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Strategic modeling to improve services and operation to energy industries' customers☆

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ABSTRACT

Continuous analyses of demanded services at the energy companies are the shortest path to recognize and anticipate customers' requests, reinforce and manage the communication and operational flows. Energy utilities need to increase their operational efficiency concerning costs and agility to improve useful media and evaluate customers' expectations and requirements. Operational effectiveness must pursue the demands, considering the amount of services that the companies provide at their relationship channels, the communication facilities and the systems' infrastructure. The companies need to organize a huge amount of historical and online data to represent and forecast customers' relationship scenarios. Resources evaluation ensure regional requirements and weather conditions best attendance response, adequately addressing faults at the energy distribution grid, motivate customers to use alternative media and improve relationship channels. Reaching this scenario, big data treatment techniques provide the necessary agility to achieve the monthly/hourly volume of data (millions of registers per month) and permit communication clusters' views.

1. Introduction

The Brazilian energy sector and the distribution companies seek for the continuous improvement of the understanding about their relationship with their customers. In Brazil, the energy distribution companies operate according to their federal concession areas and are responsible for delivering the energy to the customers' unities, which mainly belong to the regulated contracting environment. Even for the free market customers, the local distribution companies are responsible for the grid operation and maintenance, as well as the monthly billing of the delivered energy. To request for the energy companies' services, the customers have at their disposal different channels such as call centers, internet, social media, e-mail, letters, SMS and personal attendance offices. The amount of executed services is a consequence of customers' needs for services, new connections to the grid, events related to power outage, billing and overdue debts. The Brazilian regulatory agency ANEEL establishes some indicators (ANEEL, 2012), but in a novel analysis, the companies need to understand and improve customers' requirements and their operational procedures. The agency establishes rights and duties, and on the other side, the energy utilities need responsiveness and customer relationship services improvement (Kotler, Kartajaya, & Setiawan, 2010).

The analysis of customers' requirements and the regulated services conditions, the grid operational situation, billing, weather conditions and energy availability can improve the communication process. The increase of attendance quality indicators affects straightly the operational costs. The lack of investments on the distribution grid or on some kinds of services increases the customers' demands.

The energy distribution companies continuously seek to assess the costs of the attendance process, finding out new capabilities to address services and operational demands, developing new systems and features in a strategic level to improve, maintain and track customers' satisfaction. As an example, this work deals with CPFL Energy Company that operates at Brazil South and Southeast regions, at 8 federal energy concession areas, and has about 7.7 million customers (CPFL, 2014). The company continually looks for excellence and innovation in energy services. The utility improves the relationship activities to allow prompt response to critical situations, new or already known demands.

Thereby, the knowledge and forecast of the customers' demands need a view towards the asked and executed services, and the measures and volume of data records at the relationship channels. The operational

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improvement of the relationship channels, concerning agility and costs, needs updated knowledge of the customers at each time that they contact the companies or request for services. The relationship evolution is correlated to the smart grid criteria point out by DOE (2013) and Gangale, Mengolini, and Onyeji (2013). These criteria reinforce what Kotler et al. (2010) propose.

Additionally, one unified vision of the volume and costs of the relationship for the entire company area may not truly represent the regional demands, distinguished according specific characteristics such as consumption profile, urban or rural areas characteristics and grid conditions. A closer view by regions, cities or even neighborhoods could provide better local services and response. Bigger granularity direct utilities to reorganize operational teams and procedures, as well as personalize their services, attending seasonal and specifically customer profiles requirements.

The statistic models must continuously revaluate and improve the decision-making, according to the market dynamic, consumption habits, political and economic trends, weather, applied technologies and investments forecast.

Other important point to consider in Brazil is related with the defaulters, that suffer the effects of the social-economic scenario and represent relevant communication and costs to the company's attendance. As a rule, the defaulters are insecure regarding energy supply interruption and often and repeatedly seek services to restore the supply or to negotiate the debts. The defaulters' scenario improves the organization of the attendance process.

This evaluation points out variables to profile different aspects of the customers such as their energy consumption facilities, their commercial group behavior and their financial registered records. This work analyzes the impact of volume on the requested services and attendances to quantify and qualify the utilities strategies.

To continuously improving models, analyses include customers' geographic positioning to identify the critical aspects of the regional relationship. Criticality models of attendance provide alerts and corrective measures efficiently. Analyses aggregate the concepts of big data models organization, promoting responsiveness summarizations to evaluate the relationships, establishing and associating existent procedures. These procedures produce strategic and operational maps that update and increase the current processes at the customers' relationship area, aggregating an environment that expands the supervision of attendance conditions.

