Presented at DistribuTECH 2002

IMPROVING SERVICE RESTORATION A PROCESS-ORIENTED APPROACH

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Background

Baltimore Gas and Electric (BGE) is the nation's oldest gas utility and one of the earliest electric utilities. BGE provides service to more than 1.1 million electric customers and approximately 600,000 natural gas customers in Central Maryland. The electric service territory is approximately 2,300 square miles. The BGE electric delivery system includes more than 1,200 miles of transmission lines and more than 17,000 miles of overhead and underground distribution lines.

Service Restoration activities have been supported for nearly 20 years by a computerized Electric Trouble Operating System (ETOS), which is responsible for analyzing customer calls, inferring outage locations, and assisting with crew dispatch to restore service. The System Operations section of the electric business manages the distribution and bulk power control rooms, and outage scheduling personnel. Control room personnel direct fieldwork activities. System Operations is responsible for prioritizing and addressing three main categories of work: Unplanned Outages, Customer Information System (CIS) tickets, and Planned Switching. During an average year the control room receives approximately 12,000 unplanned outage jobs, 50,000 CIS tickets, and 6,000 planned outage requests.

When a customer calls the Customer Care Center, Customer Care Representatives, the Interactive Voice Recognition system, or the Call Overflow records an “All Out” condition. The customer’s grid and transformer number information is sent to the trouble call analysis portion of ETOS via CIS. Using feeder model connectivity provided by the Distribution Management Information System (DMIS) related calls are grouped (if possible) and ETOS jobs are created. As jobs (excluding house service) are created, updated or restored on ETOS, a copy of the job information is sent to the CIS, where a local database of active job information is maintained. This database includes information such as: job identifier; device operated; time created; dispatch status; and, Estimated Time of Restoration (ETR) information. This information, along with a simple customer to transformer to protective device matching function, is used to perform a lookup on active jobs and provide job status information when customers call. ETOS is used to record Service Operator work assignments and to update job status information (assignment, dispatch, ETR, completion, fault cause, etc.).

In January 2000, following major weather-related system disturbances in 1999, BGE undertook a project to replace the ETOS with a new Outage Management System (OMS). An OMS Project Team was established to manage OMS implementation for the System Operations Organization to combine people, processes, and technology changes for improved restoration performance.

From the start, BGE realized that an implementation approach based on business process improvement was essential for defining requirements, implementing the system, and developing and delivering training.

This paper describes in detail the techniques and tools used to analyze existing business processes, develop requirements, and support the overall business change management activities that accompanied technical implementation of the new system.

Defining Requirements

A series of Joint Application Development (JAD) sessions was conducted to define OMS requirements. JAD is a methodology used to obtain group consensus on problems, objectives, and requirements. The JAD process is performed in a session where people who need to make decisions affecting multiple areas of the organization are brought together in structured meetings. JAD session information has been used during the course of the project to define the Project Scope, create the Business Process Model, and develop requirements for the Request for Proposal.

JAD sessions were conducted with OMS Project Team members and Subject Matter Experts (SME) from each business unit. Each of these JAD sessions – a total of eighteen – was led by an experienced facilitator and was structured by means of a short questionnaire covering current technical infrastructure, interfaces, business processes, and anticipated future needs.

Sessions were structured around business process drivers used for the existing outage management system and the desired combination of future processes and technology opportunities. JAD sessions reviewed the following processes and technology opportunities:

- Call Management

  The receipt, storage, and processing of outage and other service notifications made available to the OMS from various sources (Customer Information System, IVR, call overflow, and outage notification devices)

- Customer Feedback and Estimated Time for Restoration (ETR)

  The ability to provide ETR, call status, outage status, crew status, feeder outage status and scheduled outages to customers

- Trouble Outage Analysis

  The analytical process of predicting the location of a protective device that operated due to a fault on the distribution system.

- Planned Switching

  The development of switching plans for elective switching operations, such as those for BGE-initiated electric system maintenance, customer requested outages and construction.

- Tagging, Permitting, and Safety Checks

  Placement and removal of electronic representations of various types of tags and work permits, and the safety checks that are required before allowing certain types of switching operations.

