as an inconsequent way of interviewing, however, it is a natural result of basing the content of the interviews on the Straussion version of Grounded Theory and should lead to both faster and more insights in the anomalies which are mentioned in table 6-1.

## 6.2 CONTENT OF THE INTERVIEWS

Due to the fact that none but one of the interviewed companies was willing to share their data behind their CtS processes, the content of the interviews is discussed per topic (mainly the anomalies discussed in the previous paragraph and some general data about the companies) instead of per company. This is done because many of the companies indicated that many of the topics that are addressed in this research are considered as sensitive and when they are addressed per topic it is more difficult to find out which company said what and therewith the sensitivity of the answers is reduced. As already addressed it is possible, to adapt the content of the interviews to the insights that arise during the series of interviews, however, the original version of the questionnaire can be found in appendix 1.

### 6.2.1 GENERAL DATA

Although a lot of the general data (such as; turnover, number of customers, ratio between bi-fuel and single fuel customers) of the energy companies can be found on the internet it was decided to address this topic in the interviews because it is expected that employees have more up-to-date data, than can be found in the annual reports. As well as the fact that it is expected that employees can put data and visions named in the annual report better into context.

Even though the relation between the CtS and general characteristics of a company is unknown it is expected that there is a relation between the CtS and the characteristics of each company. It is for example expected that economies of scale will occur, this is expected due to the definition of CtS (total CtS/number of connections) (Vermeiden, 2012). As well as it is expected that companies which are undergoing relatively strong growth might incur higher cost, to service their new customers. The reason for this is twofold, on the one hand the new customers (needed to make the company grow) might not be used to the way their new energy supplier operates which might lead to extra calls to the contact center. And on the other hand it is expected that the customers who switch from energy provider are more demanding than the so called "sleeping customers" who just have their automatic payment collection turned on and never mind their energy bill.

Of the eight companies that are interviewed, three operate in the Belgium market and five in the Dutch market. Four of the companies are so called challengers (these companies are relatively new and have a rather small market share) where the other four are incumbents (these companies originated before the liberalization of the energy market and already got a large market share). The customer base varies between about 100.000 customers for one of the challengers (Eneco België) and about 3,1 million customers (Electrabel Belgium) for one of the incumbents. All of the companies that participated in the interviews service both B2C and B2B. Two of the eight companies operate on their own, where the other six have to report to other international operating energy companies.

As already addressed in paragraph 1.1.1 there are two types of contracts, bi-fuel and single-fuel. It is expected that bi-fuel customers decrease the CtS when compared to single-fuel customers because some synergy in the service process is expected. It is for example possible to send one invoice for electricity and gas, this synergy probably reduces the CtS. Al the energy suppliers therefore keep track of their connection/customer ratio (ideally this ratio is two). For the companies that participated in the interviews the ratio varied between 1,5 and 1,9. In the southern part of Belgium it is quite common to have a propane gas-tank instead of a connection to the natural gas grid. Therefore the connection/customer ratio is lowest for energy suppliers which also service this part of Belgium. This wide range of connection/customer ratio is a strong argument for the definition of CtS as total CtS/#connections.

Growth of the number of customers or connections also has influence on the CtS. One of the challengers (Eneco België) has increased its number of customers with more than 100% in 2012, where the incumbents had a fluctuation of only a few percent. There are two reasons for these differences in growth, one when looking at absolute figures this difference is much smaller an increase of for example 50.000 customers is an increase of 50% for Eneco België where it would mean an increase of about 2% for Eneco Nederland. And two the auctioning of large energy contracts for a united group of consumers is gaining in popularity. In the Netherlands even the ANWB (the Dutch cycling and automobile union) has set up a group to put up for auction called Energiecollectief ANWB 2013 (ANWB Collectieve Energie Veiling, 2013). These energy auctions are an effective way to increase the number of customers but they are however quite risky because the same group of customers can be gone at the next auction period and they bring large fluctuation in the workflow of the organizations when compared with steady growth. Most of these auctions are won by the challengers because of their urge to rapidly increase their customer base (Perre, 2012).In order to get a good insight in the CtS it is important to take the growth of the energy supplier into account. The winning of an auction by one of the challengers could (in theory) decrease the CtS by 50% in one day, this would of course give a distorted picture of the CtS.

### 6.2.2 COST TO SERVE

This paragraph addresses the insights gained in the CtS of the companies that participated in the interviews. Although all the issues addressed in the interviews are expected to relate to the CtS this paragraph addresses those issues that are directly linked to the CtS. However, as already mentioned in the previous paragraph, due to the large fluctuations in the number of customers the CtS should be monitored over a longer period but the companies that participated unfortunately did not have these insights over a longer period. The major setbacks in this research is that despite the fact that eight out of the 14 companies that were addressed were willing to participate in the interviews, only one of these companies was willing to give insights in their data behind the CtS. Even when the companies were offered a non-disclosure agreement or the anonymization of their data they were unwilling to share their data. This is all due to the sensitivity of the data, however, the one company willing to present the data, wanted to give it under the motto sharing of knowledge is good but giving is not. This implied that without the data of the other companies their data cannot be used in this research. The influence of the lack of data on the proceedings of this research is elaborated in paragraph 6.3.2.

As Chapter 1 discussed there is no standard definition of the term Cost to Serve, there is also no right or wrong in a CtS definition. In order to get a broad support for the CtS definition used in this research all the companies that participated in this research are asked to give their definition of CtS and how they came to their definition. When the participants were asked for a high level definition of CtS they all said something of the same scope, the cost inquired by the processes needed to provide service to our customers. When however going into the detail of which processes are contributing to the service provision of customers there are some discrepancies. There is no industry wide definition of CtS, in fact none of the companies has a definition of CtS or a framework for selecting processes which should be allocated to CtS. The reasoning behind the selection of processes appears to be based on intuition per process.

- Essent Nederland, for example, has allocated the FTEs of their marketing division to the CtS. Where the rest of their marketing budget is allocated to CtA. When asked for the criterion behind this allocation Essent says it is due to the assumed retention effect of marketing that it is no more than fair to allocate some cost of marketing to CtS and therefore Essent chose to allocate the FTEs of marketing.
- Another example is the exclusion of the revenues from billing and bad debt by Eneco Nederland with the reasoning behind it that the term CtS concerns costs as the name also implies and revenues could not be mixed with costs. While on the other hand they subtract the revenues from billing (they charge extra for paper invoices) from their CtS. This inclusion of some revenues and exclusion of other revenues is another indication of lack of structure for selecting the processes attributing to the CtS.

There is also no industry wide consensus on how to look at CtS, some companies add the cost of all processes contributing to their definition of service (for example metering and billing) to arrive at their total CtS while other companies look at components of the processes (for example FTEs and IT cost) and add these components to arrive at their total CtS. Adding these components will lead to the same total CtS but it gives no insight in the cost per process, while these processes are influenced by a CIS. Therefore it is necessary to know the cost per process. The components that were often mentioned are:

- FTEs
- Housing
- Postal and printing
- IT
- Overhead (some companies differentiated between overhead and corporate overhead)
- External Call Center

Due to the fact that not all participants in the interviews had the knowledge of how their company allocates the above mentioned components to the processes performed in their company, the way component cost are allocated can only be described for those companies of which the participants had this insight. All the participants that had insight in the allocation of component cost, indicated that the cost were divided over the FTEs working at each division. After the allocation per division, the costs can be allocated to processes by the amount of FTEs used by each process in this division, this is nonetheless rarely done. However, despite the fact that some of the companies have not sorted their cost per process, they were still able to describe the processes performed by the entire organization to keep the organization functioning normally.

Processes that were repeatedly named when discussing CtS are:

- Subscription
- Sourcing/ Forecasting
- Metering
- Billing
- Bad Debt collection
- Marketing
- Continues improvement of processes

In line with the Straussian way of posing and adapting questions, the general description made by the first interviewed company (Essent Nederland) of the processes performed by the entire organization, is presented at the companies that followed while they were asked to make changes where they thought the scheme differed from their way of running operations. After interviewing all of the eight companies it appeared that the main processes for each company are quite alike. The figure below shows the flow-scheme of this general and abstract way of running operations at an energy supplier.

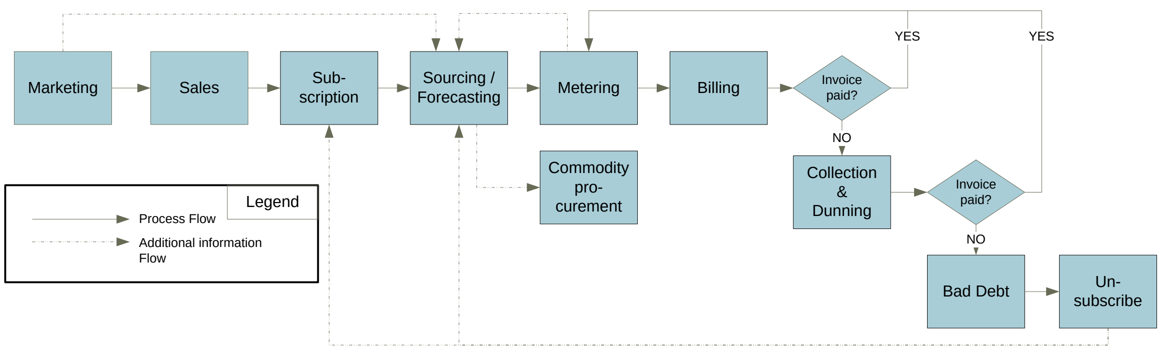



**Figure 6-1 Flow-scheme of general and abstract operations at energy suppliers**

None of the companies had any major remarks on this flow-scheme, except for Lampiris who was the only participant who supplies energy in Brussels. Brussels is a region in Belgium with its own energy-supply legislation. This legislation implies that it is not possible to disconnect customers, they can however place a budget meter (a pay per use meter) (Eandis, 2013) after 6 months of default payment. Due to the fact that the remark by Lampiris is specific for a small region compared to the total area of the scope of this research it is decided not to process this remark in the flow-scheme.

The fact that Lampiris was the only company with a major remark on the flow-scheme insinuates that consensus on the definition of CtS should be quite easily established. However, when discussing the sub-processes behind the flow-scheme it becomes clear that consensus will not be easily reached. Because different sub-processes are used to divide the main processes and the allocation of sub-processes to CtS is even more diverse. A flow-scheme of the sub-processes based on the insights of all the participants and Ferranti can be found in appendix 3.

Regardless the fact that no data is made available in this research, the wide range of CtS definitions would make it senseless to compare the total CtS of each company. Since the companies were not willing to share their data or disclose at what level they collected their data, it is not possible to allocate cost to each separate sub-process. Yet the only way to construct the desired model to predict the relation between CtS, QOS and CIS is to have insight in the cost per sub-process. One company told that they could not provide the data regarding the sub-processes because they were simply operating for a too short period of time to collect all the relevant data. During the interviews the sentiment arose that many companies were not only, not willing to disclose their data but they also did not have the detailed data at hand. All the participants acknowledged that they monitor and control their organization according the total CtS and not the CtS per sub-process or even main process.

During the fourth interview (Eon Benelux), it was stated that 80% of the work which they allocated to CtS was caused by the company itself. Three out of the four participants following after the interview with Eon said that they did not have the exact data but they thought that for them it also might be true that they caused about 80% of the work themselves. The root-cause of this generation of their own workload is due to the fact that, when nothing out of the ordinary happens almost no customer will contact their energy supplier. However, as for example addressed in paragraph 3.2 when an energy supplier has a dissatisfied customer by for example a strong variation in their actual consumption and their monthly tariff (either they have to pay extra at the end of the year or they have paid too much every month and get a refund) the customers are incentivized to contact their energy supplier and ask for an explanation.

### 6.2.3 QUALITY OF THE PROVIDED SERVICES

The final part of the previous paragraph already suggested that there is a relation between CtS and QOS. The example of a dissatisfied customer due to a strong variation in their actual consumption and their monthly tariff, shows that when the quality of the processes is not adequate (in this example the forecasting or metering process) the CtS increases, because customers are incentivized to contact their energy supplier in order to get things clarified. Therefore, it is important not to only study the influence of a CIS implementation on the CtS but also the QOS should be included in this research. This paragraph addresses the quality of the services [QOS] in order to try to answer the following questions:

1. What definition of quality is used by each company?
2. How is the defined quality measured?
3. What is the impact of each sub-process on the overall quality?
4. What is the current quality score?

Despite the fact that many energy suppliers claim that QOS has a high priority in their company (and the fact that customer satisfaction has shown a steady growth over the last years (VREG, 2012) (Vereniging eigen huis, 2012), none of the participating companies have a multi-dimensional quality definition as advised by Jaiswal in its paper on service quality (Jaiswal, 2008). Currently quality is expressed as customer satisfaction and no other aspects of quality are taken into account, this means that quality is not monitored as a whole. All the companies define quality by a set of by the company identified key performance indicators [KPI] and reason that when they meet all targets of their KPIs their processes are in control and as a result the quality is ensured. Not only the lack of different aspects to measure quality as well as the lack of identifying interrelations between the processes influencing the quality makes the quality measurement inadequate. If the interrelations between the several processes are not taken into account it is not possible to predict what will happen to the total quality if one process is influenced.

The following KPIs are often mentioned by the companies:

- Wait time (time before call is answered)
- First time right (solve customers' problem directly during the first call, when a customer contacts its energy supplier to report a problem, instead of solving the problem later on which would require the customer to call again)
- NPS (Net Promoter Score, this is an index where customers are asked how likely they are to recommend the energy supplier to somebody else)
- Occupancy of staff (the amount of time employees are actually working to service customers instead of performing administrative tasks)
- Employee satisfaction
- Forecast accuracy
- Channel mix (phone, digital channels (email, twitter etc.), mail)

The literature review in paragraph 4.4 pointed out that these KPIs are a good indication of customer satisfaction and although customer satisfaction and quality of service are correlated they are not the same (Moore & Schlegelmilch, 1994) (Dabholkar, Shepherd, & Thorpe, 2000) and it is recommended that customer satisfaction and quality are measured separately (Dabholkar, Shepherd, & Thorpe, 2000). The participants indicated that the organization mostly steered the organization on net promoter score, because it is easy to measure as well as it gives a broad representation of customer satisfaction.

When energy suppliers decide to measure quality as a separate factor from customer satisfaction as advised by Dabholkar and needed for the model to predict the relation between CtS, QOS and CIS it is advised to define quality according the five dimensions of quality by Jaiswal (Jaiswal, 2008).

### 6.2.3 CIS EXPERIENCE

All of the participating companies are using some sort of CIS. It is hard to say what brand of CIS they are using because many participants use different modules of different suppliers for different parts of their service process. Except for Lampiris, who has built its own CIS, all companies have CIS modules of SAP, Oracle and/or Ferranti.

Since all participating companies have implemented a CIS it is interesting to know why they decided to implement a CIS. What were their expectations/targets of the CIS and did the CIS live up to its expectations. As well as how they experienced the implementation phase.

