THE CONCEPT AND IMPLEMENTATION OF THE MARKET PLACE E-UTILITIES•COM

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Abstract: In order to remain competitive in a deregulated environment, a group of European Utilities developed a prototype of a single Marketplace called *e-utilities•com* whose mandate is a clear customer centric orientation in the European environment for a successful mid-term multi-utility business via the Web. This paper highlights the concept of *e-utilities•com* and its implementation in a Web portal.

1 INTRODUCTION

Many Utilities nowadays find themselves facing the most challenging market conditions that they have ever experienced. Deregulation is creating a new business environment, one that requires utilities to be transformed from product-oriented to customer-oriented business entities (E-utilities, 2000). A group of European Utilities within the European project, e-utilities aimed at developing solutions and platforms that will enable utilities to provide the European consumer with better, more cost effective services. and products, in a flexible and dynamically adaptive manner.

The such a context, the project consortium develop the idea of a single Marketplace called *e-utilities•com* whose mandate is a clear customer centric orientation in the European environment. *E-utilities•com* develops the concept of strategy fit to identify market opportunities for a successful mid-term multi-utility business via the Web. The strategy intent of the *e-utilities•com* is to be unique for the customer, which is seen in both consumers and utilities. process.

The belief is that the concept should provide competitive advantages to both customer groups and utilities that would give to *e-utilities•com* a sustainable position in the market. The main benefits for consumers provided by *e-utilities•com* are in the field of wider choice of value-based prices, of customised multi-utility products and of services. Quality of product and services is seen as a major requirement by the *e-utilities•com*. For utilities key issues in attractiveness of *e-utilities•com* are based on the opportunities for consolidation and efficiency, customer service and the additional sales channel. More precisely the Market place should enable :

- Consumers
  - To manage every step of their utility provision process in terms of contracting, metering, billing and payment without needing any access to any utility front offices.
  - To have one single interaction point with *e-utilities•com* regarding the services and products being provided by the utilities that are members of *e-utilities•com* and their own information relating to their contract with *e-utilities•com*.
  - To have access to an increased choice of products and related prices so that they can customise their requirements to available products.
  - To subscribe and use related services, such as energy efficiency consulting and white goods maintenance.
- Utilities
  - To expand their businesses towards multi-utility service provision through participation in packages offered by *e-utilities•com*
  - To analyse patterns of behaviour in the *e-utilities•com* customer databases and through such analyses to re-design their business processes towards more customer-use oriented products and services.

- To enable them to launch marketing activities for offering products and services according to customer segmentations.
- To increase their sale channels

In order to support the *e-utilities•com* concept, we develop a portal (E-utilities, 2003) comprising a set of technical components and software tools working on standard platforms which are surveyed in this paper.

The paper is mainly organised in two parts as follows. In section 2, the business model underlying the *e-utilities•com* is first introduced and the functional architecture of the portal is outlined. Thereafter, the components are introduced with a focus on the VUM/VUS component. VUM/VUS stands for Virtual Utility Market (VUM) and Virtual Utility Shop (VUS) respectively. VUM is targeted towards prospect customers whereas the VUS is dealing with the customers. In section 3 the key underlying technologies are presented namely, the Generic Catalogue of products, services and associated tariffs of *e-utilities•com* and the Consumer Profiling facility.

2 E-UTILITIES BUSINESS MODEL AND ASSOCIATED PORTAL FUNCTIONALITY

In our point of view, the construction and the use of a business model in a such type of e-business projects is important in order to help the designers and developers in :

- Identifying and understanding the relevant elements in a specific domain and their relationships (Ushold, 1995).
- capitalising the domain specific knowledge, communicating and sharing their understanding of the business among other stakeholders (Sternman, 2000).
- settling a discussion base that facilitates the change management in information systems (Petrovic, 2001).
- identifying the relevant measures to follow in an e-business (Pigneur, 2002).

- simulating businesses and learning about them (Sternman, 2000).

As introduced in the fisrt section, the aim of e-utilities• com is to provide to multi-utility European consumers a single Marketplace. Products and services of e-utilities•com are offered by a group of utilities who are members of the •com Marketplace and may remain 'transparent' for the consumer. The intent of e-utilities•com is to comply with the consumers' needs and satisfaction and, from the utility side, to prospect, to contract and to retain a customer. Figure 1 highlights the core business model and the flows, which were set to fulfil this objective.

When a consumer contacts e-utilities• com marketing activities will take place to convince him/her to feel confident subscribing products and services.

To offer him/her customer centric provisions, e-utilities•com needs

- To explore consumer's intention and interest by capturing consumer's data
- To get an estimate of the consumer profile using a customer profiling functionality and,
- To make a personalise product offering matching the consumer's needs with the *e-utilities•com* products and services.