- Switching

  The update of the OMS network operations model to reflect field switching operations, and logging of the switching actions.

- User Interface

  The network-oriented and dispatching-oriented screens provided by the system, whether used locally by control room operators or from remote locations by construction personnel in a dispatching role.

- Alarming and Notification

  Alarming processes are reserved for user notifications that are important enough to require a response (acknowledgment) from the user. Notification refers to any other event-driven dissemination of information to users.

- User Management

  The association of particular roles, responsibilities and privileges with each OMS user.

- Crew Management and Dispatch

  All business processes required to define field resources to the system, assign work to field crews, monitor the progress of work, and record the final resolution of jobs.

- Storm Restoration

  All activities needed to develop and support system restoration activities following events that have caused widespread outages.

- Network Model

  The network model provides a comprehensive, up-to-date representation of the BGE distribution system, including the current status of all switches, reclosers, cutouts, and breakers.

- Network Analysis

  Network analysis provides the calculation of current flows and voltages for any part of the BGE distribution and sub-transmission system.

- Emergency Backup

  The operational procedures and the physical computing and communication diversity necessary to ensure business continuity if the OMS, critical communications, or Control Room facilities are rendered unusable.

- Reporting

  Reporting provides the analysis and presentation of current or historical information via either screens or hardcopy. Reporting is based on the existence of a historical data repository or data warehouse containing all available data pertaining to outages, calls, crew management and dispatching information, resolution information, materials estimated and actually used for jobs, and callbacks.

- Executive Information System

  A secure, web-based development environment and information server that provides controlled access to near-real time system status information and historical report information.

The JAD sessions resulted in a technology inventory, a projection of technology trends at BGE, a business process overview, and identification of future BGE business process needs. In the time frame of the JAD effort it was not possible to perform detailed business process analysis. The objective was to ensure that the workflow elements of the future OMS solution would be compatible with BGE's current and future business process needs. The business requirements resulting from the JAD sessions were used directly to support the creation of the Request for Proposal (RFP), system vendor selection, and business process analysis.

Analyzing Business Process

BGE used the results of the JAD sessions as the initial structure for formal business process modeling sessions. Although detailed description of the existing (As-Is) business processes were not needed by the OMS vendor to implement the system, they were essential for defining the communication and training elements of the overall change management program. All Outage Management business processes were analyzed to understand and document:

- Functional Area, Function, Process, Sub-Process, and Activity Decomposition
- Detailed Activity Diagrams (Triggers, Actions, Outcomes)
- Roles
- Organizations
- Handoffs
- Business Rules
- Supporting Technologies
- Supporting Work Procedures

All information was captured in a business process modeling toolset to allow effective analysis, communication, and maintenance of the business process information. The GEMWorX FlowModeler toolset was used to capture business rules, work documents, job aids, technologies, roles, organizational structure, and other corporate knowledge related to OMS processes. The tool links this information directly into the business process model through an integrated database and graphical representation. Users can access this information directly with a mouse click while viewing a workflow step in the process diagram. In addition, the information can be analyzed and reported for an individual process or an entire business area.

Using the business process activity task information, swimlane diagrams were constructed. Swimlane diagrams document detailed tasks of an activity. Tasks for each activity were mapped on horizontal lanes from left to right. An important characteristic of swimlane diagrams is that they document all internal and external interfaces within a process. Technology used by each task was recorded in a predefined swimlane directly above or below the task that uses the technology.

As-Is process modeling resulted in a representation of the relationship between processes and functions for the existing ETOS technology and interfaces between process owners. Review of existing procedures, job tasks, forms, notifications, and skills sets were evaluated to determine the changes required to move forward with the new OMS technology.