New methods co-relate and characterize regional aspects, kind of accomplished services, and relationship media or channels eligible considering socio-economical aspects to cluster the customers and the attendances. Groups and business rules improve statistic predictions and can indicate the target media to provide better results for the relationship/actions with the customers from a specific region. As examples, regional knowledge point out the areas that mostly demand services and contact the company, valuating the related services, improving the critical process, allowing the modernization of attendance structure and/or faster recognition of the problems, anticipating actions and results. Analytical tools aggregate evolutionary routines to the company's channel and service control team (LaValle, Lesser, Shockley, Hopkins, & Kruschwitz, 2011).

The following items organize this development done focusing on customer communication. Section 2 highlights the current necessary communication improvements, Section 3 follows with the methodological guidelines, Section 4 the solution architecture and Section 5 the results and benefits achieved. Section 6 concludes that the model represents the operational features to manage and forecast the communication, services records and relationships results.

These sections summarize up the knowledge organization focusing on: i) the identification of conditions of customer attention; ii) the excellence of this attendance; iii) the situations and processes that can predict why the customers reach for the company and not only work to minimize or correct the problems. They achieve valuable information to decision-making and investments, for the continuous improvement and for the coordination of the attendance effectiveness.

2. Development motivation

In the energy sector many actions look to achieve solutions for the customer attendance. The problem is characterization and forecast the customers' relationship, based on their specific necessity, the company's interactivity potential, media or channel availability for attendance and the circumstances that trigger the energy customer demand for the company's attention.

This work intends to organize the issues related do relationship based on events recurrence analyses as power outage, debts and billing, energy supply interruption or other facts caused by the companies or by grid problems and customers' demands, evaluating the region/local attendance conditions, grid conditions, weather events and/or social-political issues. By a systemic analysis of the regional attendance and clustering indicators, the work estimates, detects, values and, and many times, predicts the behavior and attendance necessities when the customers contact the utility. This communication view exposes the necessity and expectations that lead the costumers to demand a service and contact the company, and the effectiveness of the relationship.

This project pursues the balance of the relationship channel's point of view versus the services the customers ask for to identify the customers' needs: as a methodologic model of complementary points of view. The methodology encourages analysis of the costs, the effectiveness of the relationship channels and the services provided. The work looks for better information records into the systems and characterization of the actions to relationship improvement by the channels (such as easier access to the services by the internet and call center, indicators for the improvement of the communication by Interactive Voice Response—IVR. Another example is the validation model to represent the effectiveness of SMS usage to communicate energy supply fault.

The work revisits the better practices for the relationship, concerning the information availability for the customers and agility in answering them by the current attendance channels. Therefore, the developed system integrates the methodologic processes.

The definition of the indicators and clusters confirms effectiveness, mainly when associated to the concepts of critical volume and costs of relationship generated by the amount of existing energy installations (customers) in each region. Therefore, a group of guiding situations ensures easier verification by the business analysts and their managers as a user friendly interface. Big data organization allows the data warehouse to the summarization treatments.

The concepts of big data governance, according to LaValle et al. (2011), reinforce the necessary data quality management for consistent information extraction, without duplicity and following indicators rules. The development applies the various data company's sources registering the services asked by the customers, as legacy systems, census information and other primary data. A new approach structures the services costs (considering the possibility of using different channels for the customer's relationship) and the system access optimization (responsiveness to the researchers/analysts responsible for the relationship channel and the company services managers).

A system organizes the different situations related to the customer's attendance, the criticality of these situations and the regional representations of problems and solutions, applying analytical filters. The project generates a software platform CCAF—*Contact Center Analytical Framework*. This software platform runs the historical patterns of the relationship between company and customer and provides analytical interfaces, which allows the analysts and managers to have systemic and specific attendances views. In this analysis, CCAF provides criticality maps, behaviors, services volume tendencies and customer profile filters, and information related to payments done. CCAF achieves up to the level of neighborhoods, so the analysts can have the monthly (to hourly)

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regional services' characterization, providing local correlation to the installed local energy customers.

Big data techniques organization process built a convenient operation of historical research into the CCAF system, summarizing and consolidation data. The resulted system process information based on 36 months historical data of 7.5 million clients and 3.5 million attendances/monthly. The system presents the information on tendency graphics, strategic and criticality maps as well as services and channels performance indicators. CCAF allows better results on technology, economy and efficiency for the historical researches. Additionally, the system generates detailed services consults for a deeper analysis of specific situations that may demand personalized actions by the company.