The *e-utilities•com* is the sole contracting party either with customers or with utilities as subcontractor. Participating utilities within *e-utilities•com* will be enabled to browse the offered products and services from competitors or other utilities from other operating areas. Intention of *e-utilities•com* is to provide transparency to customers and utilities in all fields of the business, which also includes a full set of customer account statements.

A third party involvement with core competence in field of finance is required to handle the customised billing/payment activities intended in the business model.

Finally the *e-utilities•com* will be the origin point for customer servicing, routing customers' requests to the responsible point for conversion into customers' satisfaction.
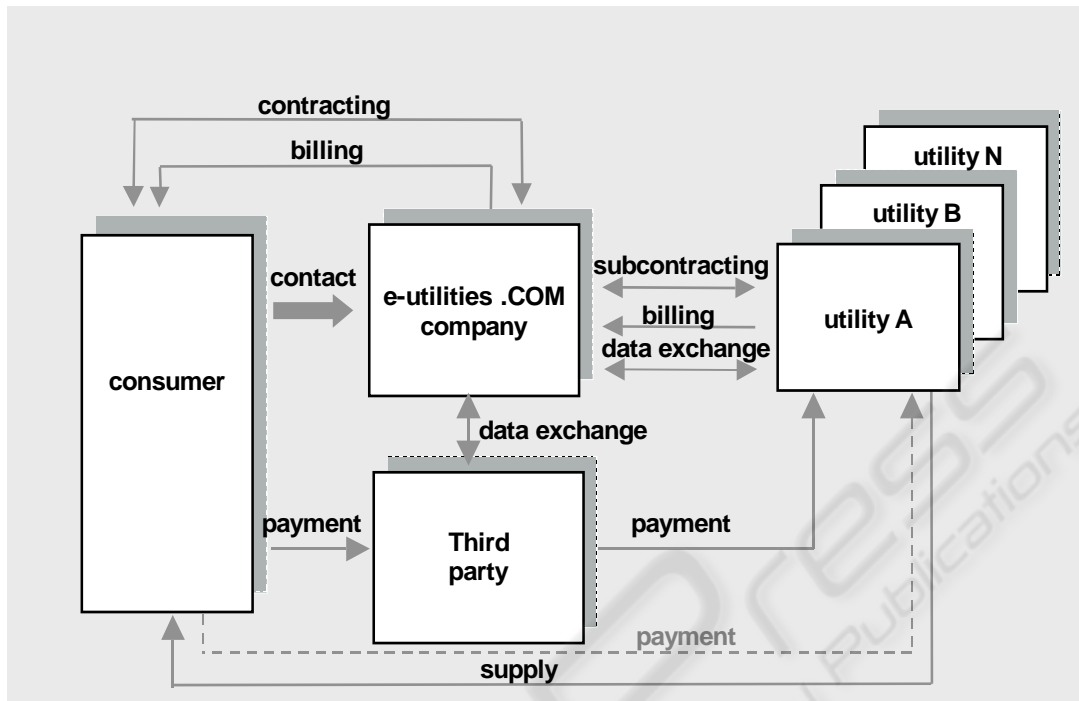
Figure1: Core Business Model

Figure 2 shows the functional architecture, which supports the *e-utilities•com* business model.

The Figure shows that six of the *e-utilities•com* portal functionalities highlighted above namely, consumer data collection, marketing, product offering, contracting, billing & payment and customer servicing are provided by the VUM/VUS component. However, contracting requires a specific technical component, the generic workflow engine. The consumer profiling facilities are dealt with by the Consumer Profiling component. Figure 2 also shows that several data repositories are necessary to support the enactment of these functionalities, the customer/prospect databases and the catalogue of products and services. We comment these in turn.

Marketing

Static pages of the portal aim to demonstrate the benefits provided by the Marketplace, both for consumers and participating utilities, together with Market Information, events, price listings, customer statistics deriving from the Data Mining in the Customer dB etc.

An interactive demonstrator is being implemented to promote the portal's efficiency in product and package offering, the facilities for multi-product comparison and outline the option of creating customised contracts that could include

more than one product from different utilities within the European Union.

Customer data collection

To facilitate customer data collection the portal offers either a guided questionnaire for the inexperienced user or a detailed one for the experienced user. Information gathered updates the prospect/customer databases and is used for the customisation of pages according to the prospect classification results. The portal also keeps track of an incomplete questionnaire that a prospect left unfinished during a visit to the portal.

The information collected in the prospect/customer databases will constitute not only one of the incentives for utilities to become members of the Marketplace, but also a data pool for data mining and prospect classification experiments. The resulting information can assist in making more informed business decisions, both on the marketplace basis but also for the individual utilities-members.

Product Offering

Being the key issue of the portal's attractiveness to the consumer, this functionality is supported by the catalogue of products and services available to

the consumer. The catalogue is implemented dynamically using a generic structure, the generic catalogue, to support any kind of update of products and services offered by participating utilities of the *e-utilities•com* or implied by the integration of a new participating utility. It allows in a flexible manner to query and display information available in the catalogue and supports comparison between products and services.