Despite the fact that many of the participants have no experience with the implementation of a CIS, simply because of the fact that they did not work for the company at the time the CIS was implemented, all of the participants were able to elaborate on their CIS experience.

The point that most companies have CIS modules of different suppliers as well as the fact that many of the participants have never experienced a CIS implementation indicates that CISs organically grow in the organizations. This means that it is often not the case that an entire new CIS is implemented, but just a component of a CIS. The reasons named for the implementation of new CIS components were mostly that the old CIS component performing a part of the service process was the bottleneck of the total service process and therefore they look for solutions. The bottlenecks are mostly created by changes in the environment of the service processes (for example new regulations or a changed number of customers), or the bottleneck is just the most outdated component of the CIS.

The implementation of CIS modules (due to the organic growth there was no experience in complete CIS implementations) needs some involvement of the company to steer the CIS supplier. The personnel used to accompany the CIS supplier, are often people higher up in the organization than the personnel that has to work with the CIS in the end. The participants in the interviews indicated that they did not really notice anything of the implementation phase (although Ferranti declared that they require significant amount of customer resources time during the realization of the CIS). All the participants however, said that they experienced the period just after the implementation as a period where a lot of time was spend on getting acquainted with the new CIS module. They also expected that in this period the efficiency of the service processes is commonly lower.

All but one of the participants indicated that they were satisfied with the CIS implementations they are familiar with. Despite the fact that no actual target values were set to measure the effect of a CIS implementation all the CIS implementations proved able to resolve the bottleneck. So that the companies could continue with their daily operations, until a new bottleneck appeared.

## 6.3 CONCLUSIONS BASED ON THE INTERVIEWS

The previous paragraph has addressed the contents and outcomes of the interviews. In this paragraph the conclusions based on the insights gained from the interviews are elaborated. And due to the setback that none but one participant was willing to share their data regarding the CtS and no data concerning the QOS was at hand not only the substantive conclusions based on the interviews are presented in this paragraph, also the implications this setback has on the research approach are presented.

### 6.3.1 NEW INSIGHTS DERIVED FROM THE INTERVIEWS

Recapping on the interviews the three most influential conclusions of the series of interviews are the fact that none but one company was willing to share their data behind their CtS, every company had a different CtS definition which seemed to be based on intuition and the fact that no quality data according any quality definition is monitored. This means that in order to be able to construct the desired model first both CtS and QOS data has to be monitored and made available. Without adequate measurement of this data it is impossible to quantify the impact of sub-processes on the CtS and QOS and therewith it is impossible to construct the desired model.

**Different CtS definitions**

Although the CtS is strictly monitored five of the eight participating companies measure the components (for example FTEs and IT cost) behind CtS and not the cost of each process (for example subscription and billing). This means that even in the case they were willing to present their CtS data, the data had to be allocated according some distribution rules which would blur the actual cost of each process when compared to the direct monitoring of each process. None of the companies used the same definition of CtS, even the subsidiaries of the three large Dutch energy suppliers have different CtS definitions from their parent companies.

**QOS level influences CtS**

The declaration that 80% of the work performed in the service processes is generated by the company itself demonstrates that, in case the data would be at hand, these interesting statements could be verified. This would also show the relation between CtS and QOS. However, due to the lack of data the exact course of the relation between CtS and QOS is unknown. Now it can only be concluded that there is a relation between QOS and CtS without knowing anything of the behavior of this relation. With insight in the processes influencing the CtS and QOS as well as the data behind these processes an attempt can be made to describe the influence of a

CIS on the processes contributing to both the QOS and CtS. Insight in the impact of a CIS on both the CtS and QOS should allow electricity supply companies to predict if a CIS is able to meet their preferred level of QOS as well as CtS level.

**Quality is undefined**

Currently quality is defined as a series of one-dimensional KPIs which are defined by the companies themselves. These one-dimensional KPIs don not take the interrelations between processes into account which is required to adequately monitor the QOS level (Jaiswal, 2008). Often the participants only measure the NPS, which is a good indicator of customer satisfaction. However, customer satisfaction should not directly express the quality level (see figure 4-3). The observation that quality is currently measured as customer satisfaction which is expressed as NPS immediately answers one of the research questions, knowing:

*How is quality currently defined by energy supply companies and how is this quality level measured?*

Currently the energy supply companies do not measure quality by a set of quality criteria. The quality is directly linked to customer satisfaction, which is expressed as NPS. In order to accurately describe the influence of a CIS on quality of service quality should be measured on other dimensions than customer satisfaction. Factors like internal process quality are required to measure the influence of a CIS implementation. However, the reasons for energy supply companies to express quality as NPS is based on the fact that NPS is easy to measure, which leaves more time to improve customer satisfaction instead of measuring it. The ease of measuring NPS combined with the fact that the influence of other actors in the energy supply chain is unknown makes the energy supply companies currently reluctant to measure the actual quality level.

**All companies use NPS**

Since all the participating companies are familiar with the NPS, and the fact that the theory in paragraph 4.4 pointed out that customer satisfaction is correlated to the quality of service, makes the NPS suitable for a comparison between companies to get an indication of the QOS of each of the companies. However, when a company decides it wants to increase its QOS level they should have insight in the quality of each process (Ladhari, 2010).

**CIS grow organically**

Concerning the experience with CIS implementations, the interviews made clear that all the participating companies have implemented CISs in their organization. These CISs are often grown organically in the companies, this can be seen in the fact that CISs are often implemented module per module, even different modules of different brands is common practice. Most of the modules are implemented in order to solve bottlenecks in the service-processes. When a bottleneck is identified most companies ask for tenders of some of the known CIS suppliers to solve this bottleneck, it was expected that they would first analyze the bottleneck and identify the process(es) causing this bottleneck and put this process(es) in perspective of the total service process. One of the great benefits of the organic growth of the CIS in the organization is that the implementation phase stays quite unnoticed in the organization, only when the CIS module is implemented the personnel encounters some reduced efficiency due to the fact that they have to get used to the new system.

Three Dutch incumbents started a subsidiary in Belgium Eneco (since august 2011), Essent and ENI (november 2012). (Nuon already sold its Belgium branch to ENI.) Do to the relative short existence of Eneco and ENI have little or no structured data concerning their CtS.

### 6.3.2 REDEFINED RESEARCH APPROACH

The research approach has to be redefined due to the unforeseen outcome of the interviews, this paragraph addresses the changes in the research approach. The initial research approach prescribed the following steps after the interviews:

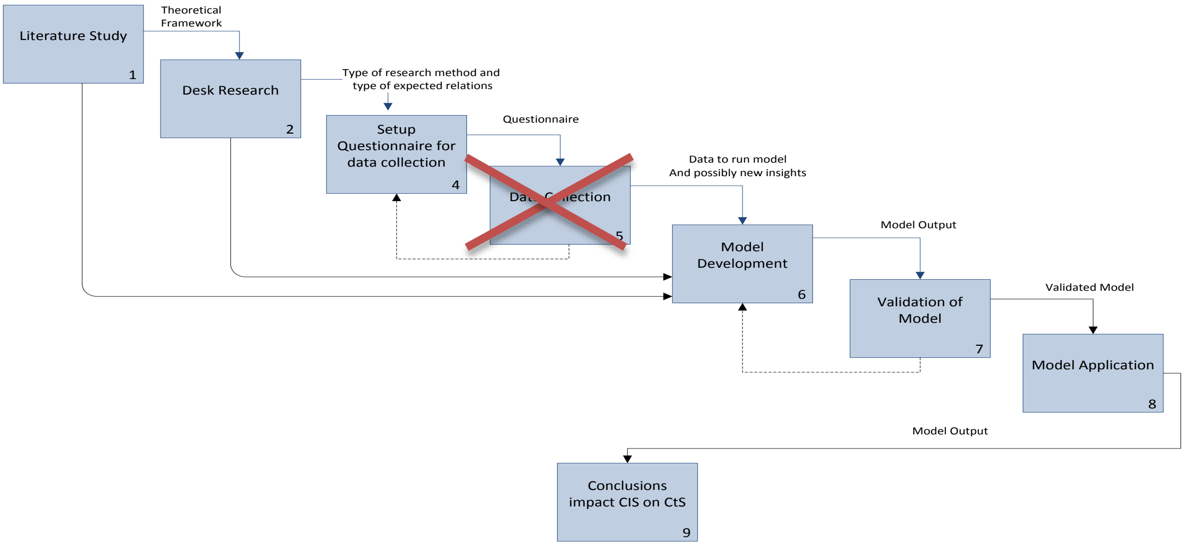



**Figure 6-2 Original flow-scheme of the activities performed to complete the research**

However, since the most companies are not willing to present their financial data behind their CtS processes as well as the lack of quality data of these processes, it is not possible to construct the desired model. And without this model that describes the relation between the CtS and the QOS, it is not possible to measure the impact of a CIS implementation on the CtS and the QOS. While measuring the impact of a CIS on CtS and QOS is the main goal of this research.

Due to the lack of data sub-questions 4, 5 and 6 cannot be answered and therewith it is not possible to answer the main research question. The sub-questions are replaced by one sub-question which leads to the set of sub-questions presented below:

1. What information is required to describe the impact of a CIS on the factors driving the CtS and QOS?
2. How can CtS be defined in a way that is accepted by both the industry and the literature?
3. How is quality currently defined by energy supply companies and how is this quality measured?
4. In what way can processes, contributing to the CtS, be identified as suitable to be executed by a CIS?

This set of sub-questions leads to a new main research question:

*Which steps are required for an energy supplier, to make an in-depth consideration for a CIS implementation?*

In line with the scope of this research it was planned to create a generic model that might be applicable in the entire utility industry (after future research). Without this generic model the research scope has narrowed purely to electricity suppliers. In order to still work as close as possible towards the goal of this research, the research approach is redefined in such a way that the data which first was required to establish the model is not necessary anymore. Instead of creating a model that describes the relation between CtS and QOS, a roadmap will be presented that allows organizations that have the required data at hand to construct the model themselves. The figure below presents the research method how to get to the roadmap.

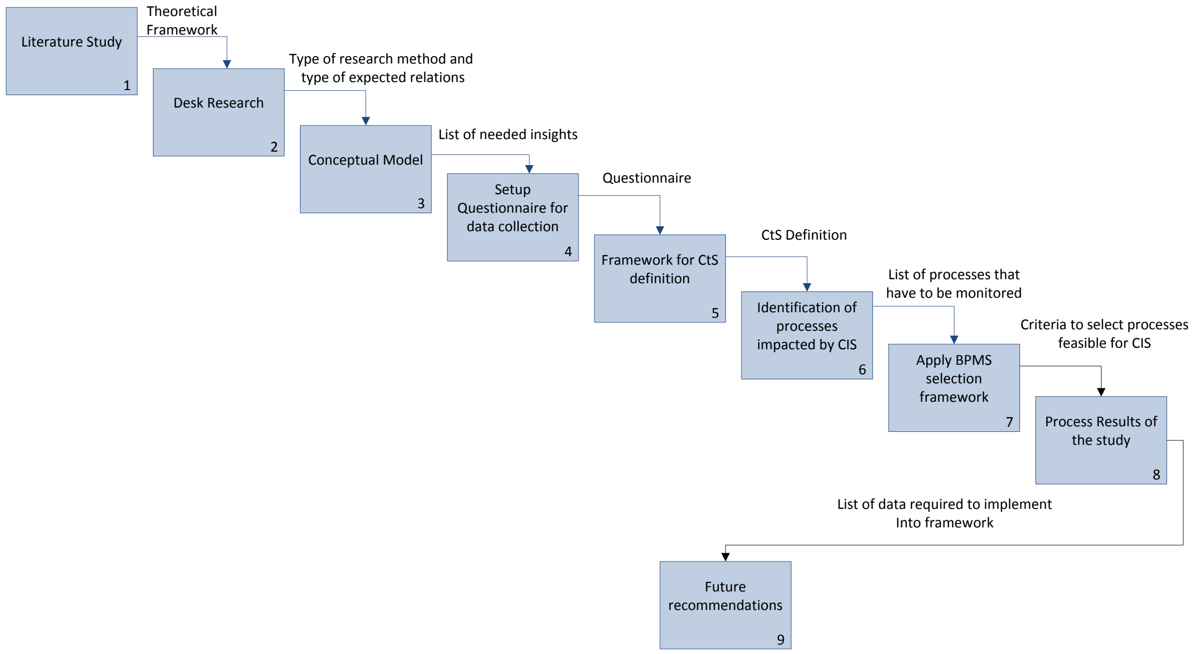



**Figure 6-3 Redefined flow-scheme of the activities performed to complete the research based on insights from the interviews**

First a set of rules has to be defined which are used to select the processes that should be included in the CtS. After the formulation of these rules CtS is defined. Based on the interviews a generic flowchart of all processes behind CtS is designed. Processes suitable to be performed by a CIS and therewith influenced by a CIS are selected according a business process automation selection framework. The selected processes indicate which processes should be monitored for their cost and their influence on the QOS. When the impact of each process on the total CtS is known as well as its impact on the QOS, the next step is determining how much the CtS should be decreased in order to make the investment in a CIS implementation economic feasible. However, since no data is at hand, it is not possible to implement this data into this research. The recommendations for future research describe what data is required to complete the economic feasibility study. In the final chapter the conclusions based on the redefined research as well as a reflection on the research are presented.

# 7 DEFINING THE COST TO SERVE

Chapter 4 addresses the more academic view on cost to serve with regard of the utility sector. Similarly Chapter 6 addresses the CtS from the more practical perspective of the energy utility sector. This chapter combines both views into one definition of CtS that is acceptable for both perspectives. This is not done by applying such a high level of abstraction in the CtS definition, that there is no noticeable dissimilarity remaining between the two perspectives. However this is done by applying a framework, of which it is expected that it is accepted by both the academic and the energy industry perspective.

Prior to working out a definition of the term cost to serve, it is useful to recapitulate what this CtS definition is about. And why each company uses its own definition instead of an industry wide accepted definition. Considering the figure below, which was introduced in paragraph 1.1, the term "definition of CtS" should not be seen as a definition in the form of, a definition where words are used to describe another word. Instead this definition should be seen as a collection of all the processes that are allocated to the CtS.