Researches of the customers' profiles that contact the companies repeatedly each month clarify which are their needs and their non-attended expectations. This was one of the paths towards the detection and prediction of effective solutions for the customers' relationship.

Additionally, this work seeks the answers for performance and criticality by the attendance systems. The project seeks to provide conditions to all customer segments analyses and direct specific actions to an efficient operation, referencing operation sustainability (Kotler et al., 2010):

- Costs—creating value for the company: different services evaluation from the channels qualifies and quantifies the attendance conditions on a historical basis, creating tendencies maps. Other possibilities appear after objective characterization of the services and channels' costs, besides the current ones. A better web interface proposition can increase the customers' convenience and can converge attention for systems with more effective operational costs;
- Support to the business departments: the CCAF system is a technical and administrative reference to understand the different services offered by channels in association with the services executed by the company's operational team. CCAF supports losses and the debts management departments associating the current communication with the customers, their demands and the services tendencies generated;
- Services set: classifying customers' necessities according to their specific profiles, relating the demanded services to a historical conditions provisioning;
- Regional problems and diagnosis generate information about the commercial situations and historical demand. Considering the historical conditions and region, the methodology predict and evaluate the operational criticality at a neighborhood level according to the customer's profile and demanded services at the attendance channels;
- Shorter response time: ensures a systemic evaluation, any time, by graphics, charts, maps and clusters attendance consults, provides agile analysis to newer situations. The project does not consider the specific actions concerning the control of the demanded services, as the utilities field services response. These will improve the project as next steps;
- New indicators consolidation: the CCAF system structures performance indicators (volumes and costs) of the different channel, services and regions, with critical analysis based on the volume of the attendances related to the customers and clusters profiles. This model is convenient for the consolidation of the energy distributor effective strategies of relationship and performance. Other indicators can evolve the model to represent the company's operation dynamism;
- Attendance media and their costs, advantages and disadvantages: Comparisons among the different media present and attempt to characterize the effectiveness of the channels based on historical behavior;
- Barriers: available data quality, monthly volume of data and attendants training conditions for specific procedures types, looking for the process robustness could generate new operational conditions. Alerts generate as a book of operational improvement present actions that can ensure the correct register of the relationships requirements, complementing information that can become future indicators of attendance efficiency or services orders localization. Additionally the model spotlights a division between asked services at attendance channels and amount of operational demanded efforts to support them, reevaluating and measuring the efforts and resources for the attendance and for the operation;
- A system improving agility concerning actions at processes level, attendances, consolidated and emergencies scenarios: data load and integration within the operational space will enable decision-making closer to real time events, attending daily/hourly tendencies;
- Recurrent calls: based on the customers' services demanded records. Therefore, recurrent contacts necessities promote specific actions to a better response to the customer or clusters, minimizing the costs and avoiding inadequate operational conditions;
- Which is the customer profile? Who are they? Why they contact the company? Which are the causes of their problems? The condition for the segregation inside the system allows tracking for unusual customers' profile and regions demanding services. Specific conditions of the attendance appear as researches models on analytic system basis. The company's specialists use market analytical tools to improve the observation (IBM, 2015);
- Problem validation tree, by region and city: same as the above information plus thematic and criticality maps according to the region down to the neighborhood level;
- Call and recurrent calls reduction in the call center: consider the customers' profile of those who often contact the company by the call center, focus on their region and debts payment. In order to make the information easier for the customer and transform the web site to the easier and preferred channel some proposals improves the website/web portal. In addition, customers' wishes influence the effectiveness of this channel. The system monitors the actions taken, to guarantee the visibility of the results and agility to indicate possible strategy corrections;
- Innovation: seeks in all indicative elements linked to the methods and implementation, from the granularity of neighborhood access to the clustering of customers' profile, channels and executed services. The analytical model for big data bases improves the specialists' access to the detailed information of the historical relationships, strategic maps and attendance tendencies;
- Active and Reactive actions: the record accuracy of the actions resulting of the customers' demands improves the relationship effectiveness numbers and the provision of energy distribution services. New methods organize costs procedures and conditions of free attendance schedules (even with costs fixed by partners contract already established), demonstrating possibilities of operational proactivity, either considering the utilization of lower costs media (website) or related to specific services;
- Databases effectiveness: some considerations made throughout the project in order to improve the registers quality on the databases, via system and attendance process adjustments.