All information gathered from the questionnaires, together with additional information provided by the user, where needed, is used to retrieve from the catalogue the most fitting offers for the customer's special needs.

The prospect will be offered the opportunity to view all unitary products and packages that apply to his situation, but also compare on their price, quality related standards, contracting restrictions, or payment options.

All information gathered during this procedure, plus the results of the consumer selection, will update the prospect/customer databases for future use in statistics and customisation of the portal's pages.

Contracting

The consulting facility guides the prospect customer through the selection of the most fitting products to the personalised establishment of his contract with the Marketplace. The main issues introducing the contracting conditions related to the following points:

a- Customer Identification

After having selected all consumer's personal information, a third party will be involved to handle the financial activities intended in the Marketplace's functionality. This third party will also undertake the role to provide information related to the customer's credit score, so that the portal accordingly offers to the user the relevant contracting options. Completion of the registration form will conclude in the assignment of the user's log in ID.

b- Selection of Billing Party

Offering the consumer more customer-centric provisions and trying to enhance its flexibility towards special conditions of any participating utility, the Marketplace will provide the option to the customer to select the specific utility and not the Marketplace as the billing party of the contract. In such a case, the Marketplace's role will end at the contract subscription, whereas all billing, payment and service activities will be on the utility's side, out of the Marketplace's responsibility.

c- Selection of payment method

Depending on his profile and requirements, the consumer is able to choose between different payment methods, via credit card, auto-pay etc. The third party will support any payment method selected and update the Marketplace with all payment or non-payment-related information.

d- Subscription of the Contract

Accordingly to the above, the contract document consists of the following components:

-   Contract Conditions related to the Marketplace business requirements (static part).
-   Contract Conditions set by the product. (information and restrictions of the Product Catalogue).
-   Contract Conditions according to the place of delivery (local laws and geographical restrictions)
-   Contract Conditions set by the supplying utility.
-   Contract Conditions regarding billing and payment methods.

The actual contract document, resulting from the above, can be subscribed either on-line, forwarded as an order to the utility, or by paper, printed for postal delivery.

Customer servicing

Finally, the Marketplace is the origin point for customer servicing, routing customer's requests to the responsible point. The customer is able to access all his prior billing and account information, report problems and submit requests, monitor on-line the status of the outstanding services and receive technical support and information from a technical help line.

Recording all customers' requests in the customer database results in an improved organisation aiming at quicker and customised processing of customers' requirements.
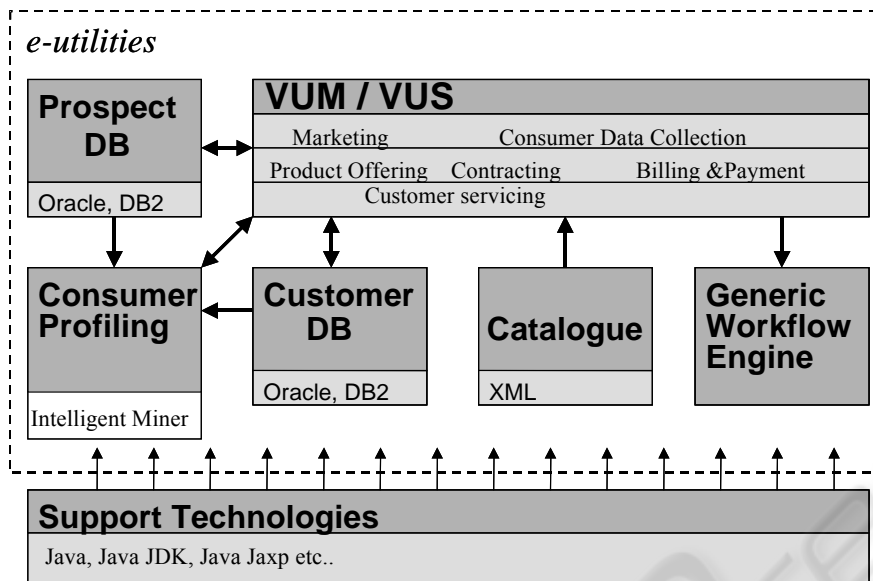
Figure 2: The functional architecture of the e-utilities• com portal

3 UNDERLYING TECHNOLOGIES

3.1 Generic Catalogue and e-utilities•com catalogue

A number of functionalities of the portal rely on data stored in the *e-utilities•com* catalogue (E-utilities(c), 2002). The catalogue is the repository of all products, services and associated tariffs of the participating utilities of the e-utilities•com Marketplace. As shown in Figure 3, the catalogue integrates the data specific to each of the participating utility in a single structured collection, which is the catalogue. As for any database, the collection of data has a structure, which is called the catalogue model (E-utilities(a), 2002).