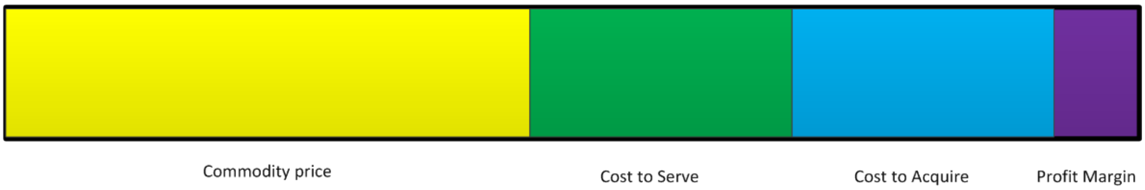



Figure 7-1 Composition of the energy price before transport and tax

## 7.1 CTS PROCESS SELECTION FRAMEWORK

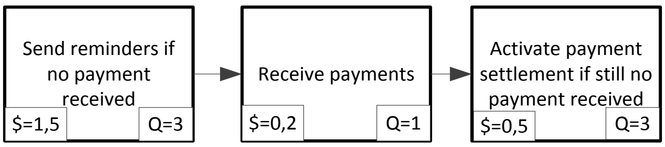
All the companies that participated in the expert interviews indicated that they divide the cost incurred in their company according the segments of the figure above (figure 7-1). However, the allocation of each of the processes to these segments is done according their intuition. This intuition, combined with the fact that in general sense each of these companies operate in the same way (see figure 6-1), while in detail they all operate in their own unique way, leads to different understandings of the correct allocation of processes to CtS and therewith to different definitions of CtS. One of the goals of this research is to create a model that describes the relations, between CtS, QOS and CIS in as much detail as possible, though still accepted by the majority of the energy suppliers. With this purpose of the model in mind the allocation of the processes to the CtS has to be done in a transparent and consistent way. To safeguard this transparency and consistency the framework presented in table 7-1 is used to allocate processes to the CtS.

Table 7-1 Framework for the selection of processes contributing to the CtS

| Rules for inclusion in CtS | Reason to apply rule |
|---|---|
| **1. Process should influence the service experience of customers** | An important step to make the CtS comparable between companies, is dividing the total CtS by the number of connections (due to the difference in bi-fuel and single fuel contracts). Despite the fact the CtS is expressed as €/connection, every connection still belongs to a customer and therefore only processes that influence the service experience of customers should be included. Processes performed for potential customers should not be included in the CtS. |
| **2. Only processes that influence the QOS are included in CtS** | Bearing in mind that service processes are primarily created in order to provide service to the customers, it can be concluded that processes which do not influence the quality of the service, should not be entitled as service processes. |

| Rules for inclusion in CtS | Reason to apply rule |
|---|---|
| **3. All cost should be allocated to either Commodity, CtS, CtA or Margin** | Processes are decomposed to such a level that there is no overlap between the different cost segments. Therefor all cost should be allocated to; commodity price, CtS, CtA or margin. When for example looking back on the earlier mentioned example of marketing. It is expected that marketing does not only influence potential customers, however it also has a retentional effect on existing customers. Nonetheless since the magnitude of this effect is not known, it is decided to solely allocate the marketing cost to the CtA |
| **4. Allocation should be based on sub-processes** | Due to the required level of detail, to be able to perform the above mentioned rules, the processes should be allocated according their sub-processes. |
| **5. Cost components should be allocated to processes based on their activities, when not enough insight available the cost components can be allocated to the number of FTEs required to perform each process** | The interviews pointed out that currently it is common practice to allocate the component cost (for example IT cost) to the number of FTEs. However, to increase the insight in the cost of the processes it is best to allocate the cost directly to the processes when this is possible. If for example specific software for the billing process is procured (and this can be demonstrated) the cost incurred by this purchase should be allocated to billing. In preference to allocating these costs to the entire organization, as general IT expenses, according to the number of FTEs contributing to each process. |

According the initial research approach, the processes relevant to the CtS and QOS were to be identified on the data behind CtS and QOS. Since this data is not available in this research, the framework for the selection of processes that are included in the CtS is presented above. This framework contributes to the consistency of the selection process, however, since the effects of the processes on CtS and QOS are unknown it is not sure that only relevant processes are included in the CtS definition. This extra required effort is made clear in the following example, when looking at the sub-processes behind dunning with imaginary data and without data.




**Sub-processes with imaginary data**

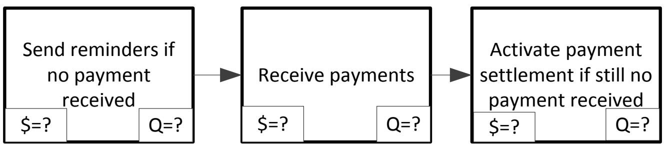



**Figure 7-2 Sub-processes without data**

The data of figure 7-2 used in this example makes clear that all sub-processes have an impact on the QOS as well as the financial contribution of each sub-process to the total CtS. When this data is lacking it is more difficult to identify which processes influence the QOS as well as the influence of those processes on CtS is unclear. This does not mean the framework created on the insights from both literature and the industry is not useful when all the data is at hand, however, when the data behind the sub-processes is available it is possible to skim the processes for their relevance which saves time when compared to the application of the framework to all processes.

## 7.2 THE APPLICATION OF THE FRAMEWORK

The framework described in table 7-1 is applied to the sub-processes, which came to light during the expert interviews. A detailed flow-scheme of the sub-processes based on the insights of all the participants and Ferranti can be found in appendix 3, parts of the flowscheme are presented in this paragraph however the flowscheme in the appendix gives the complete overview of the processes. Each of the sub-processes depicted in this flow scheme is administered by the framework, this leads to the following selection of processes to be allocated to the CtS:

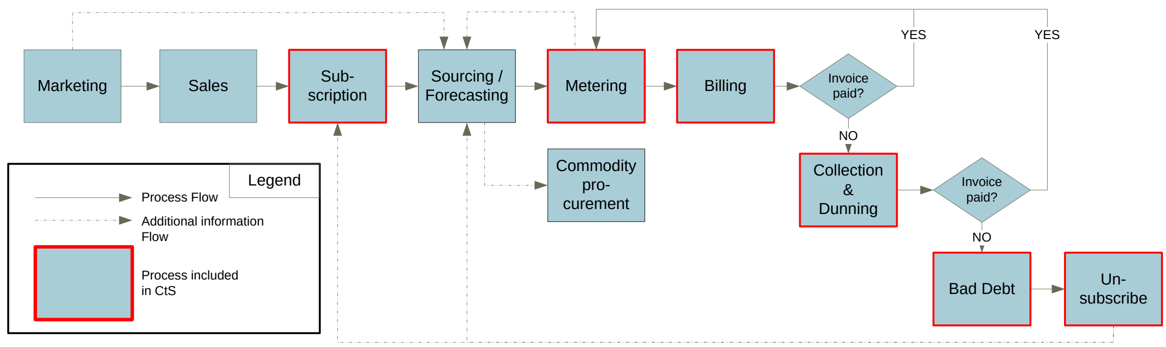



**Figure 7-3 Flow-scheme of general and abstract operations at energy suppliers, with processes allocated to CtS based on rules from table 7-1**

The figure above shows that almost all processes performed by energy supply companies, after the moment that a potential customer becomes a customer, are allocated to the CtS. The remainder of this paragraph elaborates on the allocation of these processes to the CtS as well as the allocation of component cost. As described in the framework the allocation on a sub-process level is at the foundation of the allocation on a process level.

The application of the framework has led to the allocation of; subscription, metering, billing, collection & dunning and bad debt to the CtS. And the exclusion of; marketing, sales, and forecasting as CtS processes. However, since the framework is applied on the sub-processes behind these processes it is possible that not all the sub-processes or other cost factors are allocated to the CtS. Therefore this paragraph addresses the application of each process that is allocated to, or excluded from, CtS individually.

### MARKETING

The marketing process is allocated to the CtA, although the framework only identifies processes contributing to the CtS and makes no claims for the allocation to other cost segments, conventional knowledge indicates that marketing contributes to CtA. The figure below shows the sub-processes that are performed in the marketing process.

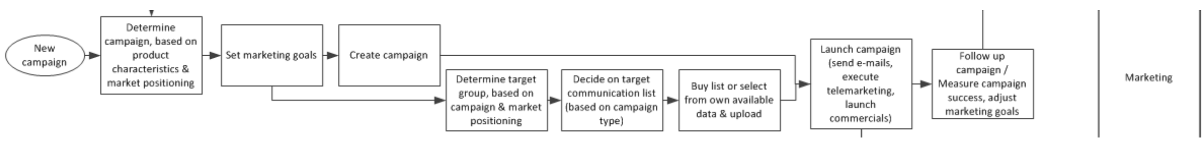



**Figure 7-4 Detailed flow-scheme of sub-processes performed in the marketing process**

The motivation to exclude marketing from the CtS is due to the fact that marketing addresses potential customers, whereas the framework describes that for processes to be allocated to the CtS, processes should address existing customers.

## SALES

Another process that is allocated to the CtA is sales. During the sales process the potential customer is transformed to a customer during the sales process, therefore the sales process is excluded from CtS. Sales is allocated to the CtA due to the fact that it is the final process of the customer acquisition.

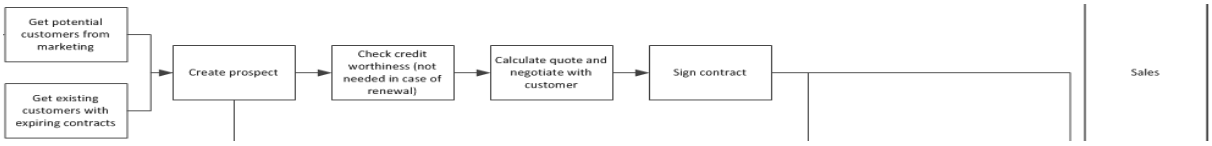



Figure 7-5 Detailed flow-scheme of sub-processes performed in the sales process

## SUBSCRIPTIONS

The subscription and unsubscribe processes are quite similar end therefore they are combined in one process. The sub-processes performed in the subscription process are displayed in the figure below.

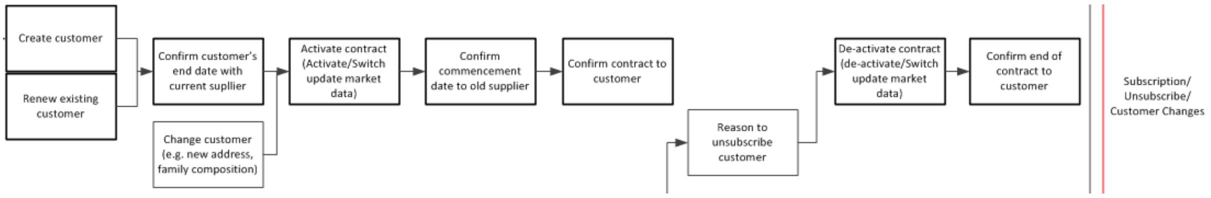



Figure 7-6 Detailed flow-scheme of sub-processes performed in the subscription process

From the time when a potential customer has signed a contract during the sales process he becomes a customer this implies that the subscription process is solely for customers. It is furthermore predictable that, if any of the above mentioned processes is not performed in the correct way, customers will notice this and therewith all these sub-processes are considered to have influence on the QOS. These two observations result in the allocation of all of the above illustrated sub-processes to the CtS.

## FORECASTING

Although forecasting is a process which is solely performed for customers, it is not expected that forecasting has influence on the QOS. As explained in Chapter 2 when forecasting is performed inadequate the energy production is balanced at the spotmarket. It is feasible that the prices are higher at the spotmarket than the longer-term markets (Bastian, Zhu, Banunarayanan, & Mukerji, 1999) and therefore inadequate forecasting leads to higher prices and therefore it is decided to allocate forecasting to the commodity price.

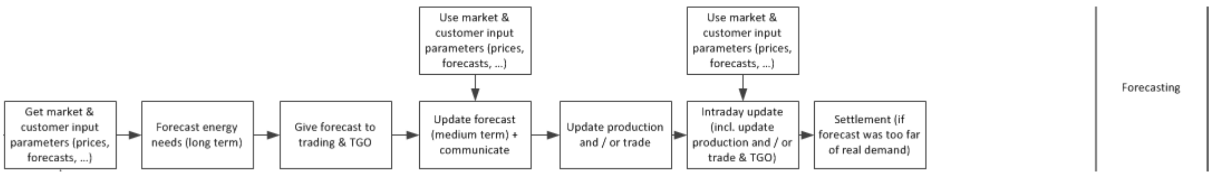



Figure 7-7 Detailed flow-scheme of sub-processes performed in the forecasting process

## METERING

The metering process is allocated to the CtS, the figure below depicts the sequence of the sub-processes required to perform the metering process.

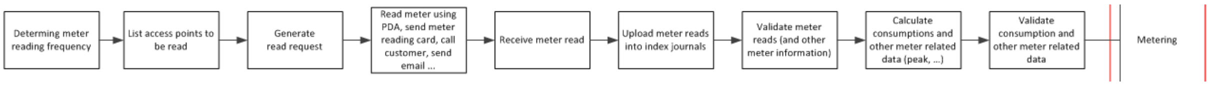



Figure 7-8 Detailed flow-scheme of sub-processes performed in the metering process

For the metering process it correspondingly applies that all sub-processes are only performed for customers. As well as the fact that if one of the sub-processes is not performed in an adequate way, the QOS is affected.

## BILLING

The billing process is completely allocated to the CtS, based on the fact that billing is only performed for customers. And if a sub-process is performed poorly it affects the QOS. It is expected that for example an incorrect amount billed to a customer leads to frustrations and therewith an affected QOS (Kim & Kim, 2009).

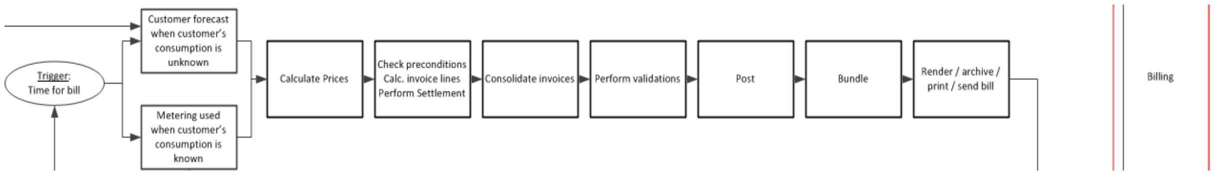



Figure 7-9 Detailed flow-scheme of sub-processes performed in the billing process

## COLLECTION AND DUNNING

Collection and dunning are elaborated as being one process, since dunning is in fact a reiteration of the collection process. The sub-processes behind the collection and dunning process are presented in the figure below.

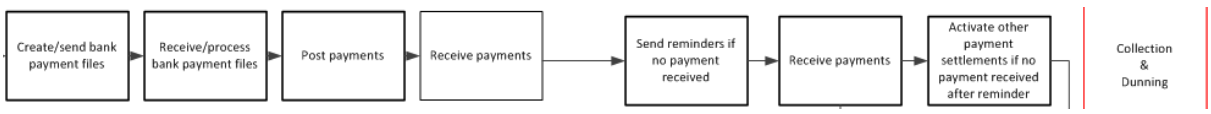



Figure 7-10 Detailed flow-scheme of sub-processes performed in the collection and dunning process

Both dunning and collection are allocated to CtS since both processes are purely for customers as well as the fact that these processes are expected to have a direct effect on the QOS. However some companies indicated they charge extra for paper invoices (to reduce the CtS) used during the collection and or dunning process while other companies indicated they give a discount in case a customer decides to use electronic invoices. The same applies to the dunning process, some companies indicated they charge extra costs for the second reminder. These additional cash-flows generated during the collection and dunning process are not allocated to the CtS, since they are not expected to influence the QOS. However, these additional cash-flows are allocated to the margin due to the fact that it is not expected that they affect any of the other cost segments.