The starting is the historic quantitative calls/attendances. The indicators associations KQI (Key Quality Indicator) result from proposed KPI (Key Performance Indicator) and map the situation (Alexander, 2007; Parmenter, 2015). At this moment, the indicators organize and help the identification of warning situations and tendencies, focusing on the region granularity, monthly volumes and costs. Weekly, daily and real time operational views are available as criticality maps and tendencies.

The companies need to identify the costs, the operational implications, and the necessity of changing their systems to the relationship/communication demands. Operational revision will add the possibilities and characteristics coming from the availability and costs differentiation, searching for attendance excellence. These questions also reflect

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the employees of the energy distributors' necessities, demonstrating the breadth of modeling and implemented strategies.

Another important point to emphasize is that this project is a part of the company's strategy in order to prepare new scenarios to smart grids compromising with the customers' relationship update, as present by Gangale et al. (2013) and LaValle et al. (2011). The next step will be the creation of new relationship environment scenarios that bring the convenience of the energy, products and correlated services usage. The customers must receive insights of how to use electricity and how they can actively manage their use, according to their priorities, comfort and costs. In this context, the energy distributors are in the best position helping their clients to manage the energy, and this is exactly what the customers are waiting for. This work starts this necessary visibility.

3. Methodologies

The first chosen methodology was the CRISP-DM (*Cross-Industry Standard Process for Data Mining*) methodology as the guidance to the development (Chapman et al., 2000; Shearer, 2000; Clifton, 2004; Li, 2004). CRISP-DM characteristics concern the organization of the data and its main principles: to motivate the tools inter-operation in data mining processing, demystifying it and making the information treatment simple. This organization was important to achieve a standard, structured and didactic procedure to the company's analysts, who will be responsible for the operational activities. This methodology provides:

- The project replicability;
- Support planning and management of projects;
- A "comfort/direction of how to do" for those who start in data mining knowledge;
- A formal structure (methodology) to record the experience about the mining, facilitating the business analysts team work;
- Decreases the dependence on great specialists;
- Motivates the best practices and helps to get better results.

The choice of this modeling methodology also supports the analytical tool used: SPSS Modeler (IBM, 2015). The procedures as a backbone allow and direct models and the construction of analytical solutions.

The attendance modeling in this project considered:

- Models used to segregate and quantify, on customers' historical consumption databases, arranged to improve the operation according to the consumption profile and regional or local characteristics (for example, grid detected problems, defaulters, contact center attendance, attendances at the offices, etc.);
- Samples selection related to database records inconsistency;
- Analysis of defined variables correlation and indicators standardization;
- Consolidation of the collected information in indicators models;
- Statistical weights to clusters evaluation, determining variables to represent the region of the distributors area;
- Systems and of strategic changes for the relationship and communication improvement (process changes and attendance options propositions);
- Information management systems evaluation to show up the indicators defined and tuned to be useful, considering the amount of treated data;
- Characterization of the operational costs and assets to achieve the model;
- Characterization of the models and indicators settings to support the strategic application for the relationship, media and services;
- Strategy for indicators exhibition, in a critical situations and troubleshooting consolidation system (historical and predictive).

The data preparation and the organization for the modeling demanded all the structure of big data characterization and governance rules 0 (Sathi, 2013; Soares, 2012), by creating a set of indexes that allow access and categorization of the original data (raw, primary) and pre-compile consolidation done. Therefore, the knowledge basis can be useful in two different ways:

- Graphic analysis basis to represent the tendencies of the customers' relationship necessities, allowing the visibility of the historical attendances in its best granularity. Graphic interface intend to offer the attendance vision by each region of the company area, city and neighborhood, with segregation of the profile and consume classes, the understanding of the tendencies of the relationship channels and demanded services. Payments conditions, the quantitative and regionalized characterization of recurrent calls appears, associated with customers' service expectation. The graphic visualization system delineates the historical conditions and seasonality.
- Structured reference data warehouse to specific analysis and business conditions modeling useful to the company's analysts. The data warehouse organizes the specific simulation conditions of attendance media changes, costs, and teams' structure as the systems' support. The design promotes the actions and models of tendency, aggregating analytical tools and providing specific activities for market intelligence.

In this sense, the services exploration and attendance that result by specific channels can increase or suit operational costs. To do so, a detailed vision of relationship channels and services required in the various regions, cities or neighborhoods is characterized (an example of the data organization is demonstrated in Fig. 1). Therefore, the generation, monitoring and managing special campaigns, based on local reality may be more assertive concerning the customers' loyalty and meet their expectations.

