EFFECTIVE INTEGRATION OF ONSITE CUSTOMERS AND SALES & MARKETING MANAGEMENT BY STANDARDIZED CODING AND CENTRALIZED PLATFORM

Tao Ji  
ChongQing Electric Power Company, China  
jitao@cqep.com.cn

Lin Qiu  
ChongQing Electric Power Company, China  
qiul@cqep.com.cn

Bo Zhou  
ChongQing Electric Power Company, China  
zb@cqep.com.cn

ABSTRACT

This article, based on technical difficulties ranging from data modeling, master data synchronization, to system loadings, and execution performance, has introduced the ways to integrate the international packaged software with local customized software, real-time sharing of customer profiles, automated meter reading and invoicing, task distribution for abnormal activities, and other automated processes. These have described the effective integration of onsite customers and sales & management by standardized coding and centralized platform.

Keywords: standardized coding, centralized platform, customer scene, sales & marketing management, integration.

BACKGROUND

Chongqing Electric Power Corp’s Customer Care & Service System (CCS) is enabling the complete business processes in a centralized platform for sales & marketing domain. It serves as the company’s business foundation management system, and supports company’s S&M daily business activities and management tasks. Customer Scene Management (CSM) System is custom-made software, built using centralized model to synchronize with CCS. It allows real-time collection of electricity sales information at customer scene, centralized monitoring of electricity load, processing of customer scene events, remote meter reading and other basic automated functions of sales & marketing.

The target that CCS manages mainly is the onsite data that’s obtained by personnel manually. Since the onsite data is uploaded to the system manually, it increases the links of the data transfer process, and correspondingly increases the personnel workloads and data discrepancy, which is disadvantageous for effective management of onsite customers. Also, the mass onsite data obtained by CSM is hard to be put into good use.

To promote better onsite customer data collection, monitoring, and management, and to improve automation level, as well as to reduce the workloads and human errors by personnel, the company plans to make use of both systems advantages, to highly integrate onsite customer with S&M management.

INTRODUCTION

1. Introduction to Systems Integration

1.1 S&M Technology Support System

As Chongqing is one of the municipalities in China, based on its administrative feature and company’s management model, the S&M Technology Support System has adopted the centralized approach for implementation. It has realized the centralization control of data and standardization of business operations in company’s unified platform. The company has used international sophisticated package software – SAP to implement the core of the S&M Technology Support System, i.e. CCS, and at the same time imported the best practice worldwide and advanced management ideas to restructure the S&M management processes, and reduce the risk of project implementation.

The company has used the architecture of Enterprise Application Integration (EAI) to realize data sharing and application integration across all the modules and external systems.

2. CCS System

2.1 Technical Architecture

CCS System is implemented using reputable international management software company, i.e. SAP’s Industry Solution for Utilities/ Customer Care & Service (IS-U/CCS), which is a packaged software used to build the centralized S&M management and customer service platform. CCS System is implemented using three layer architecture, which consists of SAN Volume Controller (SVC) technology to construct storage environment, solid information security protection system, and development, test, training, and production environment to have the data fully independent from each other. With integration of EAI with external systems, business intensive management and information sharing across power bureaus at different locations can be accomplished.

Diagram 1: CCS System Technical Architecture
2.2 CCS System Functionalities
CCS System mainly consists of 4 modules, which are customer service, device management, billing and invoicing, and finance. They are used to manage customer profiles, customer contacts, service connection, move-in/ move-out processing, work distribution, meter reading management, device management, rate management, electricity bill calculation, payments, credit management, dunning and accounting processing.

2.3 CCS System Technical Features
2.3.1 Configurations for Basic Functionalities
To realize the basic functionalities, configurations need to be done. After the standard configurations, the industry standard business processes are basically shaped into a ‘draft’ version of the system. Adjustments based on the company’s requirement can be incorporated to the ‘draft’ and the system functionality is realized as such.

2.3.2 System Support for Business Growth
CCS system architecture supports dynamic expansion, which enables system expansion such as adding server hardware without interfering production system operations.

2.3.3 System Support for Business Change
For business processes changes, CCS just need to make changes to certain configurations.

2.3.4 Compatibility with Other Systems
CCS is integrated with external systems thru EAI, and EAI is expandable to support non-SAP system as well.