## BAD DEBT

Bad debt is allocated to the CtS due to the fact that the process solely services customers and it is expected that bad debt collection has an influence on the QOS. If for example a customer is processed as a default payer while actually he is up-to-date with his payments it is likely to have influence on the perceived quality level.

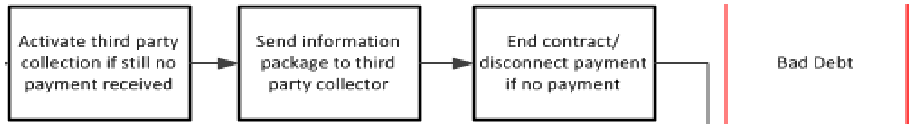



**Figure 7-11 Detailed flow-scheme of sub-processes performed in the bad debt process**

Similarly to collection and dunning there are different ways to allocate the cash flows around bad debt collection. Most companies indicated during the interviews they subtract the income generated by bad debt collection from the total CtS, while they add the loss due to non-paying customers to the total CtS. However since it is expected that these processes have no influence on the quality of service, their cash flows are allocated to the margin.

## COMPONENT COST

The interviews pointed out that not all the companies have the insight in the cost per process. Therefore the participants in the interviews indicated most component costs are distributed over the organization according to the FTEs working at each division. However since it is favored to only allocate costs to the CtS when these costs are actually incurred by the processes behind the CtS, this paragraph provides an advice on how to distribute the component cost over the processes.

The following component costs were frequently mentioned during the interviews.

- FTEs
- Housing
- Continuous process improvement
- IT
- Overhead
- External Call Center

The framework describes it is preferred to allocate the costs according their actual consumption by every single sub-process. When for example looking at the investment in IT, commonly the expenses for IT are divided over the divisions according to the FTEs working at each division. Nonetheless it is likely that not every IT implementation is relevant for every employee, therefore companies are better off when they keep track of which divisions make use of the implementation and only assign the costs of the implementation to those divisions that make use of the IT implementation. Only the expenses on IT systems, used by the processes which are allocated to the CtS, should be added to the CtS, instead of allocating these expenses based on FTEs. The table below (table 7-2) shows per component cost the preferred way to assign the costs to the processes.

Table 7-2 Distribution of component costs

| Component | Grounds to assign costs |
|---|---|
| **1. Fulltime-equivalent (FTEs)** | FTEs should be allocated to the processes which they perform, this could be done according the job-description or by keeping track of the actual activities. |
| **2. Housing** | Housing should be allocated to the FTEs per process, since it is expected that every process requires the same amount/type of space per active employee. |
| **3. Continuous process improvement** | The expenditures made on continuous process improvement should be allocated to the processes which are actually improved. |
| **4. IT** | IT expenses should be allocated to the processes for which the IT systems are designed. In case of general IT systems or when it is hard to identify which processes make use of the IT system, the allocation can be based on the FTEs per process. |
| **5. Overhead** | Since most of the companies which participated in the expert interviews are a subsidiary of large energy “giants”, they make a distinction between overhead and corporate overhead (which is overhead imposed on the organization by the parent company). It is advised to allocate both types of overhead to the FTEs per process, due to the fact that it is quite time consuming to identify which process consumes which part of the overhead especially in case of corporate overhead. |
| **6. External Call Center** | Most companies only use external call centers for marketing and sales purposes, in which case the allocation would be straightforward. However, sometimes the external call center is used as customer support portal, in these circumstance it is advised to allocate the cost of the call center on the basis of the type of processes for which the support is needed (for example subscription or metering etc.). |

The framework presented in table 7-1 combined with table 7-2, allows for a transparent and consistent approach to identify which processes contribute to the cost to serve, without the use of data behind these processes as well as the allocation of component cost. The application of this framework has led to the inclusion of five out of nine of the main processes (performed by energy suppliers) to the CtS. The table below gives an overview of which of the processes are included and excluded from CtS based on the CtS selection framework.

Table 7-3 Results of CtS selection framework

| Processes included in the CtS | Processes excluded from the CtS |
|---|---|
| **1. Subscription** | **1. Marketing (CtA)** |
| **2. Metering** | **2. Sales (CtA)** |
| **3. Billing** | **3. Sourcing/forecasting (Commodity cost)** |
| **4. Collection & dunning (Cash flow attributes to margin)** | |
| **5. Bad debt (Cash flow attributes to margin)** | |

However, there are some costs components which are currently not directly allocated to processes, the framework helps distributing these component costs over the processes. When the framework has allocated the processes to the CtS, the component costs which contribute to processes behind the CtS can be added to the CtS directly. The table below shows which components are allocated based on their contribution to processes as well as the component cost which are allocated based on the FTEs per division.

Table 7-4 Results from the component cost distribution

| Component cost allocated to processes | Component cost allocated to FTEs |
|---|---|
| 1. FTEs | 1. Housing |
| 2. Continuous improvement of processes | 2. Overhead (and corporate overhead) |
| 3. IT expenses | |
| 4. External call center | |

The figure below shows all types of costs, which are taken into account in this study, in relation to the composition of the total electricity price.

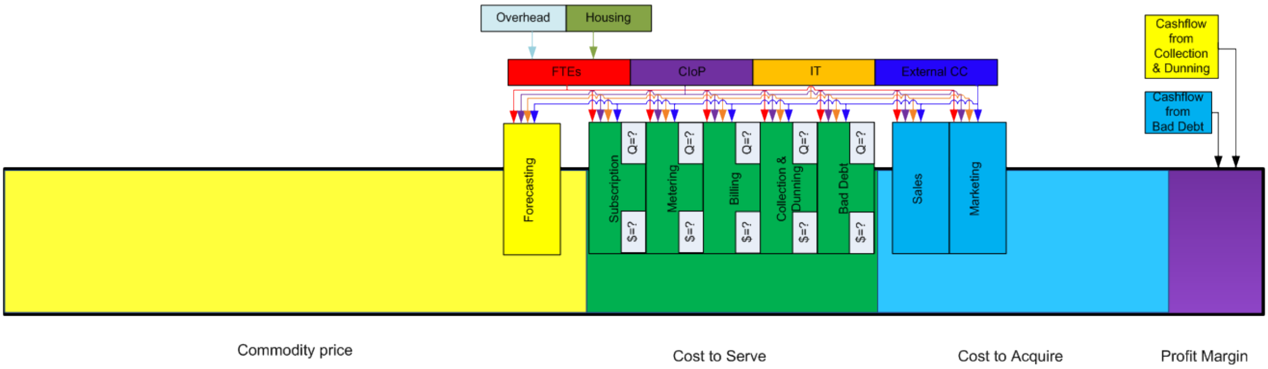



Figure 7-12 Graphical representation of the allocation of processes to the CtS

Based on the insight in the composition of the CtS gained in this chapter, it is promising to evaluate the influence of a customer information system implementation on the CtS. Chapter 8 addresses the potential influence of such a CIS implementation.

# 8 IMPACT OF CUSTOMER INFORMATION SYSTEMS ON COST TO SERVE

The absence of data collected during the expert interviews, as discussed in chapter 6, make it not possible to set up the model to quantify the impact of customer information system on the cost to serve. However, the framework presented in Chapter 7 to allocate processes to the CtS combined with the framework which is presented in this chapter to identify processes which are likely to be influenced by a CIS implementation, a roadmap is created. This roadmap assists organizations, which have access to the required data, in the process of deciding whether or not to invest in a CIS implementation.

To first paragraph of this chapter presents the business process management systems [BPMS] selection framework by Gerhardson and Akerlund (Gerhardsson & Åkerlund, 2012). The second paragraph elaborates on the combined use of the BPMS framework and the CtS selection framework presented in Chapter 7.

## 8.1 BUSINESS PROCESS MANAGEMENT SYSTEM SELECTION

Now that the processes that are contributing to the CtS are known (see table 7-3) it is necessary to identify the part of these processes which are suitable to be performed by a CIS. The business process management systems [BPMS] selection framework by Gerhardson and Akerlund is used to select these processes. This framework is selected due to the fact that no other frameworks, to identify processes which are suitable to be performed by a CIS, are known. As discussed in paragraph 8.2 this framework is not applied to the processes identified in the energy supply industry. The practicality of the framework cannot be tested due to the lack of data, suggestions to test the practicality of the BPMS framework are discussed in paragraph 9.3.

In order to be able to categorize the processes, allocated to CtS, according their suitability for automation with a CIS three main features of these processes should be evaluated; process performance, strategic importance and process feasibility. Gerhardson and Akerlund have developed a number of questions to perform this evaluation. It is the set of questions for each feature and not one question alone that indicates whether a process satisfies these characteristics or not (Gerhardsson & Åkerlund, 2012).

In their study Gerhardson and Akerlund define the three main features as following (Gerhardsson & Åkerlund, 2012):

Table 8-1 Three main characteristics of processes' suitability to be automated

| Characteristic: | Description: |
|---|---|
| **Process performance** | Process performance is defined by how well the process is performing on; effectiveness, efficiency and distinctiveness. |
| **Strategic importance** | Process importance is based on the process' contribution to accomplishing the organizations strategy. As well as the process' contribution to the value of the service. |
| **Process feasibility** | The feasibility of a process is based on a number of criteria; variety of input, type of data, iterations, human interaction, tacit knowledge and decision points. |

The questionnaire designed by Gerhardson and Akerlund, to evaluate these characteristics can be found in appendix 2. When all these questions are answered each of the processes is evaluated according to the three process characteristics. Starting with the assessment of the current process performance, then each process is checked as important or not important. And finally the process is valued for its feasibility to be automated. The completion of the questionnaire leads to the following scheme.

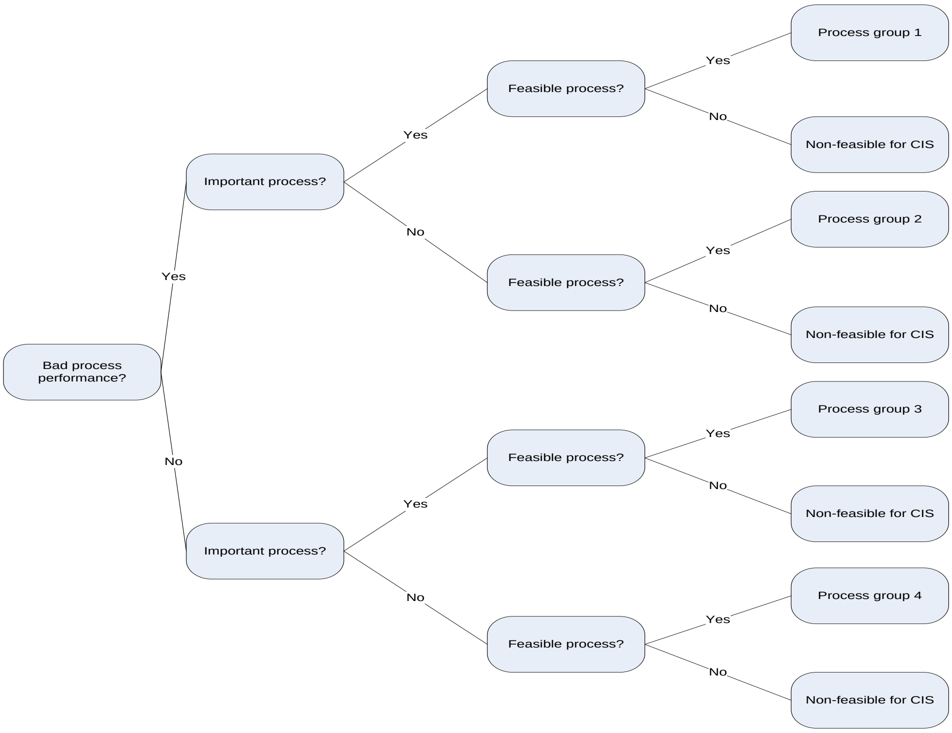



**Figure 8-1 Possible outcomes of the BPMS selection framework (Gerhardsson & Åkerlund, 2012)**

As can be concluded from this scheme the evaluation of the three characteristics leads to the five possible outcomes for each process. The processes can be classified as; non-feasible for CIS, process group 1, process group 2, process group 3 or process group 4. The table below elaborates on the implications of process group 1 till 4 (Gerhardsson & Åkerlund, 2012).

**Table 8-2 Four types of processes according their suitability and priority to be automated**

| Classification | Description |
|---|---|
| **Process group 1** | Processes in this category possess all three main characteristics for a high priority process for automation with a CIS. Processes in this category are currently not functioning well. The high importance of the process increases the incentives to start with processes in this category. |
| **Process group 2** | These processes are not performing well, however, since they lack importance the need for improvement is not urgent. They are a strong candidate for automation as long as they can be automated at relatively low cost. |
| **Process group 3** | In this category processes are performing fine, however since they are important and feasible they are candidates for automation. The fact that they are currently performing fine indicates a low automation priority and therefore time- and cost-saving potential should be assessed first. |
| **Process group 4** | Processes in this category are performing smoothly and are not of great importance for the organization. However, the fact that they are feasible for automation make processes in this category worth considering if automation can be done at low cost. |

## 8.2 APPLICATION OF THE BPMS SELECTION FRAMEWORK

The framework presented in the previous paragraph allows for the screening of each process, which is contributing to the CtS, to assess the feasibility of these processes to be executed by a CIS. However, since no data behind the processes was presented during the expert interviews, it is not possible to answer the questions required to assess the feasibility of CIS implementation to reduce the CtS (see appendix 2). In order to be able to set up the roadmap without the data behind the processes, a series of processes which are expected to be identified as feasible by the BPMS selection framework, are selected by way of exercise. This selection is based on experience from Ferranti and conventional knowledge. As said before this figure is not based on real data, however it is just performed as a way of exercise to show that over 70% of the sub-processes contributing to the CtS are probably eligible to be automated.

Based on insights from the BPMS exercise, which is achieved with knowledge from Ferranti and conventional knowledge the business process management systems [BPMS] selection framework by Gerhardson and Akerlund, it is estimated that 28 sub-processes (out of the 38 sub-processes which are allocated to the CtS) would be selected as possible interesting processes to be (partly) performed by a CIS. These processes are marked with a green delineation in figure appendix 4-1 which can be found in appendix 4. The fact that more than half of the sub-processes are assumed to be sensitive to changes in the CIS makes it reasonable to assume that the total CtS can be influenced by changes in the CIS. It is however also likely that the QOS is influenced by changes in the CIS, therefore the measurement of the QOS is very important.