As Figure 3 shows there is one catalogue model, which is instantiated as many times as *e-utilities•com* comprises participating utilities. Each instantiation provides the actual data about the products, services and tariffs of a specific utility. As an example, one instance corresponds to the tariffs, products and services of PPC and other instance provides the data about the services, products and tariffs of RWE.

Towards genericity of the catalogue model
The salient characteristic of the catalogue model is its genericity. The model is generic in the sense that it abstracts from the differences in structuring products and services of the different participating utilities of the Marketplace. It also abstracts from the different tariffs structures that the different members utilities of as *e-utilities•com* might have.

As an example let us consider the PPC tariff strategy and the Thames Water tariff strategy. The former is based on consumption and will introduce tariff structures based on time slices (night and day for example) whereas the latter is based on social characteristics of the customer such as his level of living and therefore will introduce tariffs that depend on consumption. Despite these differences the catalogue model must provide a generic structure that could be instantiated in the catalogue to represent either the PPC kind of tariff structure or the Thames Water type of tariff structure.

Overview of the catalogue model

Figure 4 shows the catalogue model that has been designed with the CASE tool Rational ROSE and it is presented in as a class diagram using the UML notations.
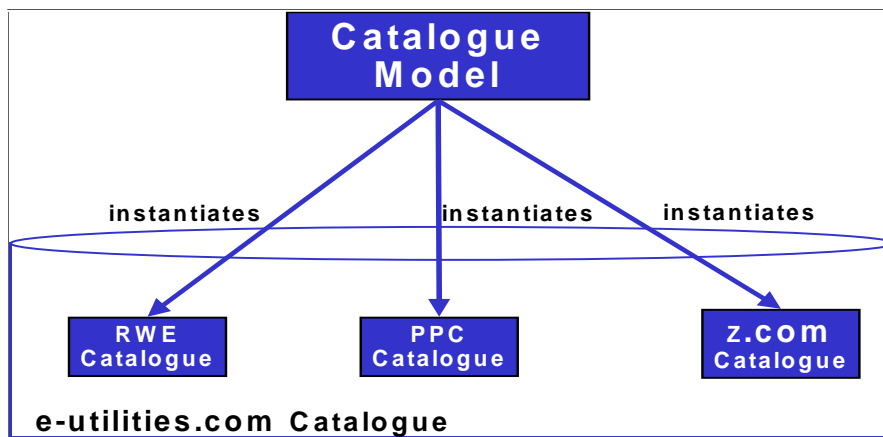
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Figure 3: Catalogue model and catalogue

The catalogue model is composed of a set of interrelated concepts modelled as UML classes in Figure 4. As shown in the Figure, the catalogue model is centred around four key concepts, namely CustomerCategory, ProductClass, Product and Tariff. Each of these concepts is a class of the UML diagram.

The CustomerCategory concept represents categories of customers identified by the e-utilities.com. Low Voltage, Residential, Commercial are examples of customercategories.

The ProductClass concept represents classes of products that are associated in the e-utilities.com to one or several categories of customers. For instance, different Water and Waste Water products are all together grouped into the Water &Waste Water productclass.

The Product concept represents the real products and services commercialised by the utility companies in the e-utilities.com. Metered Water Supply is an example of product. An interesting distinction brought out by the catalogue model is the one of unitary product which is sold by its own versus a package which is composed of package elements that can be products sold independently or just elements which make sense only in conjunction with other elements that compose the package. Figure 5 gives the example of the package called GEW Residentia .com that belongs to the product class 'commodity goods' and is offered as a e-utilities•com package.

The Figure 5 shows that the package is composed of 4 elements, namely *Metered Gas* that is a *commoditygoods* provided by GDF, *BEC* that is a *commoditygoods* provided by PPC, *Installation* that is a *servicegoods* provided by PPC and *Unmetered Water* that is a *commoditygoods* provided by

Thames Water. The *package* is therefore a multi-utility and multi company package..

Finally, the concept of *Tariff* represents the different tariffs of the e-utilities.com companies. As can be seen in Figure 4, the class *Tariff* has four of sub-types such as *TimeBasedTariff*, *BranchingTariff*, *UnitaryTariff* and compound tariffs.

- The *UnitaryTariff* corresponds to the case where pricing depends of a fixed parameter such as the consumed quantity of electricity.
- In a *CompoundTariff* pricing of an *element* is obtained by breaking out the amount to bill into parts having each its own billing formula.
- The *BranchingTariff* is a complex structure including different sub-tariffs applicable under specific conditions.
- In a *TimeBasedTariff* pricing is time dependent.