3. CSM System
CSM has used the centralized approach and was built together with CCS. It realizes real-time collection of electricity sales information at customer scene, centralized monitoring of electricity load, processing of customer scene events, remote meter reading and other basic automated functions of sales & marketing.

3.1 CSM Technical Features:
- The centralized main system is built to cover the company and its root units.
- Make use of different type and multi channels communication technology to realize shared management of 230G, GPRS, and CDMA.
- Open interface standard, which is compatible with different terminal models, vendors, and functions.
- Make use of network automation technology that enables better reliability and real time processing power.
- Sizing of System Design: 20K of dedication transformer customers, 40K of public transformer, 0.2M of residential customers, to accommodate development needs in the next five years.

4. EAI Interface Platform
Enterprise Application Architecture (EAI), using middleware to serve as the glue to connect enterprise’s different type of business systems, application and data sources, to satisfy seamless sharing and data interchange for different systems, databases, and data warehouse. EAI platform should be a service-oriented and scalable architecture that provides unified and integrated business solution.

Chongqing Electric Power’s S&M EAI platform has selected software from BEA Weblogic Integration for development. The platform has development, test, and production environment to ensure the data is totally independent. The S&M EAI platform has four components: which the technical architecture is shown below:

Diagram 2: CQEP S&M EAI Technical Architecture

Application Integration Service
Core business process flow management: mainly realize the design of business process flow, development, deployment, and execution, as well as process flow related exception cases processing, such as logging, events, data conversion and messaging agent.

SAP Adapter: Realize the interaction of EAI platform with packaged software SAP IS-U/CCS and BW, by providing RFC/BAPI interface invoking, file transfer, and messaging.

Controlware: With web service calling, file transfer, and JMS messages transfer, automation is realized to accomplish information interchange between EAI platform and custom made software system i.e. 95598 Call Center System, CSM, and others.

Execution, maintenance, and management: Thru browser-based monitoring and management tool, it realizes WLI process flow actual case monitoring, application deployment, process flow status, system parameters monitoring and etc.

Monitoring and Management
Based on business functional requirements, realizes application log management, application parameters maintenance, application execution status monitoring, service inquiry and others.

FTP Server
With EAI, data integration and information sharing can be done thru file transfer from multiple systems. Therefore FTP server is built within EAI platform.

EAI Database Engine and Business Database
EAI platform has selected SYBASE as its database. By using software to arrange EAI database engine and business database, so that both databases store independently, not interfering each other, ensure system and business is separated, and improve the reliability.
5. CCS and CSM Integration

5.1 Integration Objective
With automation of meter reading, billing, and work distribution as core requirements to integrate the functionalities of CCS and CSM, thus realize: CCS generate meter reading order – CSM perform meter reading automatically – CCS bills intelligently, which the whole process is automated without manual operation.

CSM and CCS shared the same customer profiles, device information, meter reading data, onsite real-time data, to ensure data consistency.

CCS can based on the terminal operation information, automatically distinguish whether the meter reading order should be downloaded to CSM or meter reading device, which CSM will based on the tasks to complete the automated meter reading.

CCS can perform intelligent billing based on the data from automated meter reading.
CSM will monitor onsite information, and deliver the exception messages back to CCS, which will then trigger the exception work order, this will ensure measurement devices can be repaired and maintained in time.
Based on the CCS tasks, CSM will automatically collect transformers I/O data, and with CCS corresponding power consumption records, the loss measurement can be managed and monitored.

5.2 High-level View of Interfaces Technical Architecture
CCS and CSM integration mainly realize the synchronization of master data, and automated meter reading data transfer. EAI interface adopted approaches such as real time calling, FTP file transfers, and ‘middle’ database.

5.3 Same Data Modeling Rules for CCS and CSM
CSM’s customer profile design strictly follows CCS’s data modeling design, which the profile data sources come from CCS. Strong foundation is built with consistent data model for profile synchronization, and standardized coding has ensured intelligent billing too.

Diagram 3: CCS and CSM Interface

CCS System Profile Model has links as below:
- Technical Data Link: power bureau – regional structure – connection object – premise – installation
  City – region – connection object – premise – installation
- Business Master Data Link: Business Partner-Contract Account – contract - installation
- Meter Reading Data Link: billing unit – meter reading unit - installation
- Device Data Link: Device Category – Device – Installation
To synchronize CCS profile information while ensure system functions and interface performance, CSM system is built to strictly refer to the CCS data model with some simplification, i.e. removing meter reading data link, simplifying device data link and business data link, and preserve the technical link.