With the present structural vision, the indicators organization helps the identification of alert situations and tendencies, focusing on the regional granularity and customers' profile, concerning volumes and monthly, weekly, daily and on real time operational representation of relationship costs, volume and number of customers attended. The use of maps to represent the criticality/indicators results and alerts modeled is on Fig. 2. The results are on the map that represents cities criticality alerts at CPFL Paulista's operational region (Fig. 3), according to a selection of criteria based on the model on Fig. 1.

4. Solution architecture

Fig. 4 shows the data flow in the service distributor process and organizes the understanding of the existing operation and the extraction condition from the legacy database systems.

This vision consolidates an understanding about the data extraction for the data warehouse structure: a new organization consolidates on a structure of processing, using the attendances' primary data as a backbone. The processing aggregate customers' personal data registers, consumption, billing, payments and grid problems coming from the legacy systems. The energy company, according to its understanding of the historical process, will establish the data extraction periodicity. The system has its modeling available for the near real-time processing. The energy company, according to the historical characterization or online operational demand will define systematic data extraction, confirming, maintaining or evolving the analytical modeling based on the transaction volume.

Primary data come from different sources and the models provide best process organization to their consistence and validation.

The research reaches to account customer orders and their expectations of services, so that the choice of attendance channel could be the most effective for both (distributor and customer) from the standpoint of agility, accuracy and operational costs. Models structure the accuracy of accounting data, information consolidation and recurrent services

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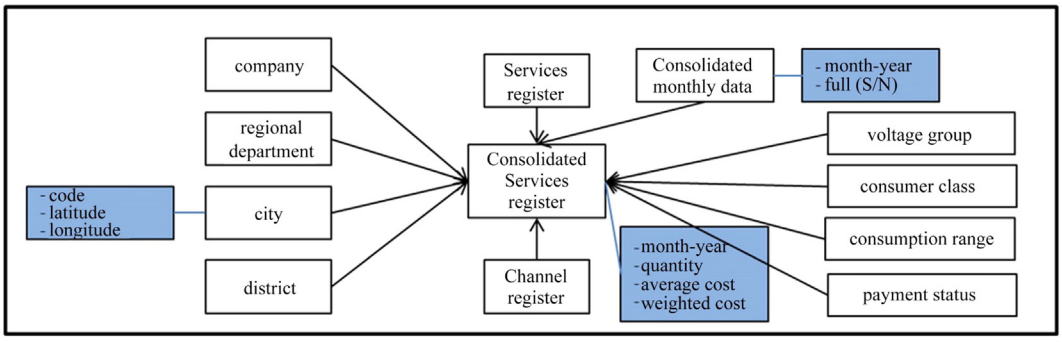

Fig. 1. Consolidation for attendance registers organization.

records associating them with the original monitoring design. Operational improvement opportunities highlight systems, services interfaces, and CRM, into a book of suggestions for improvement mentioned before, resuming proposals procedures and suggestions for systems evolution, relationship platforms and attendance trainings.

5. Results and benefits

The CCAF System allows analysis of service channels and services usage, facilitating correlations in demands for attendances with customers' profiles or requesting regions characteristics and providing support for decision-making. The methods provide results from the dynamics of relations operation, month by month, or in a period of observation. As proof of results for the operation and the customer relationship/communication, find out some example situations below. After the improvement, action implemented or changed processes, the system continues as a verification tool of the effectiveness of the actions:

- Situation example 1—Achieved result: improvement in customer interfaces on service portal. Sought for clarity and ease of use in this media, more direct answers to the customer needs and more adequate accounting access record. Valuation: From the records of the services requested at several channels, accounting records by the consumer access on the web site indicate the weaknesses, especially with regard to access to rebill service. The web portal improvements look for performance and robustness. Due to customer navigability difficulties and responsiveness, the work team studied deeply the site's usability. Many times the customer, without correct answer at the web portal, looks for the services via call center to simple information, rebill account and/or to obtain a payment barcode. A change in this media (website) proposal uses the concept of "one-click access" to obtain an objective way the information necessary for payment, including encouraging costumers to use the web portal to make their energy payments;
- Situation example 2—Achieved result: recognition of need for improvement processes to costumer request registers performed by call center, allowing their better accountability and appropriately qualification. Valuation: records registering requests made by the costumer as "general information" (unstructured services), when there were more appropriate services types for service requested identification. Some training performed and attendance proceedings reinforced allowed better information. Additionally, this allows the evaluation of the needs by the requested services and prepare processes and specific attendance actions;
- Situation example 3—Achieved result: recognition of the effectiveness of the SMS channel as a warner of power disruption and repair time indicator. Valuation: the SMS deployment presupposes a customer satisfaction with information anticipation about grid failures. The monitoring of the actions taken could ensure better performance of the channel, procedures adjustments and warnings shipping reschedules;
- Situation example 4—Achieved result: attendance and service channels records costs structure revaluation. Valuation: considering the contractual structures and the processed amount of services by channel, there was time and resources availability to expand the responsive relationship. Therefore, each channel cost structures study improves service planning capabilities and analyzes service contracts with partner companies. The study seeks to accomplish suitable operations for the occupancy of the attendance channel, offsetting any idleness with proactive and responsive relationship. Register update, e-mail bills and SMS notifications adhesion campaigns look for these opportunities of resource availability;
- Situation Example 5—Achieved result: recognition of needed services by very demanding customers. Valuation: characterization and studies of the situations of customers' multiple requests during the last 12 months. Additionally, foreign searching robots appear at the web portal access and require additional security actions implementation. Cases of not fully completed data records also characterize operational improvements to the CRM systems;

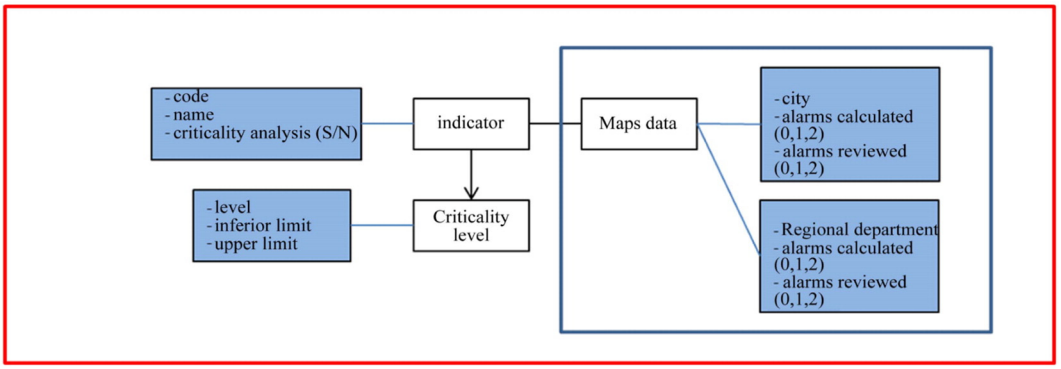

Fig. 2. Indicators' representation of the for the maps system.

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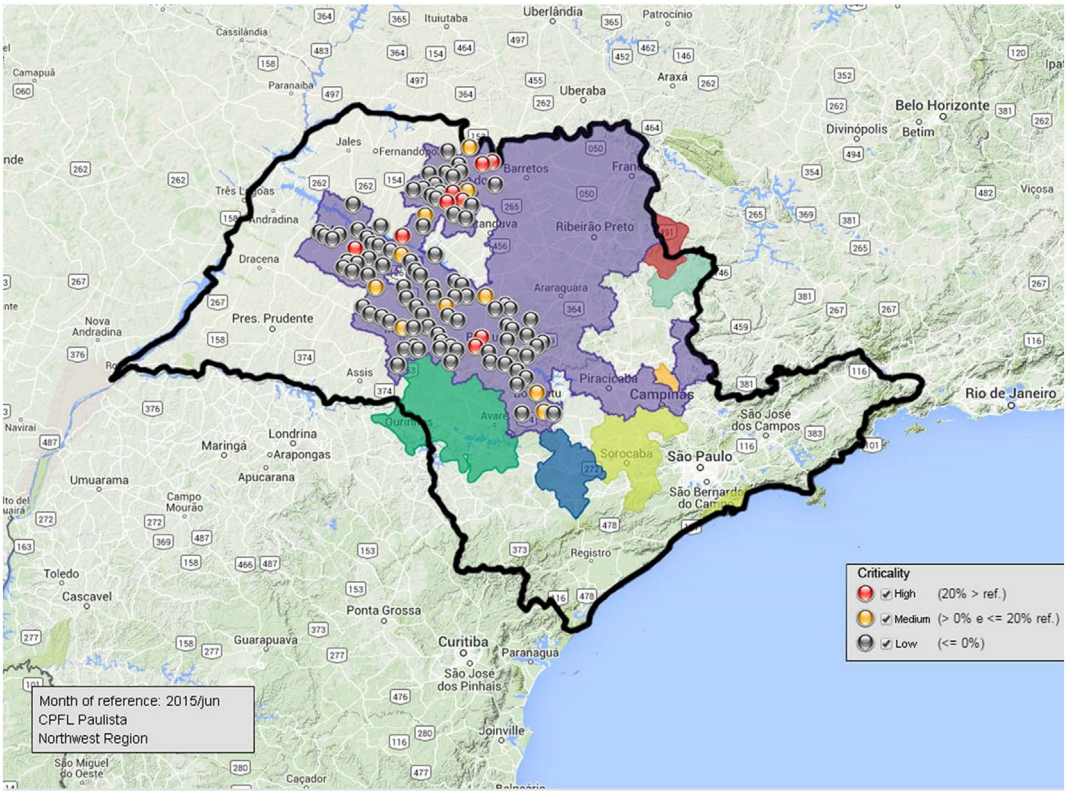