When for example looking at the decomposition of the collection and dunning process a CIS can be used to automatically check whether invoices are paid and in the case of a lacking payment it can automatically generate and send reminders. If the reminders do not result in the fulfillment of the invoice a CIS can send a settlement proposal if these are not accepted the CIS can send the history of the customer to a third party collector.

At the moment it is known which processes are contributing to CtS as well as the fact which processes are identified as being suitable to be influenced by a CIS. The next step is to set targets for the desired quality and price-level of each of the processes. The targets set per process will give an indication of the potential cost savings as well as the potential QOS changes. These indications serve as a basis for the decision whether or not to invest in a CIS implementation. The roadmap presented in Paragraph 9.1 elaborates on how to decide on a CIS implementation.

# 9 CONCLUSIONS, RECOMMENDATIONS AND FUTURE RESEARCH

Based on the performed literature review, the expert interviews, the CtS selection framework and the BPMS selection framework the redefined research question and sub-questions are answered in this chapter. The first paragraph of this chapter addresses the conclusions drawn upon the research and answers the research questions. The second paragraph addresses the recommendations for Ferranti with relation to the offering of MECOMS™ as a tool to reduce the CtS and the final paragraph presents suggestions for further research.

## 9.1 CONCLUSIONS

Based on the literature review and the results derived from Chapters 6,7 and 8, this paragraph answers the redefined research question, as well as the sub-questions. The sub-questions that lead to the answer of the research question are:

1. What information is required to describe the impact of a CIS on the factors driving the CtS and QOS?
2. How can CtS be defined in a way that is accepted by both the industry and the literature?
3. How is quality currently defined by energy supply companies and how is this quality measured?
4. In what way can processes, contributing to the CtS, be identified as suitable to be performed by a CIS?

The subsequent answering of these sub-questions should facilitate the answering of the research question:

*Which steps are required for an energy supplier, to make an in-depth consideration for a CIS implementation?*

Due to the adjusted research question, the scope of the research has changed from developing a model and drawing conclusions from that model to describing how such a model should be designed. The final part of this paragraph attempts to elaborate on the implications of the model.

### WHAT INFORMATION IS REQUIRED TO DESCRIBE THE IMPACT OF A CIS ON THE FACTORS DRIVING THE CTS AND QOS?

The literature review pointed out that there are knowledge gaps, which has to be filled in order to be able to describe to the impact of a CIS on the factors driving the CtS and QOS. The purpose of the expert interviews was to fill these knowledge gaps. Paragraph 6.1 contains an overview of the information which had to be obtained during the interviews to fill the knowledge gaps. Two experts of the electricity supply industry are approached to help to set-up the questionnaire. However, since electricity supply companies are completely free in the way they address their CtS and QOS a questionnaire with closed questions is not feasible. In order to be able to process the data (required to fill the knowledge gaps) as well as being able to adjust the content of the questionnaire according the responses of the participants in the expert interviews, the Straussian version of grounded theory is used to set-up the questionnaire.

However, the required data is never collected and therewith one of the goals of the interviews is not achieved. The fact that one of the goals of the interviews is not achieved does not mean that the theory used to set up the questionnaire failed. The participants indicated that the data required to construct the model is too sensitive to share, this sensitivity is unrelated to the theory used to set up the questionnaire.

In this research the Straussian version of grounded theory [GT] is used. The Straussian approach allows the researcher to anticipate on the knowledge gained in each interview (in contrast to the Glaserian approach, see paragraph 5.2). In the series of interviews performed in this study, the questionnaire was based on the expectance that the participants were willing and able to hand over the data behind the CtS processes. Unfortunately the required data could not be presented during the interviews. However, since the Straussian approach is used in the setup of the questionnaire, it was possible to change the content of the questionnaire in order to adapt the interviews to the unexpected reluctance of the participants of the expert interviews to share their data behind CtS and QOS. This flexible way of handling the unforeseen outcomes of the interviews, is one of the distinctive characteristics of the Straussian version of grounded theory. The Glaserian approach requires starting each interview without any presumptions and therewith the Glaserian approach would not allow adapting the questionnaire when it became apparent that the participating companies were unwilling to present the required data. The acknowledgment of insights from the previous interviews created an opportunity to change the content of the questionnaires at the moment it became clear that the participating companies were unwilling to share their data. This opportunity allowed the change of the interviews in line with the redefined research question (see paragraph 6.3). The flexibility of the Straussian approach to adapt the content of the questionnaire in order to be able to answer the redefined research question makes the Straussian approach a suitable theory to set up a questionnaire for interviews with experts of the energy supply industry.

## HOW CAN CTS BE DEFINED IN A WAY THAT IS ACCEPTED BY BOTH THE INDUSTRY AND THE LITERATURE?

Although the interviews pointed out that currently none of the participating companies have a structured way to allocate cost to the CtS, all companies allocate all their cost to one of the following segments; commodity cost, cost to acquire, cost to serve or margin. After interviewing all of the eight companies it appeared that the main processes for each company are quite alike. The figure below shows the flow-scheme of this general and abstract way of running operations at an energy supplier.

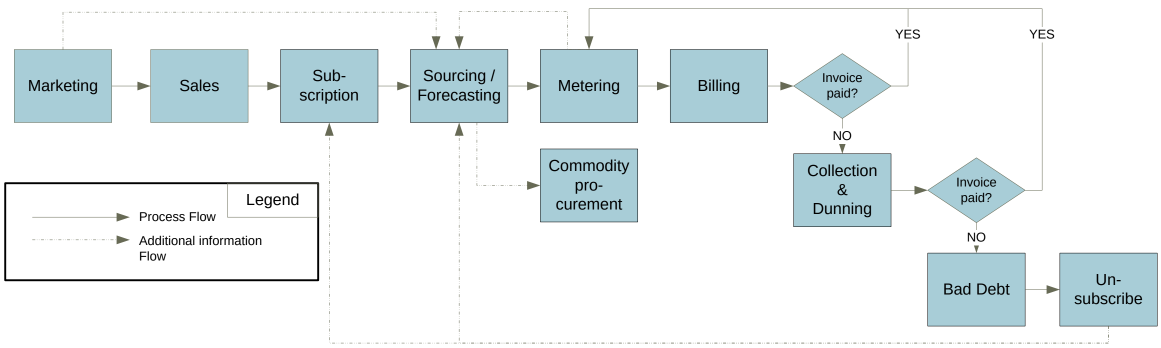



**Figure 9-1 Flow-scheme of general and abstract operations at energy suppliers**

None of the companies had any major remarks on this flow-scheme. In order to decide which of the above depicted processes should be allocated to CtS the CtS selection framework is created in Chapter 7. This framework provides a consistent and transparent way to allocate processes to the CtS. Table 7-3 gives an overview of which processes are allocated to the CtS and which processes are excluded. While Table 7-4 presents an overview of how the component cost should be distributed.

The application of the framework on the sub-processes of the processes shown above, has led to the allocation of cost according the figure below (Figure 9-2).

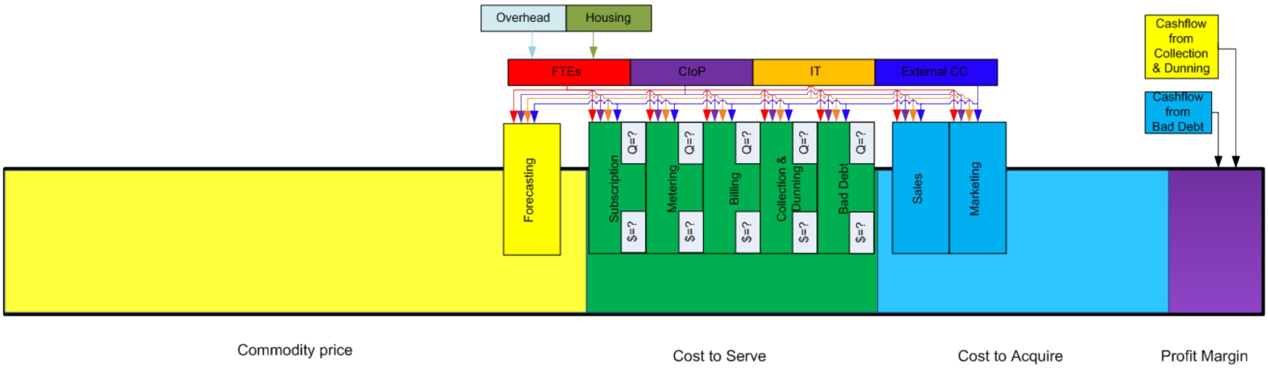



**Figure 9-2 Graphical representation of the allocation of cost to the CtS**

As can be concluded from the figure above (figure 9-2); subscription, metering, billing, collection & dunning and bad debt are the processes that contribute to the CtS. The fact that no definition of CtS is found in current literature combined with the idea that the CtS selection framework led to a transparent and consistent way of selecting processes it is expected that the CtS definition is accepted by in the literature. Returning to the sub-question addressed in this paragraph it can be concluded that it is expected that the CtS selection framework, which is used to identify the processes behind CtS, defined CtS in such a way that it is accepted by both the industry and the academic literature.

## HOW IS QUALITY CURRENTLY DEFINED BY ENERGY SUPPLY COMPANIES AND HOW IS THIS QUALITY LEVEL MEASURED?

The interviews pointed out that none of the participating companies have a definition of quality (see paragraph 6.3.1). Instead quality is translated to a series of key performance indicators [KPIs]. However, the KPIs used by the companies are an indication of customer satisfaction instead of a measurement of the quality level (see figure 4-3). Although quality and customer satisfaction are highly correlated it is advised to measure these definitions separately (Dabholkar, Shepherd, & Thorpe, 2000). Currently quality is undefined and not measured, however, the companies are controlled according customer satisfaction indicators. Despite the fact that quality is currently undefined and not measured, recent customer reviews have shown an increase in the customer satisfaction over the last years (Vereniging eigen huis, 2012) (VREG, 2012).

However, as described earlier in paragraph 4.4 the electricity supply companies are at the end of the electricity value chain. Measuring solely the quality level of the electricity supplier, separately from the other actors in the value chain might prove inadequate. The measurement of the quality level along the entire value chain of electricity is discussed in paragraph 9.3.

## IN WHAT WAY CAN PROCESSES, CONTRIBUTING TO THE CTS, BE IDENTIFIED AS SUITABLE TO BE PERFORMED BY A CIS?

An important note when answering this question has to be made with regard to the way this question is formulated. The question implies that before assessing the suitability of a process to be performed by a CIS the process has to be identified as contributing to the CtS. The reverse order is also possible however, this order does not provide the same total CtS since the application of the BPMS selection framework in Chapter 8 pointed out that not all processes included in the CtS are suitable to be performed by a CIS. Since this research focusses on CtS it is chosen to first apply the CtS selection framework and afterwards the BPMS selection framework.

Although the BPMS selection framework is not applied in cooperation with one of the participating companies, the framework is applied on the sub-processes, which are identified by the experts and insights from Ferranti. The fact that no existent company data could be used to collect the required information for the BPMS selection framework (for an overview of these questions see appendix 2), it is not possible to see how the framework performs in the real world as well as it is not known how difficult it is to answer all the questions. However, the outcomes of the application (based on insights gained during the interviews as well as insights from Ferranti) of the framework are very plausible. This plausibility, combined with the fact that the BPMS selection framework provides a prioritization of which processes should be automated, make the BPMS selection framework a highly valued framework in this research. In the sample case the BPMS selection framework identified 28 of the 40 sub-processes as suitable to be performed by a CIS. This led to the conclusion that the BPMS selection framework is well suited to identify the suitability of sub-processes (which are allocated to CtS), to be performed by a CIS.

## WHICH STEPS ARE REQUIRED FOR AN ENERGY SUPPLIER, TO MAKE AN IN-DEPTH CONSIDERATION FOR A CIS IMPLEMENTATION?

Based on the insights gained from answering the sub-questions it is possible to answer the adapted main research question. This question is answered in the form of a roadmap. This paragraph presents the roadmap towards the implementation of a CIS. The roadmap can be used by organizations which have access to the data behind the CtS and QOS as well as organizations that still need to collect these data. Organizations which already have the required data available are able to skip some of the steps in the roadmap.

1. Identify all processes performed in the organization. The participants in the interviews all acknowledged that they have enough insight in their processes to identify all processes. If this insight is lacking it is advised to use IDF0 to identify all processes.
    - Output → List of processes
2. Classify all sub-processes behind these processes. The participants in the interviews all acknowledged that they have enough insight in their sub-processes to identify all sub-processes. If this insight is lacking it is advised to use IDF0 to identify all sub-processes.
    - Output → List of sub-processes
3. Apply CtS process selection framework. This framework is presented in table 7-1 and applied in paragraph 7.2. However, the CtS selection framework is not applied on an existing organization and therefore the suitability of both the application as well as the outcome is unknown, this should be tested in a pilot case.
    - Output → List of processes included in CtS
4. Apply BPMS selection framework to the sub-processes identified in step 2. This framework is presented in Chapter 8, however, the BPMS selection framework is not applied on an existing organization and therefore the practicability of the framework is not tested yet.
    - Output → List of processes which are included in CtS and suitable to be automated (Gerhardsson & Åkerlund, 2012)
5. Identify cost behind each sub-process which is defined in step 5. In case the cost behind these sub-processes are unknown it is advised to use activity based costing to identify the cost behind each sub-process allocated to the CtS
6. Allocate component cost to processes. The allocation of the component cost should be based on the distribution of component cost presented in table 7-2
    - Output → Total CtS as well as cost per process
7. Define quality scale, preferably inspired by the five dimensions of quality by Jaiswal presented in table 4-1 as well as figure 4-3. As well as a series of questions which provide the data to measure the quality level (avoid open questions in order to be able to easily process the questions). An example of this type of questions is presented in paragraph 4.4.

- Output → Definition of quality and a series of questions to measure this quality level

8. Identify the current quality level based on the definition of quality as defined in step 7 as well as the impact of each sub-process (which is identified at step 4) on the quality level.
    - Output → Total CtS, cost per process and quality score of each process
9. Set target values for CtS and quality level, a reference for the target value for CtS can be found in the CapGemini benchmarking study discussed in paragraph 4.2, however, the definition of CtS might vary between the definition prescribed in the CtS selection framework and the definition used by CapGamini. A suitable source for target values for the desired quality level is unknown, since quality is currently ill defined in the energy utility sector.
    - Output → Target values for each sub-process which influences quality level and CtS
10. Invite CIS supplier to offer a CIS that can meet the set target values
    - Output → Price indication to meet target values with CIS implementation
11. Decide upon depreciation period of CIS and subsequently calculate new cost per process as well as quality level
    - Output → Cost to meet targeted CtS and quality value, per connection
12. Calculate if it is economic feasible to meet targeted values
    - Output → Decision to invest in CIS implementation

### CONCLUSIONS BASED ON RESEARCH QUESTIONS

This research has shown that currently most energy supply companies allocate processes to CtS based on intuition as well as quality is defined as a set of customer satisfaction indicators. Based on these definitions of quality and CtS it is impossible to make a rational decision on investing in a CIS implementation. Therefore the CtS selection framework, the BPMS selection framework and the five dimensions of quality are introduced in the roadmap presented in the previous paragraph. Due to the lack of data the roadmap could not be tested on its practical applicability for energy supply companies. The testing of the roadmap is discussed in paragraph 10.3. Despite the fact that both the CtS selection framework and the BPMS selection framework could not be tested with real data it is expected that due to the transparency and consistency both frameworks will be highly appreciated by the energy supply companies.