Figure 6 illustrates a *compound tariff* and its attachment to the unitary product *called 'Small Consumption'* supplied by RWE (Company) only in Germany (Gepographical Area). The Figure illustrates the hierarchical attachment of this unitary product to the product *class Gas Level1* which is part of the more general product class *Commodity* (E-utilities(b), 2002).
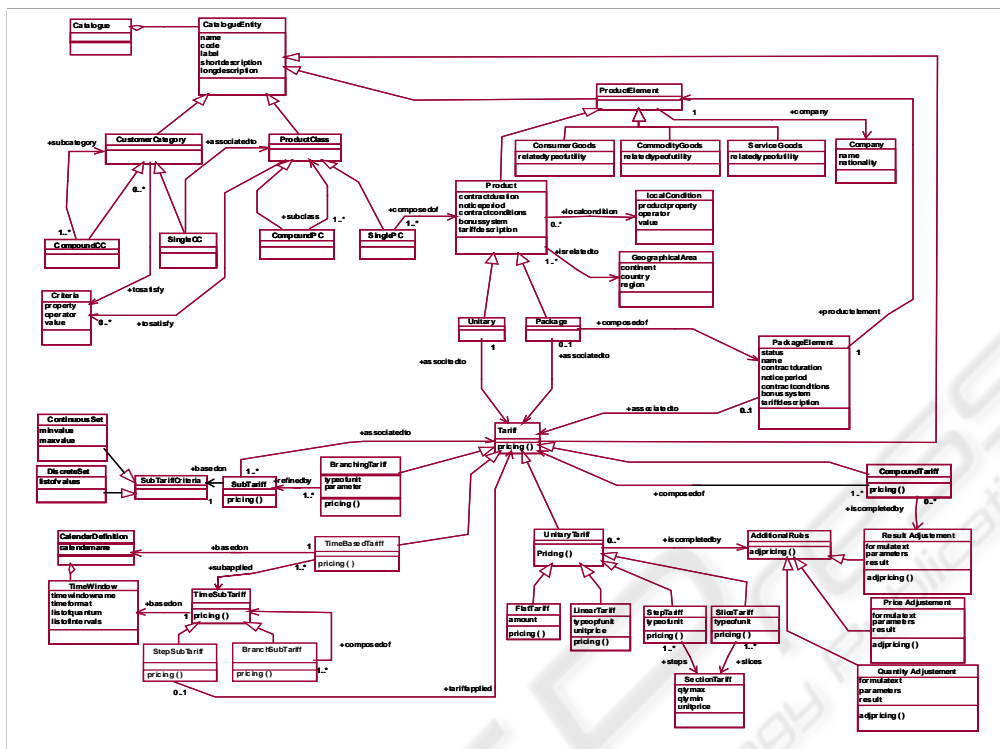
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Figure 4: UML class diagram representing the catalogue model

The *SmallConsumption product* is linked to the $T_{SmallConsumption}$ *tariff* which is a *compound tariff* combining two *linear tariffs* to respectively bill the fixed charges and the consumption charges. The first *linear tariff* $T_{SmallConsumptionfixedcharges}$ serves to calculate the fixed charges by the formula: *fixedcharges* = 2,935*period. The second *linear tariff* $T_{SmallConsumptionfvariablecharges}$ serves to calculate the *consumption charges* such as *consumptioncharges* = 0,04*qty.

3.1 e-utilities•com Customer profiling component

The Consumer Profiling (CP) component addresses the needs of businesses to better understand individual customer's needs and appeal to personal views (E-utilities, 2001). CP plays a main role to provide businesses the abilities to well manage the relationships with their customers and to serve them better with the appropriate and appealing products and services that are customised for them to meet their needs.

Distinguishing customer and prospect

In addition to the *profiling* ability to the customers of the *e-utilities•com*, the capability to *score the prospects* is also important to support the 'best fit' offering or the product/service comparison functionality of the *e-utilities•com*.

A *prospect* is a consumer who maybe unknown, or maybe less known and not familiar to the *e-utilities•com*. Here in this project, we consider a prospect may be a first time user, or an existing customer of other utility companies, who has the *potential to switch* to be the customers of our *e-utilities•com*.

Thus, we consider that the *prospect* and the *customer* are two different objects. This is reflected in the portal architecture drawn in Figure 2 by the presence of two different databases, the *Prospect DB* and the *Customer DB*, respectively.

As there is the customer database which contains the customer data from the participating utility companies to *e-utilities•com* to support customer profiling, it is also needed to create a database populating some prospect data to support prospect scoring. The use of this database is to primarily capture prospect details and support the scoring and product selection work within the VUM/VUS, but also to provide the basic customer oriented data store for when a prospect is ready to contract with the *e-utilities•com* company. In addition this
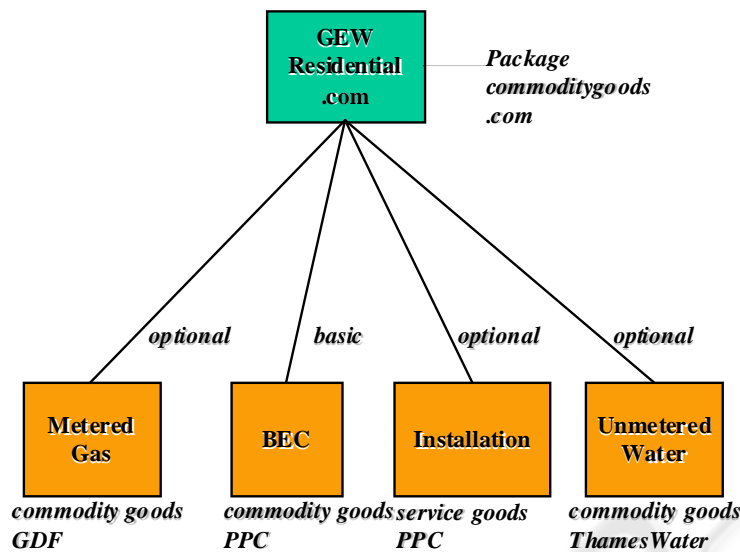
Figure 5: Multi utility and multi company package