Fig. 3. Northwest region of CPFL Paulista map, representing the criticality (alerts) regarding the cities number of customers x services required.

- Situation Example 6—Achieved result: recognition of plaintiff default costumer needs. Valuation: cases associating attendance request with power cut-off notices previously sent, caused by defaults, generate excessive requests at different channels, mainly at call center. Proposals for communication improvements for these default customers, taking precise information about procedures and times involved in the power cut-off and collection processes. Changes at web portal, seeking usability and responsiveness in the case of late payments complement the situations present in the situation Example 1;
- Situation Example 7—Achieved result: operational improvements proposals in case of delay of responses in the requests for change of contracts or reconnection. Valuation: characterize the amount of care and time to meet customer needs. Restudies of processes seek operational agility;
- Situation Example 8—Achieved result: segmentation of relationship register between receptive and responsive. Valuation: for some relationship channels (mainly e-mails and correspondence) the legacy systems don't make the appropriated information record as receptive

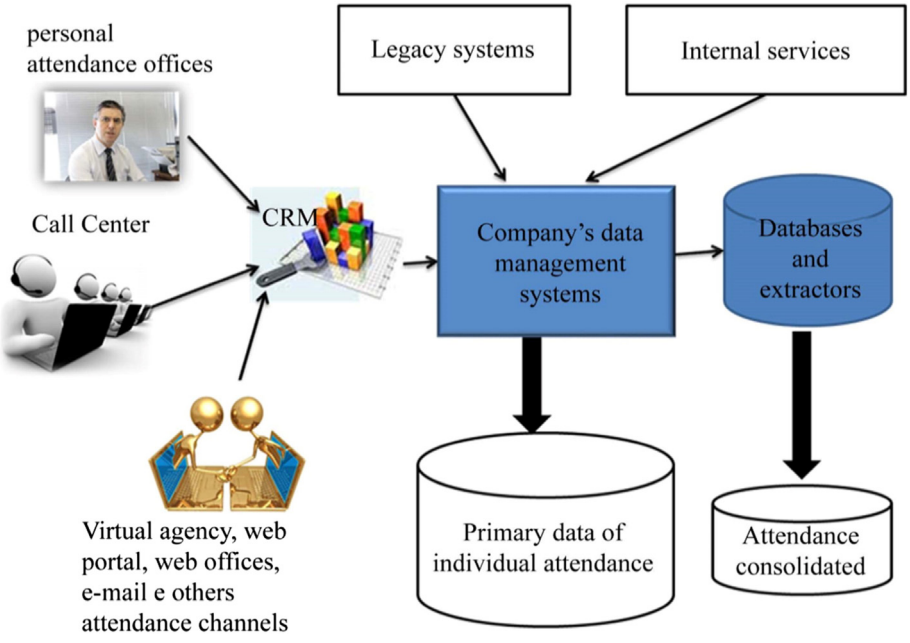

Fig. 4. Distributor data processing flow.

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service (customer initiative) or responsive one (distributor initiative). Additional information record proposals emphasize the resizing and prioritization of teams' structures, plus proper accounting of requests and answers.