The fact that all but one of the participants indicated that they were satisfied with the CIS implementations they are familiar with, indicates that a CIS implementation can reduce the CtS. Despite the fact that no actual target values were set to measure the effect of a CIS implementation all the CIS implementations proved able to resolve the bottleneck.

Based on this research it can be concluded that the Straussian approach is very suitable in explorative research. Due to the Straussian approach it was possible to change the content of the interviews as it turned out that the energy supply companies were not willing to share their data concerning the CtS. If the Glaserian approach was used, it would have been impossible to adapt to the behavior of the participants of the expert interviews.

## 9.2 RECOMMENDATIONS

**Anticipate on increased appreciation for QOS**

Based on the conclusions presented in the previous paragraph it is recommended that Ferranti takes the initiative in changing the way energy supply companies approach their process optimization of CtS and QOS. As the interviews pointed out that the customer information systems just grow organically in the energy supply companies and CIS parts are added or updated when bottlenecks are identified. In the current business model of the electricity suppliers the resolving of the bottlenecks is sufficient, however, when the electricity suppliers are extending their value chain (by for example supplying load stations for electric vehicles) the QOS becomes more important. In the Netherlands for example, these electric vehicles are mainly for home to work use, these customers attach more value to QOS and are less price sensitive (Hoen & Koetse, 2012). This increased appreciation for QOS requires electricity suppliers not to search for a local optimum of QOS. However, in order to be able to outdistance the competition a true optimum of QOS should be acquired.

**Pilot case by Ferranti**

Ferranti can assist electricity suppliers with finding and establishing this optimum, when they approach the energy supply companies with the systematic roadmap presented in the previous paragraph and help these companies improve their service level while reducing their CtS. Currently Ferranti communicates to its customers how their system helps in reducing costs and improving customer satisfaction, however as discussed in paragraph 4.4 customer satisfaction is not the same is quality of service and when Ferranti can demonstrate that MECOMS™ cannot only improve customer satisfaction but also the much broader QOS, Ferranti can use QOS as a sales point, for the changing business models of Ferranti's customers. However, since some of the steps advised in the roadmap are never performed before it is recommended that Ferranti choses a suitable partner to perform a pilot case. In this pilot case Ferranti together with its partner should perform the steps described in the roadmap, after which it is checked if the target values for CtS and QOS are achieved. Taking into account the complexity of quality measurement due to the involvement of multiple actors in the electricity value chain (see paragraph 2.1 and 4.4) it is imaginably that the first pilot case is performed with a company which is considering a new CIS and that operates in a non-liberalized market (however this company should still be attempting to increasing its value chain), after which a second pilot case can be performed in a (more complex) liberalized market. This pilot case will probably be quite time consuming (when compared to the standard modus operandi) as well as it will be a costly operation in terms of man-hours, however, when this concept is proven it might give a great competitive advantage for Ferranti. This potential advantage might be an incentive for Ferranti to offer the CIS (which should be the outcome of the roadmap) at lower cost than usual, which in turn might be an incentive for the energy supply companies to join in the pilot case.

Nonetheless, in order for Ferranti to be able to apply the roadmap in a pilot case some of the steps described in the roadmap need to worked out in more detail first. The steps that require more research are discussed in the next paragraph.

## 9.3 SUGGESTIONS FOR FUTURE RESEARCH

This paragraph makes a distinction in two types of future research. One type is future research to research the applicability of the roadmap presented in paragraph 10.2 and therewith going more in-depth in this research. While the second type of future research aims at broadening the scope of the research.

### IN DEPTH FUTURE RESEARCH SUGGESTIONS

In paragraph 9.2 Ferranti is recommended to use the roadmap presented in paragraph 9.1 to communicate with its customers. However, since the roadmap is not applied with real company data, the outcomes as well as the required amount of effort to apply the roadmap are unknown. Below the activities performed in the roadmap are presented together with an indication of required further research. Those activities that require further research are elaborated separately.

Table 9-1 List of activities required to complete the roadmap including the requirement for additional research

| Activity | Additional research required to perform activity |
|---|---|
| **1. Identify all processes performed in organization.** | No (Participating companies had data at hand) |
| **2. Classify all sub-processes behind these processes.** | No (Participating companies had data at hand) |
| **3. Apply CtS process selection framework.** | Yes |
| **4. Apply BPMS selection framework** | Yes |
| **5. Identify cost behind each sub-process.** | Yes |
| **6. Allocate component cost to processes** | No (See framework in Ch.7) |
| **7. Define quality scale, preferably inspired by the five dimensions of quality by Jaiswal (Jaiswal, 2008)** | Yes |
| **8. Identify quality level and impact of each sub-process, which is identified at step 4** | Yes |
| **9. Set target values for CtS and quality level** | Yes |
| **10. Invite CIS supplier to offer a CIS that can meet the set target values** | No (See list of main known CIS suppliers in Chapter 3) |
| **11. Decide upon depreciation period of CIS and subsequently calculate new cost per process as well as quality level** | Yes |
| **12. Calculate if it is economic feasible to meet targeted values** | No |

As can be concluded from the table above (table 10-1) seven of the twelve activities performed in the roadmap need additional research. Suggestions for this future research are elaborated below.

**Test influence of applied cost accounting technique on CtS**

In this research activity based costing is suggested as a technique to identify the cost behind each process, however, ABC does not describe how the processes (to which the costs should be allocated) themselves should be identified. Also the effects of the use of ABC in comparison to other cost accounting techniques are unknown. If the participants were willing to share their data, while some of them use different types of cost accounting techniques, the effect of these different types of cost accounting techniques on the calculated CtS is unknown. The lack of insight in the impact of the used cost accounting technique on the calculated CtS is weakness in the generic acceptability of the proposed roadmap.

**Pilot case to test feasibility of CtS selection framework**

Although figure 7-3 is based on figure 6-1 which is accepted by the participants in the expert interviews, the CtS selection framework is not validated with any of the companies. To increase the value of the CtS selection framework it is necessary to apply the framework to processes identified by a real electricity supply company and discuss the finding of this application of the CtS selection framework with this company. In order to evaluate the suitability both the application and the outcome of the framework should be tested in cooperation with an electricity supply company.

**Case study to perform feasibility of BPMS selection framework**

The application of the BPMS selection framework is not applied on real company data, therefore it is not known how if energy supply companies are able to answer the questions needed to apply the BPMS selection framework (see appendix 2). Also the duration to apply the BPMS selection framework is unknown, the duration of the application of the roadmap is crucial for the applicability of the roadmap. If it takes too much time to implement the roadmap it will void the benefits of the roadmap. In order to establish the required time to apply the BPMS selection framework as well as ability of companies to answer the required questions it is suggested to first perform a case-study with a well acquainted customer of Ferranti. Based on this case-study Ferranti can decide how the BPMS selection framework fits in the roadmap.

**BPMS suitability to predict impact of CIS**

Another aspect of the BPMS selection framework which is underexposed is the fact that the BPMS selection framework is meant to be suitable for any type of automation techniques. However, a CIS (a CIS for utility companies to be more specific) is a special type of automation technique. The case study should also pay attention to the feasibility of the BPMS selection framework with regard to a CIS, in comparison to the suitability of any other type of automation.

**ABC might be suitable to allocate cost to processes**

The identification of cost behind each sub-process needs further research for the same reason as the BPMS selection framework. Due to the fact that no financial data is presented during the interviews, it was not possible to identify the cost behind each sub-process. It is moreover not known at what level the energy supply companies administer their cost. In case companies keep detailed records of their cost it is expected that they are able to allocate cost directly to each sub-process, if they however still need to collect data at a more detailed level it is suggested to apply activity based costing [ABC] (Lin, 2012). The suitability of ABC to gain insight in the cost of the energy supply companies is not known as well as it is unknown if it is necessary to identify cost with ABC or that companies already have this data at hand. Therefore it is suggested to first search for an energy supply company which does not have the data at hand and subsequently this company can be asked to join in a case-study to test the applicability of ABC to identify cost of an energy supply company's sub-processes.

**Define Quality of Service**

Prior to the expert interviews it was expected that the energy supply companies had a definition of quality as well as the fact that they would measure this quality. However, the interviews pointed out that quality is not defined as such and therewith quality is not measured at the energy supply companies. Developing a definition of quality suitable for the energy supply industry is outside the scope of this research. Nonetheless in order to be able to draw conclusions upon the relations between CtS, QOS and CIS it is necessary to have a definition as well as data of QOS. When it became clear that currently quality is not defined as such within energy supply companies an attempt has been made to incorporate a QOS definition in this research, however without the data from the interview participants it proved impossible to define a quality definition (Fassnacht & Koese, 2006). Literature on quality scales has led to the conclusion that the quality should be measured on different dimensions (Parasuraman, Zeithaml, & Berry, 1988). In order to apply the roadmap a definition as well as data behind QOS is needed, it is advised to do further research to create a definition of QOS based on the five dimensions of quality of Jaiswal (Jaiswal, 2008). As depicted in in figure 4-3 currently QOS is indicated by customer satisfaction which is mostly measured in net promoter score. This research advises to indicate QOS based on; assurance, empathy, tangibles, reliability and responsiveness. However further research is required to define measurable indicators of these five dimensions of quality described by Jaiswal.

**Determine influence of actors in the electricity value chain on quality level**

As already discussed in paragraph 2.1 the electricity supply companies are at the end of the electricity value chain. The performance of the other actors in the value chain can influence the quality level of the electricity suppliers. If for example the metering of the energy consumption is performed by a network operator and this network operator collects the correct data, however, somewhere in the metering process this data gets mixed up. This mixed up data is then sent to the electricity supplier who makes up the bill for its customers. Thereafter the customers might lower their perceived quality level of their energy supplier, while in fact the cause of this reduced quality perception is at the network operators. Future research into the influence of all the actors in the electricity value chain on the perceived quality of the consumers is suggested, in order to determine the contribution of external parties on the quality level as well as the internal contribution of the electricity supply companies themselves.

**Identify quality level**

This future research should be performed in cooperation with energy supply companies to ensure that the data required to measure the QOS can be retrieved from the energy supply companies. This is to make sure that the process required to retrieve the data behind QOS can be performed in an economic feasible way. Otherwise there is the risk that the measurement of the QOS does not outweigh the benefits of more detailed QOS insights.

**Target values CtS and QOS**

Future research is needed to set ambitious though realistic target values for CtS and QOS. Target values for CtS can currently be retrieved from benchmarks such as the CapGemini utility benchmark (CapGemini, 2011), however one has to bear in mind the difference between CtS definitions each company uses. With regard to the QOS it is more difficult to decide upon a realistic level, since none of the companies currently measure quality. Therefore it is advised to research the options to set up a continuous quality improvement scheme.

**Depreciation period for a CIS**

The final part of the in-depth future research suggestions concerns the depreciation period of a CIS. Standard IT products have quite a small depreciation period, however since CISs grow organically in an organization it is not that straightforward to set a depreciation period for a CIS. Without a depreciation period it is impossible to allocate the cost of a CIS to processes and therewith it is impossible to calculate the CtS. This implies that further research is needed with regard to the depreciation period of a CIS.

## SCOPE BROADENING FUTURE RESEARCH SUGGESTION

**Other utility industries**

The research performed, focused on energy supply companies, specifically electricity, however future research should point out if the roadmap presented in paragraph 10.1 also can be useful for other utility industries. It is not sure if this roadmap can be directly applied to for example the water industry due to the different dynamics of the markets. Electricity cannot be stored in large volumes and therefore the electricity production and demand always have to be in balance, as well as the fact that in order to supply electricity at a consumer different organizations have to communicate with each other. In the example of water storage is possible, as well as that the fact that the complete supply chain is controlled by one organization (this sector is not liberalized). Due to these differences future research of other utility industries is required to check the applicability of the roadmap in other utility industries.
However, when the interviews pointed out that the participants in the expert interviews were unwilling to share their data, an attempt has been made to collect data from the telecom industry. When a researcher in the telecom industry was approached, it became clear that also in this industry the sensitivity of the data plays an important role. As well as the fact that some data is not available in the organization itself due to the fact that this data is currently not collected.

**B2B has a large potential for CtS reduction**

B2B energy supply is left out of the scope of this research due to the lack of data. The data of B2B customers is never collected by energy suppliers because the profitability of these customers was so high that nobody bothered to measure the profitability of these customers (Vermeiden, 2012). However, the economic downturn since 2008 might have influenced the profitability of these B2B customers. This reduction in customer profitability makes CtS an interesting point of attention in the B2B segment. Therefore it is suggested to not only focus on B2C but also start collecting the required data to calculate the CtS in the B2B segment. This segment might comprise some "easy gains" since the organizations were never controlled and steered to reduce CtS in the B2B segment.

**New business models**

Another issue which is suggested for future research is caused by the fact that currently most energy supply companies are expanding their value chain. Examples of this expansion are charging stations, photo-voltaic solar panels or house isolation. These expansion activities might influence the way energy supply companies look at CtS and QOS, therefore it is suggested to research the implications of new business models on CtS and QOS and therewith the requirements of a CIS.

# 10 REFLECTION AND DISCUSSION

Looking back on this research, some remarks can be made for the choices in this research. These remarks are presented in the reflection paragraph. The second paragraph discusses this research in the bigger picture of the energy supply industry.

## 10.1 REFLECTION ON THEORY

As discussed in Chapter 4 cost to serve is ill described in literature, especially with regard to the utility sector. In the initial scope of the research the scientific relevance was found in the fact that current theories which are suitable to allocate costs to processes, like activity based costing, were tested on their suitability to on the utility sector. However, since the model could not be constructed due to the lack of data it was not possible to test the suitability of these theories. The lack of data has led to a descriptive research on how to allocate costs to processes and processes to the CtS. This change in the research scope has also changed the scientific impact of the research. Instead of testing the suitability of cost allocating theories on the utility sector, this research presents a first step towards a framework to allocate processes to CtS in a consistent and transparent way. Therefore the scientific relevance of this research can be found in the development of a method to define the CtS, which is currently lacking in the academic literature. However, it should be noted that this framework is not tested with real company data and therefore future research is required to test the applicability of the framework. This future research is discussed in paragraph 9.3.

## 10.2 REFLECTION ON RESEARCH APPROACH

With hindsight some decisions and assumptions made in this research have had more influence on this research than anticipated. This paragraph addresses these assumptions/ decisions and reasons what implications these assumptions/decisions had on the research.