database will be the source from which updated data will be extracted to perform offline data mining and customer profiling activities to better fit the comprehending and predictive models.

Customer profiling and prospect scoring processes

Since the *prospect* and the *customer* are two different objects, which deal with in the whole VUM/VUS process, different ways of working are therefore generated to handle the prospect and the customer respectively. Whereas the ability to score the prospect is one of the main functionality of the VUM, the customer profiling function is embedded in the VUS.

Furthermore, before a model can be applied to scoring a new prospect on line, this model needs to be trained to do it offline in the preparation stage by being fed the existing prospect data. Figure 7 shows the two stages necessary in prediction data mining procedure, i.e. the training process and the applying processes.

Prediction is normally connected with supervised learning. The essence of supervised learning is to train (estimate) a model on a portion of data, then test and validate it on the remainder of the data. A model is built when the cycle of training and testing is completed. The model will then be used to apply for new data. This is the stage called applying process. It should be in mind that the training data and applying data should have the same attributes.

For that reason, the operations for prospect scoring are divided into two different processes, one for *training the prospect scoring* while another for *applying the prospect scoring* to new prospect who come to visit VUM for the first time.

Consequently, there are now three different processes for each of the purposes mentioned above. These three processes are drawn in Figures 8, 9 and 10.

Preparing for Prospect Scoring

This process is for the preliminary stage prior to the rollout of the VUM. Feeding in the information from the current prospect database from the user companies, to train the scoring model and then make it generic to the overall utility market, in order to have this scoring component ready to score prospects online in the future.

On-line Prospect Scoring

This demonstrates, when the e-utilities web site is running; how this scoring component works with VUM to online score the prospects that visit the web site, based on the information they provide.