- Situation Example 9—Achieved result: extension of consistency rules of activities records Valuation: The CRM system register, eventually, two or more activities to the same user request. Necessary improvement at the consistency rules across systems, during the register of activities, try to eliminate such occurrences;
- Situation example 10—Achieved result: providing new services and self-services facilities at web portal for the biggest clients. Valuation: simple service request detection, as rebills, consumption and payment historical information, at personal service channels, and more complex, as contractual changes done by e-mail or letters. For a complex service to the biggest clients, analysts' performances improve the data records quality. The availability of information and facilities at the website to complete and submit contracts, with cyber security and controlled document signings, improves the relationship sought. Others capabilities proposals solve noncomplex requests immediately;
- Situation Example 11—Achieved result: costumers' registers update to represent adequately their business activities. Valuation: identifying probable errors or registration obsolescence that generated the application of consumption undue taxes. Registers rechecking is necessary for indicated customers;
- Situation Example 12—Achieved result: notifications to managers and analysts with a critical regional attendance volume and excessive customers' requirements during an observation period. Warnings via SMS, e-mail and available on CCAF system. Valuation: conditions characterization and limits to establish critical levels for the attendances in the observation period;
- Situation Example 13—Achieved result: low-income population or low energy consumption pattern relationship characterization. Valuation: social class profiles, using legal documents information provided by the customers, allow appropriated segmentation of their requests and improve their relationships. Changes in intelligence incorporated at IVR (Interactive Voice Relationship) closest these customer segment to service solution;
- Situation Example 14—Achieved result: characterization of the attendances per day as a "heat map". Valuation: consolidation differentiates data service per day per customers' profile and region. Attendance quantitative and qualitative analysis allows resource reorganization for seasonal and regional service provisioning.

CCAF system features permits these examples representation and operational condition detection and monitoring. Other conditions and specificities promote a new form of behavior analysis in this consolidation tool. Analytical tools SPSS Modeler 0 carry out details or indicators associations as data mining process, using statistical and deterministic mechanisms.

This study seeks to prepare the conditions for the treatment of large volumes of data and processes the information bases to support the relationship evolution trends that will come with the implementation of smart grids. In this new paradigm of network structures and control operation resources, customers receive new services and consumption detailed data information. The operational and seasonal requirements improve systems, ways of access, control and communication organization. The preparation of this relationship step must be done with the simplification of current attendances, in understanding of needs, available services and quantifying the resources involving costs and response times. The demand for complex services or those that require human interaction need a revalidation to a better attendance and to minimize costs. The entire list of services requires constant systems upgrade to meet dynamic market requirements.

6. Conclusions

This work provides a new process to recognize customers as decision makers, choosers and hirers of services, preparing paths to the new relationship now arising with energy companies' smart grid (0. The work retries products/new services management and differentiates communication with the buyers and their needs (Kotler et al., 2010).

The paper attempts to restructure the model of service conditions care and provisioning which suites to (or points out) the customers' specific needs and regional characteristics. From the operational point of view, the recognition of the requested services in each attendance channel and improvement of knowledge of costumers/consumers expectations do, or will do, the differentiation to a better communication. The analyses performed additionally contribute to improve friendly systems, registering and accounting of the customer requests with greater accuracy.

The Key Quality Indicators (0 promote the necessary operation dynamic view. KQI complement the results of KPI maps that represent the regional attendance demand and costs. Additional indicators organizations assist the identification of alert and trend situations, focusing on the regional granularity (cities and neighborhoods views) and on the customers' profiles (consumer class according to the Brazilian regulation, consumption or energy tension range and bill payment). Monthly services required and operational dynamics, the weekly, daily and real time views result in historical trend analyses.

These new resources are now available to the utilities business intelligence analysts helping them to understand customers' relationships. The work aggregates focus on the unattended expectations presented by costumers, resulting on multiple calls to solve their problems and the reinforcement to the defaults cases. These problems are recurrent and costly to the dealership, needing special attention to the status of the customers' timely payment, registers effectiveness and the energy company's performance to the requested services. Variables representing the relationships correlate the performed services, regional demands, companies' relationship campaigns and weather conditions.

Other evaluations correlate weather problems and grid failures grid weakness, recognizing regions and trends, sending SMS to alert about unavailability and remaining time to service returns. This kind of analysis and its efficiency evidence the system features.

In this moment, the distributor utilities evaluate the costs variables ensuring more visibility and financial accuracy to the operation efficiency conditions 0).

It is important to emphasize the uniqueness of analysis, considering the indicators' visibility and granularity, to represent the communication with the customers and relationship conditions considering the regions, cities, neighborhoods that present specific needs. The smart grid future demands and services offers must pass by this way, trading big data associations at distributor databases, providing support to new business opportunities and efficiency at critical operation times (DOE, 2013).

The next steps are directly related to the dynamics of operational and customers' communicational needs, improving representative models based on fsQCA (Woodside, 2014) and others. The first steps generate an open organizational model of the relationship effectiveness.

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