One of the first decisions made in this research was the scope of this research, to be precise Dutch and Belgium B2C electricity and gas suppliers. This scope was chosen based on the assumption that the Dutch and Belgium energy sectors in general are identical, however due to different market dynamics and slightly different regulations it is not justified to compare the total CtS of companies operating in Belgium with the total CtS of companies operating in the Netherlands. The differences which make it hard to compare the total CIS are; fewer incumbents in Belgium than in the Netherlands and different disconnection and bad debt policies. During the interviews no data behind the CtS was presented, however if this data was presented it is not sure if it was possible to use the same generic model for Dutch and Belgium energy suppliers.

None of the steps presented in the roadmap are performed on an existing company. The feasibility of the application of the roadmap as well as the suitability of the outcome of the roadmap are unknown. Despite the fact that a large part of this research is based on information obtained during interviews with experts from the electricity supply companies it is not sure that the roadmap will be well received by the electricity supply companies. In order to increase the chance that the roadmap will be accepted, it is best to first apply the roadmap in a pilot case in cooperation with an electricity supply company. After which a dialogue with the participating electricity supply company should be started in order to discuss both the application as well as the outcomes of the roadmap, after which minor changes to the roadmap can be made in order to increase the level of acceptation of the roadmap by the electricity supply companies.

The use of the Straussian approach in the interviews proved to be a good decision. Prior to the series of interviews a questionnaire in line with the scope and goal of the research was made up in cooperation with experts from Ferranti and somebody from the energy supply industry. When later on the companies participating in the expert interviews proved not willing to present the data behind their CtS the Straussian approach allowed the researchers to adjust the content and scope of the questionnaires in order to still get the most information out of the interviews. If the Glaserian approach was used in the questionnaires this would not be possible and therewith less useful information could be obtained from the interviews. In case of this research it can be concluded that in circumstances comparable to this research (explorative research, interviews with third parties and sensitive data in a competitive market) it is preferred to use the Straussian approach over the Glaserian approach.

Some steps taken in the series of interviews had unforeseen effects on the outcomes of the research. Most of the participants in the expert interviews were selected on their knowledge with regard to the CtS and QOS, however it might have been better to also take their position in the organization into account. The experts had very detailed knowledge of the subjects addressed in the interviews, however they were not able to see CtS and QOS in the broader context of the organization. This might also be the reason that these persons did know the definition of CtS used by their organization and why on the other hand they did not know how this definition was created. Besides selecting participants on the incorrect position in the organization it also proved unadvised to include the recently started Belgium challengers in the series of interviews with regard to CtS and QOS. Although the most organizations were not willing to share data due to the sensitivity of the data, the recently started challengers could not provide this data because this data was unavailable due to their short period of existence. Even if they had the data available, there would be a high risk that the data of these recently started challengers would blur the complete data set due to the large fluctuations in their customer base caused by auctions of large amounts of customers (see paragraph 6.2 General data).

In the benchmarking study performed by CapGemini, the data presented by the participating energy supply companies is made anonymous due to the sensitivity of the data. In this research the companies were offered the same approach of handling the data, however, they still were reluctant to provide the data. Perhaps this has something to do with the type of organization that is performing the research. Although this research is performed in the name of Technical University Delft it is also affiliated to Ferranti, this might have influenced the attitude of the participating companies towards the sharing of their data. Perhaps the attitude of the participants changes when they are approached solely by a research institute like Technical University Delft.

The fact that quality currently is defined as a series of customer satisfaction indicators (mostly only net promoter score is used, as depicted in figure 4-3), instead of a multidimensional definition of quality, led to the conclusion that quality should be redefined and measured as depicted in figure 4-3. However, it is not known how much time has to be spent on quality measurement, if quality measurement proves to be very time consuming the benefits might not outweigh the costs incurred by the measurement itself and therewith quality measurement might be unfeasible.

Another complication concerning quality is the fact that electricity supply companies are at the end of the electricity value chain. The performance of the other actors in the value chain influences the quality level of the electricity supply companies. The fact that the quality is dependent of all the actors in the electricity value chain has two main consequences:

- Quality consists of two parts; an internal component and an external component
- It is unknown if customers have a notion of which actors contribute to the quality

The fact that the quality is dependent on other companies involved in the electricity supply make it more difficult to measure the quality level. As well as improving the quality in case the measurement points out that the quality level is inadequate. This notion of multi-actor complexity has to be taken into account when considering the conclusion that currently quality is not defined and not measured. When electricity supply companies attempt to define quality it is advised that they clearly define which part of the quality level is caused by the performance of other companies in the value chain and which part is based on their own performance. Due to the unknown ratio between internal and external contribution to the by the customer perceived quality, it is not also more comprehensible that electricity supply companies currently focus on customer satisfaction instead of quality. However, when electricity suppliers wish to extend their value chain quality will become more important.

In paragraph 10.3 the BPMS selection framework is already mentioned for further research. However, one of the crucial things lacking from the BPMS selection framework from Akerlund and Gerhardsson (Gerhardsson & Åkerlund, 2012) is the fact that there is no guideline on how to weigh to total set of questions posed to identify process performance, process importance and feasibility to automate process. This lack of predefined weigh factors is a weakness in the consistency of the BPMS selection framework which should be mitigated prior to the application of the BPMS selection framework.

## 10.3 DISCUSSION

This paragraph addresses the CtS in the broader context of energy supply companies. This research identified the height of the CtS as undesirable and focused solely on the CtS (as part of the total cost) and QOS (this is graphically depicted in figure 1-2), however, there are many other issues concerning the energy supply companies. Examples of these issues are; the introduction of smart meters, the increase of sustainable energy which leads to complications in forecasting or the lengthening of the energy supply value chain by placing for example charging stations for electric vehicles. These issues are expected to influence the role of a CIS, this is due to the fact that a in case of a lengthened value chain or introduction of smart meters a CIS might prove important to enable the deployment of these techniques. This also changes the assessment of the CIS implementation, because then CIS not only plays a role between CtS and QOS but also sustainability should be taken into consideration. This changes the value proposition of a CIS implementation in such a way that CtS is probably not only seen as a negative thing, which always should be reduced to a minimum. Instead, service could perhaps become the key driver for customers to change from energy supplier (currently price is the key driver (Overgaauw & Harkink, 2010)). In case service becomes the key driver, the reasons for energy supply companies to contact CIS suppliers might also change. Instead of searching for ways to reduce the CtS energy supply might approach CIS suppliers to design extra modules to increase to service provision by for example making energy trading modules for car batteries. Such new technical possibilities would change the relation between energy suppliers and CIS suppliers, since the CIS suppliers do not sell products that pay back by decreasing the expanses instead their products will pay back by generating more income.

However, there are still some technological and institutional uncertainties which influence the success of the large scale implementation of the above mentioned technologies. Before these technologies are implemented on a large scale the role of a CIS is expected to stay unchanged from its current role. In this current role CtS is reduced with CIS implementations which are implemented to resolve identified bottlenecks in the service process. Nonetheless the expert interviews indicated an attitude, towards CtS and CIS, corresponding to "currently everything is working fine let us not put too much effort in the CIS implementation". If this truly is the attitude from energy supply companies towards CtS and CIS implementations the CtS selection framework presented in Chapter 7 combined with the BPMS selection framework might seem to be too time consuming by the energy supply companies. During the expert interviews it became clear that the most experts are true experts in their field, they are constantly focusing on the CtS and they are judged by their superiors on the CtS. The downside of such a focus on CtS is that other than CtS reduction are barely taken into account. If Ferranti would approach these experts with a suggestion to change the CIS in order to increase the service options it is likely that these experts are less interested because they only search for ways to reduce the CtS.

Above two scenarios (one scenario foresees an increased role of service processes while the other scenario foresees that service is only experienced as a burden), which influence the role of a CIS in the energy supply organizations, are described. However it is unknown which scenario will become reality and when. Therefore the suitability and the necessity of the frameworks created and used in this research remain uncertain.

# 11 LITERATURE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# 12 APPENDICES

## APPENDIX 1. THE ORIGINAL QUESTIONNAIRE

This appendix gives an overview of the initial questionnaire which is used during the first three interviews. After the first three interviews the questionnaire was adjusted (instead of focusing on the figures behind CtS the focus moved to the processes influencing the CtS). This questionnaire is based on extensive desk research and insights from experts from Ferranti. The questionnaire consists of four parts: company characteristics, Cost to Serve, Quality of the provided service and Experience with CIS implementations.

### BEDRIJFSCRITERIA/SPECIFICATIES COMPANY X

1. Aantal klanten?
2. Aantal aansluitingen?
3. Welke producten (gas/elec)?
4. Welke segmenten (B2B, B2C)
5. Strategie?
6. Positie in de markt?
7. Actief marketen?
8. Is het aantal klanten stabiel?
    a. Hoeveel inschrijvingen/uitschrijvingen in 2011
    b. Is er een trend te zien?
9. Hoeveel FTEs heeft jullie organisatie?
10. Hoeveel FTE's hebben jullie op de service afdeling?
11. Hoeveel FTE's huren worden er ingehuurd?
12. Hoe hebben jullie het service centre georganiseerd? Eerste en tweede lijn, of een lijn?

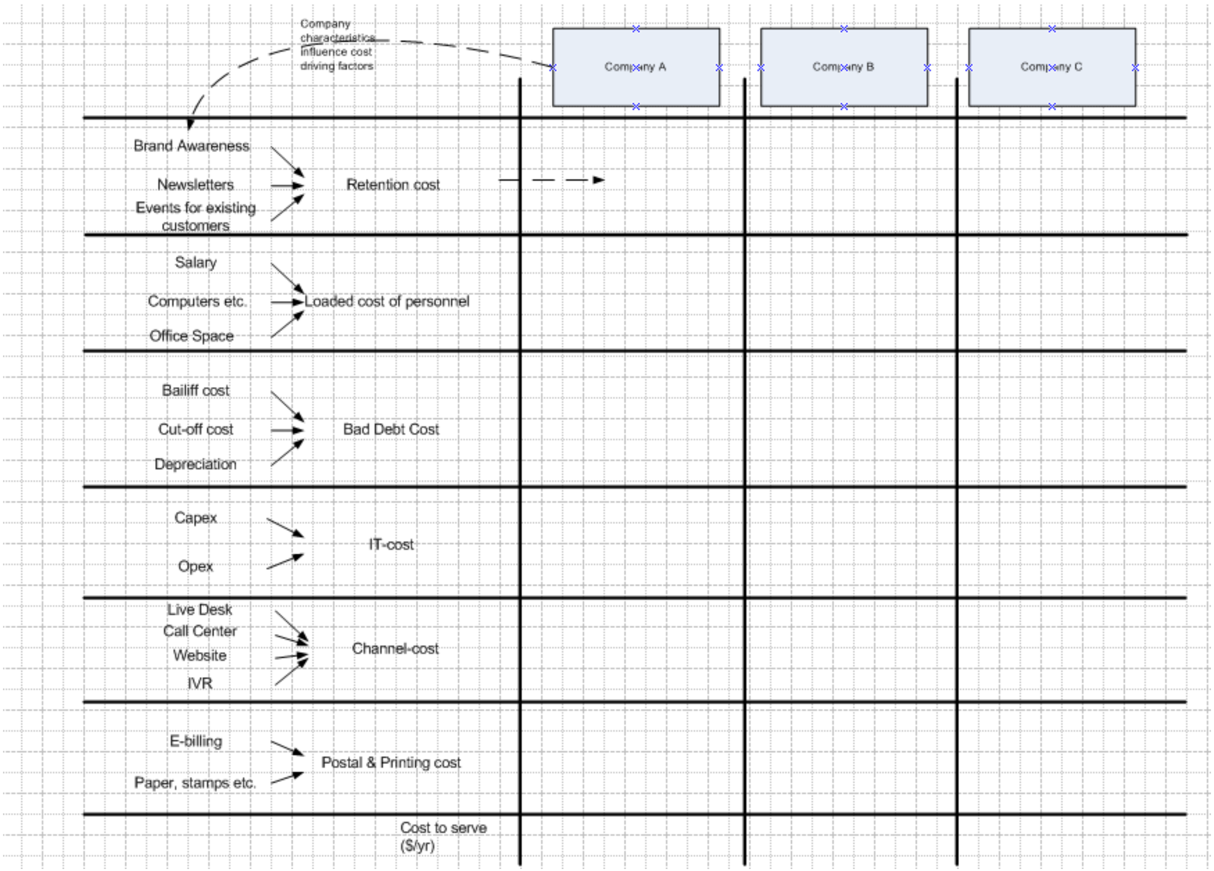
| (bedragen in € miljoen) | 2011 | 2010 |
|---|---|---|
| **Resultaten** | | |
| Totale opbrengsten | [redacted] | [redacted] |
| Opbrengst energie en energie gerelateerd | [redacted] | [redacted] |
| Brutomarge energie en energie gerelateerd | [redacted] | [redacted] |
| Bedrijfsresultaat voor afschrijvingen (EBITDA) | [redacted] | [redacted] |
| Bedrijfsresultaat (EBIT) | [redacted] | [redacted] |
| Nettoresultaat | [redacted] | [redacted] |
| Kasstroom uit operationele activiteiten | [redacted] | [redacted] |
| **Vermogen** | | |
| Investeringen in materiële vaste activa | [redacted] | [redacted] |
| Eigen vermogen | [redacted] | [redacted] |
| Rentedragende schulden | [redacted] | [redacted] |
| Balanstotaal* | [redacted] | [redacted] |
| **Ratio's** | | |
| Eigen vermogen/totaal vermogen* | [redacted] | [redacted] |
| Rendement op werkzaam vermogen | [redacted] | [redacted] |
| Interest coverage rate | [redacted] | [redacted] |
| **Medewerkers** | | |
| Aantal FTE's gemiddeld | [redacted] | [redacted] |
| Ziekteverzuim | [redacted] | [redacted] |
| LTIR | [redacted] | [redacted] |
| **Verkoopvolumes** | | |
| Elektriciteit (GWh) | [redacted] | [redacted] |
| Gas (miljoen m³) | [redacted] | [redacted] |
| Warmte (TJ) | [redacted] | [redacted] |

* Gegevens 2010 voor vergelijkingsdoeleinden aangepast.