Customer Profiling for VUS

This basically demonstrates the CP component's work with VUS after the prospect decides to become the customer of the e-utilities, whenever the e-utilities feel like to understand its customers' behavior.
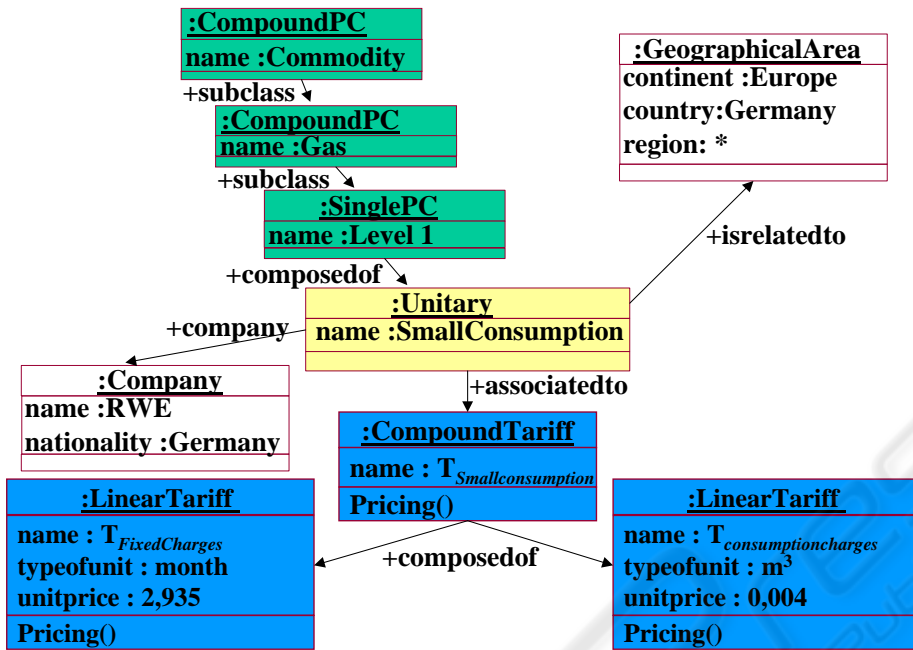
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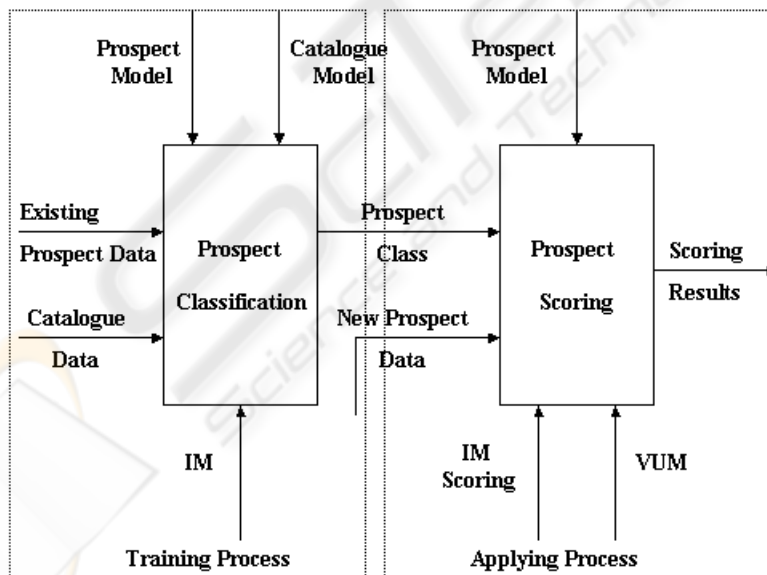Figure 6: Compound tariff applicable to the unitary product Small Consumption
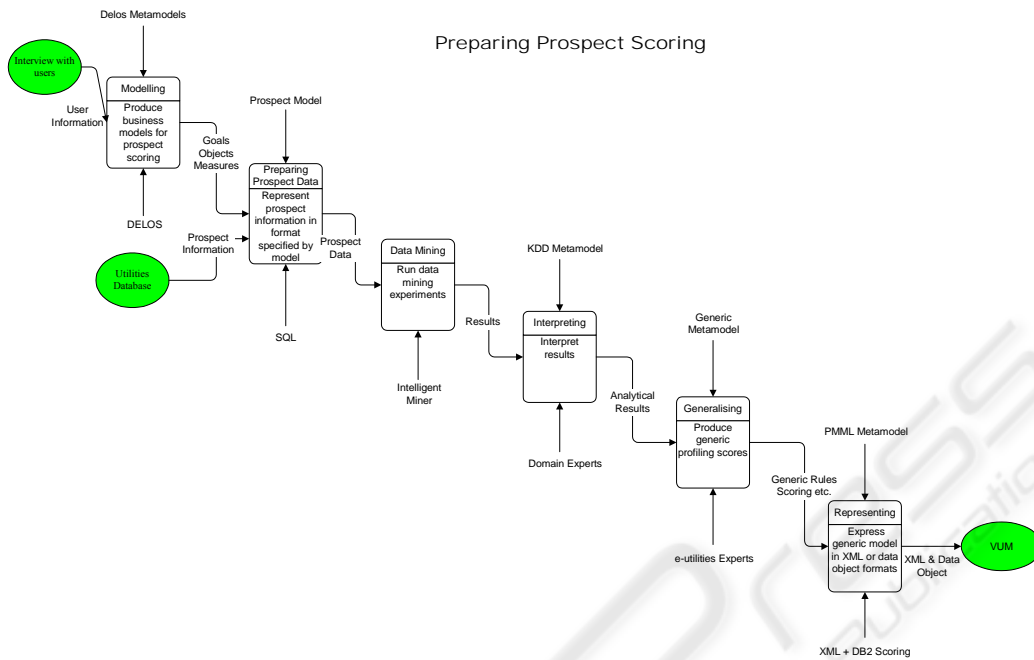