5.4 Data Synchronization
CCS is required to output the master data and integrate with the ‘middle’ database to provide the data to CSM.

5.5 Integrated CCS and CSM for Automated Meter Reading and Intelligent Billing
With the interface of both systems, it realizes: CCS generate meter reading order – CSM perform remote meter reading automatically – CCS perform billing and invoicing, which the whole process is automated without manual operation.

Diagram 5: Automated Meter Reading and Billing Process Flow

5.6 Automated Alarm, Work Distribution, and Onsite Inspection for Measurement Device.
With interface of CCS and CSM, CSM is able to obtain exceptional measurement status and upload to CCS...
system, which CCS will immediately notify related personnel thru SMS/ work order, and go onsite for investigation.

Diagram 6: Process Flow of Automated Processing for Measurement Status

KEY TECHNICAL CHALLENGES AND SOLUTIONS

1. Master Data Synchronization
CQM’s main tasks are to accomplish load control, automated meter reading, and onsite measurement status monitoring. CSM’s customer profiles and measurement device settings are all obtained from CCS, while CCS as international packaged software, is having complex data model, which the master data sharing and synchronization is a key challenge.

Solution:
- Refer to CCS master data model rules to build CSM data structure, and maintain consistent coding.
- Custom develop programs to output 31 data files (including both business master data and technical master data), and data sharing and synchronization can be attained thru EAI.

2. System Pressures and Operational Efficiency
CQEP CCS System has 4 million customers, which 17K of them is being meter-read and monitored thru CSM, and the number is expected to reach 0.2 million customers in the future. Since there is no standard BAPI in SAP for master data file output, it will a challenge for CCS’s pressures and operational efficiency to custom develop 31 master data file output and synchronization

Solution:
- Master data file output and synchronization job is placed into nightly batch to avoid peak hours of system operation.
- Using SAP parallel processing capability to configure the optimal concurrent jobs and optimal contract account numbers for each job to maximize the system performance.
- Performance optimization thru repeated performance testing to identify bottleneck, and optimize the programs to improve the run time. (0.2 million customer master data full synchronization require 5 minutes, and update synchronization require 15 minutes)

BENEFITS

The seamless integration of CCS and CSM has significant benefits to CQEP’s S&M management in details.
- With the systems integration, it has provided technical support to onsite customers.
  In early 2008, Chongqing has faced with issues such as lack of coal and winter snow disaster, the electricity breach has reached the historical highest level, i.e. 30% (up to 158 million kW). The system has played an important role in this case, by making use of system loading control function, it has directly reduced the load of 129 million kW (i.e. 80% of the breach), which is also the best record historically. This has safeguard electricity consumption for residential and VIP customers.
- CCS and CSM enhance resources sharing, unify data modeling rules and coding format, which has ensured data consistency. As for high-voltage customers, it has realized automated meter reading and intelligent billing to reduce error effectively, and to improve service quality. Dedicated transformers have 100% automated meter reading, which covers 80% of the total electricity consumption of the company.
- Adequate use of CSM onsite monitoring tool and CCS work management to implement onsite customer status monitoring, which has improve prevention capability for electricity stealing.

AUTHOR INTRODUCTION

Tao Ji  Female. Ms. Tao Ji graduated from UEST (The University of Electronic Science and Technology) at 1991, whose major was computer software. She is senior engineer, and takes vice director of customer service center in CQEP. She has more than 15 years experience in information technology field, mainly focuses application development and deployment for power retailing and customer service. She led team to implement the first SAP IS-U/CCS project in Mainland China as project manager.
Email: jitao@cqep.com.cn

Lin Qiu  Male. Mr. Lin Qiu graduated from CTBU (Chongqing Technology and Business University) at 1999, whose major was automation. He is engineer, and takes deputy manager of application department of customer service center in CQEP.
Email: qiul@cqep.com.cn

Bo Zou  Female. Ms. Bo Zou graduated from CQU (Chongqing University), whose major was computer and network. She is manager of system department of customer service center in CQEP.
Email: zb@cqep.com.cn