## COST TO SERVE

1. Welke definitie van CtS hanteert Company x?
2. Flexibiliteit van de service en is dit standaard of kunnen klanten kiezen? Tussen bijvoorbeeld E-billing en papieren factuur.
3. Welke processen vallen er bij jullie onder CtS en waarom?
4. Uit welke activiteiten bestaan deze processen?
5. Wat zijn de bedragen voor de verschillende componenten van de service?
6. Zijn jullie bezig met verminderen CtS?
7. Hebben jullie zicht op het verloop van CtS over de afgelopen jaren?
8. Hebben jullie inzicht op factoren die van invloed waren op het verloop?
9. Hoe CtS ervaren naar liberalisering?

| Service matrix | Call Center | Verkoop punt | Brief | Web-chat, E-mail | SMS, Apps | Website | Telefoon met bandje |
|---|---|---|---|---|---|---|---|
| Algemene info | | | | | | | |
| Vragen betreft rekening | | | | | | | |
| Doorgeven wijzigingen gegevens | | | | | | | |
| Contract aanpassen | | | | | | | |
| Meterstandendoorgeven | | | | | | | |
| Vragen betreft betalen | | | | | | | |
| Betaling uitvoeren | | | | | | | |
| Aansluiting aanvragen | | | | | | | |
| Opzeggen contract | | | | | | | |
| Extra service aanvragen (bijv CV onderhoud) | | | | | | | |
| Overige | | | | | | | |



## QUALITY OF THE PROVIDED SERVICE

1. Monitoren jullie de kwaliteit van de processen?
2. Welke definitie van kwaliteit hanteren jullie?
3. Indien jullie geen definitie van kwaliteit hanteren wat monitoren jullie dan wel? Klant tevredenheid?
4. Op welke punten wordt de klanttevredenheid gemeten?
5. Wordt de organisatie ook gestuurd op deze scores?
6. Is er een stijgende lijn te zien in de kwaliteitsscores/klanttevredenheid?
7. Vermoeden jullie een verband tussen kwaliteit en CtS?

## ERVARINGEN MET CIS IMPLEMENTATIE

1. Hebben jullie CIS geïmplementeerd?

Ja.

1. Wanneer?
2. Wat was de aanleiding hiervoor?
3. Hoe was de uitwerking hiervan?
4. Wat was de prognose voor de implementatie?
5. Zijn de targets gehaald?

Nee.

1. Waarom niet?
2. Hebben jullie plannen in de toekomst om CIS te implementeren?
3. Hebben jullie al zicht op de targets van eventuele nieuw te implementeren CIS?

## APPENDIX 2. THE QUESTIONS REQUIRED FOR THE BPMS SELECTION FRAMEWORK

The questions presented in the table below are used to classify the process performance level. According to the BPMS selection framework of Akerlund and Gerhardson insights in the current process performance are needed to assess the potential of a CIS implementation on an organization (Gerhardsson & Åkerlund, 2012). A shortcoming of this framework is that it does not prescribe which answers lead to which categorization. It only prescribes which questions are relevant when considering processes for automation.

Table Appendix 2-1 addresses the questions which are relevant when assessing the potential of a process for automation.

**Table Appendix 2-1**

| Criterion: | Question to be asked: |
|---|---|
| **Effectiveness** | Is there a decrease in market share? |
| | Loss of market share can be a result of a non-effective process. Reasons for this might be that the company is not doing the things to keep up with competitors and satisfy customers' demands. |
| | Is there an evident backlog? |
| | An accumulation of jobs that are not processed is an indication of ineffectiveness. |
| | Are there customer complaints? |
| | Complaints are a clear indication of ineffective processes, it is important to use their complaints as indicators of where the process is failing |
| **Efficiency** | How much resources are needed per unit of output? |
| | The amount of customers per employee (compared to other organizations in this sector) is a good indication of efficiency. |
| | What is the true-value-added cost percentage of total process cost? |
| | This is difficult to measure in a service sector, however, it can be checked by measuring the ratio between processes which contribute directly to the core activities and processes which support these core processes. |
| **Distinctiveness** | Is there a clear owner or customer of the process? |
| | A well performing process should have a clear owner otherwise there is a lack of guidance of whom to address when deficiencies are noted in the process. |

Besides process performance, the BPMS selection framework prescribes to address the strategic importance of the process as well as the feasibility of the processes to be automated. The table below presents the questions posed to gain insights in the strategic importance of the processes.

**Table Appendix 2-2**

| Criterion: | Question to be asked: |
|---|---|
| **Strategic** | Is the process in line with the overall strategy? |
| | For processes that are considered to be main processes this is an indication that they are important in the organization. Processes that have a supporting function have a lower priority to be automated, it is preferred to focus on the processes which are supported by these processes. |
| **Value-adding** | Is the process directly or indirectly value-adding? |
| | Either types of these processes should be considered important. By value-adding is meant a set of quality control activities, which transform an input into an output that is valuable to internal or external customers. |

The final series of questions, needed to collect the required information for the BPMS selection framework, concern the processes' feasibility to be successfully performed by a CIS.

**Table Appendix 2-3**

| Criterion: | Question to be asked: |
|---|---|
| **Varity of input** | To what extent does the input of the process vary? |
| | A process with low variety of input is generally easier to define and therefore easier to automate. |
| **Type of data** | What type of data is involved in the process? |
| | Data that can be encoded makes a process easier to automate. This means that data that is already encoded makes a process easier to automate. Data that is vague makes a process harder to automate. |
| **Iterations** | Is the process often repeated? |
| | In order for a process to be suitable for the extensive work effort automation takes, a higher priority should be given to processes that are often executed. Many repetitions indicate a defined process and possible cost or work effort reductions. |
| **Regulations** | Are there regulations surrounding the process? |
| | A process can be regulated by law, organizational rules and cultural behavior. A process with many rules can be automated as long as it is possible to define and do not include too many exceptions. |
| **Human interaction** | To what extent does the process include or demand human interaction? |
| | Processes with high human interaction indicate possible cost reductions and lead time reductions through automation. Some processes demand high human interaction due to high complexity, many exceptions and vague definitions. |
| **Tacit knowledge** | Is there tacit knowledge involved in the process? |
| | Tacit knowledge is knowledge that is hard to transfer from one person to another. Processes with a high amount of tacit knowledge are primarily not suited for BPM since the process is hard to encode and automate. |
| **Decision points** | Does the process include decision points? |
| | A decision point is often an early target when looking at parts of a process to automate since a decision point is often followed by a waiting time, which can lead to costs. A process with many or important decision points indicates complexity and can be hard to automate. |
| **Measurable results** | Is it possible to measure the output and improvements of the process? |
| | In order for a BPM---project to be successful, some kind of measurement of process output and improvement is useful. Examples of indicators of process improvement that can be measured are decreased lead---time, cut costs or increased process reliability |

# APPENDIX 3. OVERVIEW OF THE CONSECUTIVE SUB-PROCESSES

The figure below gives a graphical representation of the sub-processes performed by the energy supply companies. The sub-processes presented in the boxes with red delineation are part of the processes which are allocated to the CtS. The sub-processes are either activated by input of another sub-process or by an information request by the front office. As can be concluded from this figure there are 61 sub-processes 38 of these sub-processes are part of processes which are allocated to the CTS.

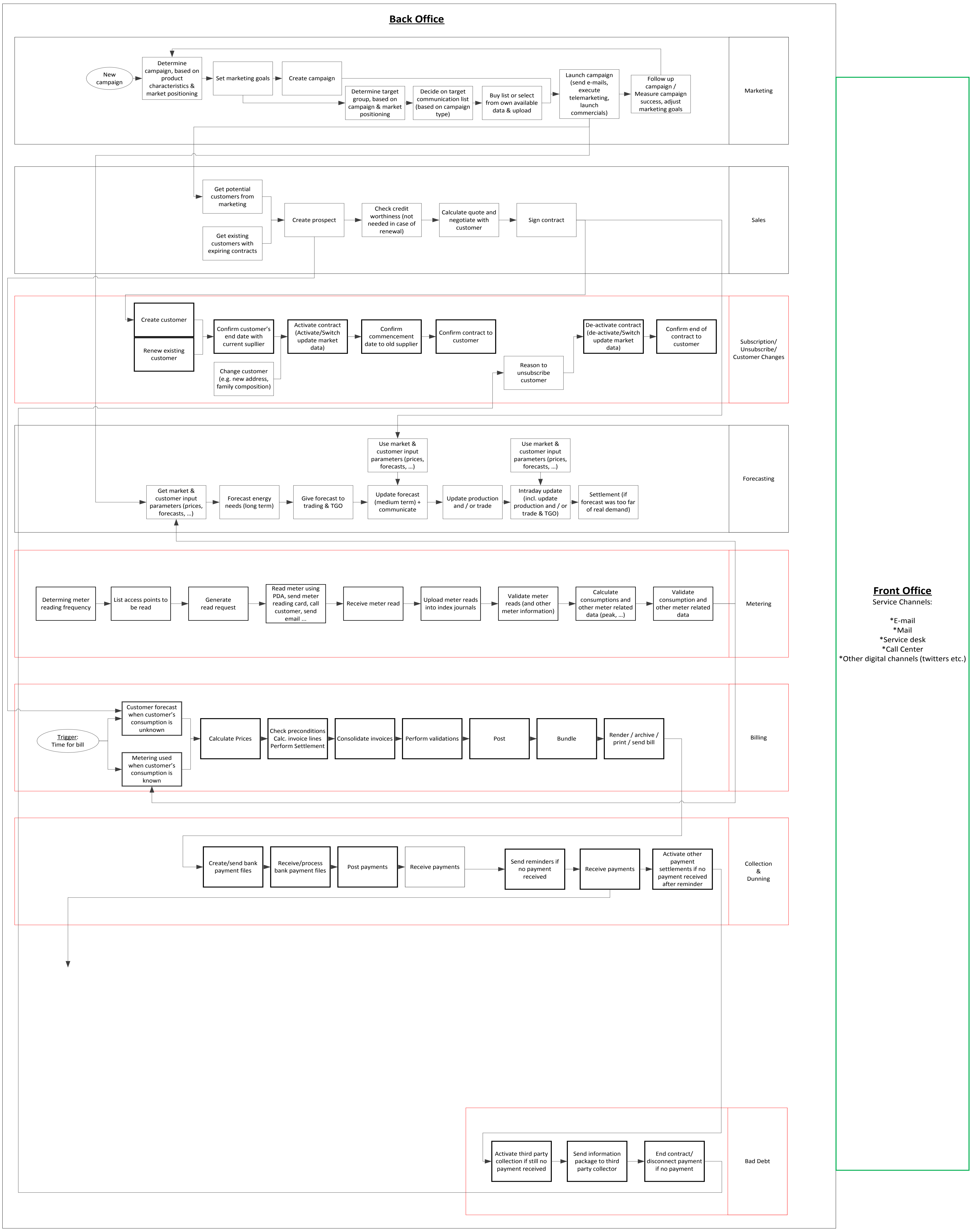



**Figure appendix 3-1 Overview of the consecutive sub-processes**

The figure below is the same graphical representation as the figure in appendix three, however, the BPMS selection framework is applied to all the sub-processes. Since no data behind the processes was presented during the expert interviews, it is not possible to answer the questions required to assess the feasibility of CIS implementation to reduce the CtS (see appendix 2). In order to be able to set up the roadmap without the data behind the processes, a series of processes which are expected to be identified as feasible by the BPMS selection framework, are selected by way of exercise. This selection is based on experience from Ferranti and conventional knowledge. As said before this figure is not based on real data, however it is just performed as a way of exercise to show that over 70% of the sub-processes contributing to the CtS are probably eligible to be automated.

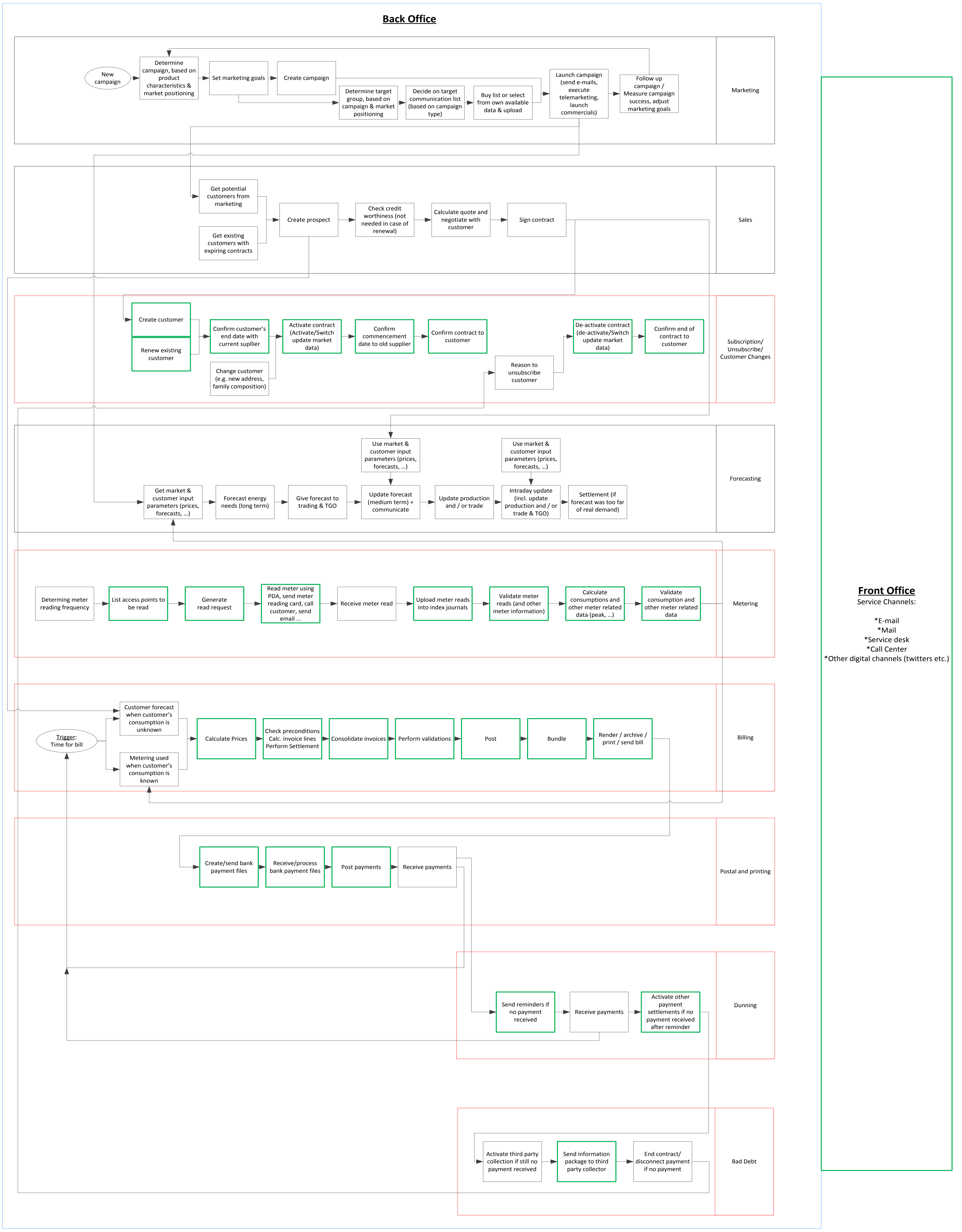



**Figure appendix 4-1 Results of BPMS selection framework**