Figure 7: Prospect, Catalogue and VUM

Preparing Prospect Scoring

Figure 8: Preparing prospect scoring
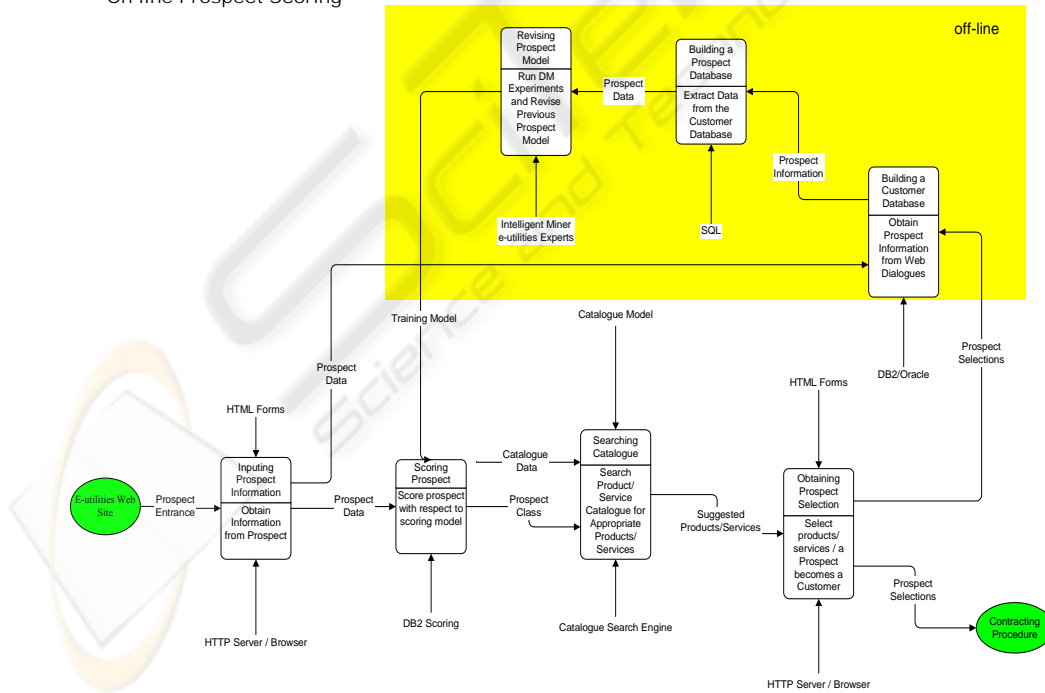
On-line Prospect Scoring
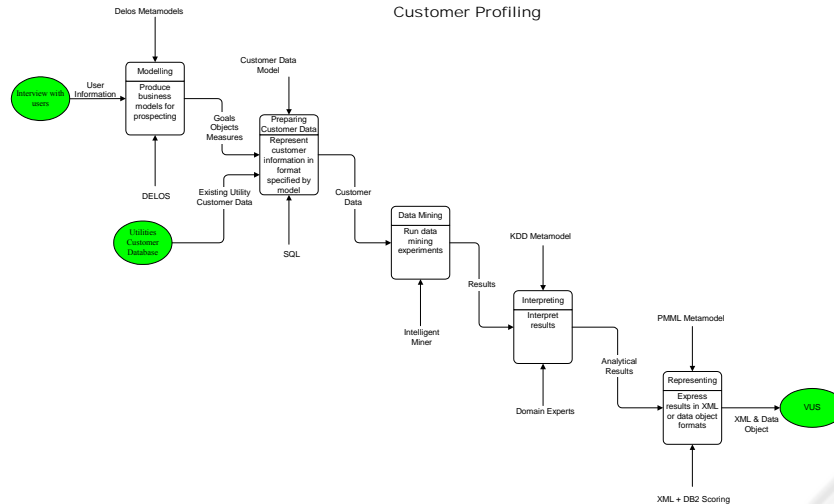
Figure 9: On-line prospect scoring

Figure 10: Customer profiling to VUS

4 CONCLUSION

In this paper we introduce the concept of a single market place, *e-utilities•com* that combines and integrates the products & services offers from different utilities companies in order to meet more effectively the needs and expectations of European customers. The market place treats utilities as customers to who are contracted by *e-utilities•*com just like regular customers are treated for the energy service provision.

The paper also shows that to support the business concept of *e-utilities•com*, there is a need for specific technologies and particularly for generic technology such as the generic catalogue structure to cope with the variety of catalogues and tariffs proposed by the different utilities member of *e-utilities•com*.

Finally, we would like to emphasize the strong coupling between the business model and the e-commerce application: (a) the portal would not have been developed effectively without a deep reasoning about the business model relevant in the new deregulated market for energy utilities and (b) the existence of web-technologies make possible the develop of new business paradigms.

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REFERENCES

E-utilities, 2001. CP to VUM/VUS Way of Working. Technical Report, WP2/T2.1/U/05.

E-utilities, 2000. Description of Scientific/Technological Objectives & Workplan. RTD Proposal, Part B.

E-utilities, 2003. http://www.e-utilities.org.

E-utilities(a), 2002. The Catalogue Model. Technical Report, WP5/T51/P/R1.

E-utilities(b), 2002. The Catalogue Model Instance. Technical Report, WP5/T51/P/R3.

E-utilities(c), 2002. The •com Catalogue. Technical Report, WP5/T51/P/R2.

Fensel, D., 2001. Ontologies: Silver Bullet for Knowledge Management and Electronic Commerce. Heidelberg, Springer Verlag.

Petrovic, O., Kittl, Teksten, R.D., 2001. Developing business Models for eBusiness. In the *International Conference on Electronic Commerce*.

Pigneur, Y., 2002. A framework for defining e-business models. *In Object Oriented Information System*.

Sternman, J. D., 2000. Business Dynamics : System Thinking and Modeling for a Complex World. McGraw-Hill, 2000.

Ushold, M. , King, M, 1995. Toward a Methodology for Building Ontologies. Workshop on Basic Ontological Issues in Knowledge Sharing, held in conjunction with IJCAI-95.