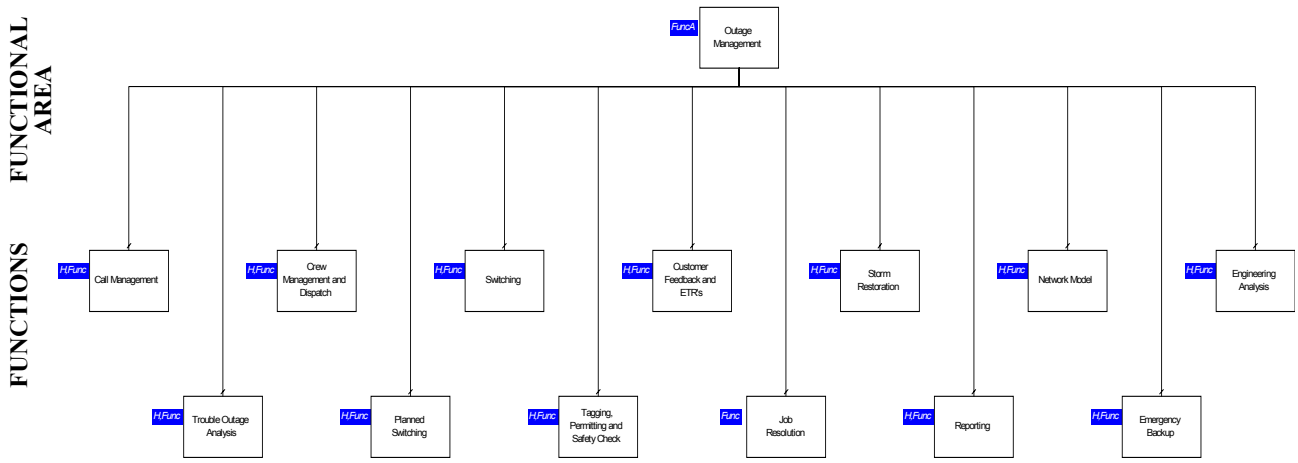
Defining Future Requirements

BGE's business objectives, the capabilities of the selected OMS, and the current business processes served as the framework for developing the detailed future (To-Be) business processes. To-Be analysis leverages the investment in new OMS technology to obtain the desired benefits of improved service restoration. These business processes were also developed (and will be maintained going forward) within the business process modeling toolset.

The scope of To-Be analysis was to evaluate the operations during both normal operating conditions and storms, examine the methods for performing the tasks, identify process issues, and address process opportunities identified in the As-Is Phase. As-Is process analysis and JAD review provided functional decomposition views of current work processes based on areas of functionality, not based upon organizational unit.

The To-Be Outage Management functional area consists of all of the functions, processes and activities required for service restoration and scheduled outages. The analysis required looking beyond the organization chart to review workflow. The objective was to understand how processes are distributed among departments and individuals using new OMS technology. Exhibit 1 provides an overview of the total Outage Management functional area to support OMS implementation.

Exhibit 1
BGE Outage Management
Functional Area Decomposition



A core of Subject Matter Experts and Project Team members familiar with As-Is processes and system models were identified to design To-Be processes. Teams were scheduled to evaluate each function to define processes down to the task level. Task steps were exercised on the Development System (an early delivery of the selected OMS) whenever possible. Simulating work tasks on a system similar to the OMS that will be delivered while vendor development requirements were being finalized allowed process development to be performed in parallel with system development.

The most important result of the analysis of the To-Be work processes was the identification of opportunities to improve operational effectiveness and maximize the use of technology. The up-to-date work process information then supported development of accurate BGE specific training materials. Employees need training for the new OMS systems as well as new or revised work processes.

Training and Change Management

The deltas between the As-Is and To-Be business processes, business rules, work procedures, roles, and supporting technologies led directly to identification of the necessary knowledge and skills for each role in the Outage Management business processes. The key objective of the OMS Change Management was to provide a training structure that will produce desired process interfaces with new OMS technology, communicate changes to employees, and provide on-going change support.

BGE used a competency-based training approach and developed a training strategy that incorporated the following principles into the training program:

- Measurement of student competency

  The criterion for completion of training modules is the successful acquisition of the skills required to perform the associated jobs.

- Integration of theory and skills

  Training modules integrate the background theoretical knowledge for processes and technologies, but remain focused upon the skills.

- Utilization of actual technologies

  Training utilizes the BGE OMS. Training exercises were conducted and a training environment is available for user practice.

- Self-paced component

  Competency-based training has been designed to allow students to proceed at their own pace. This demands that modules include a combination of instructor-delivered and self-delivered components.

Key factors considered for training design were potential gaps between training sessions, access to the final BGE OMS model, and user practice time. The critical training audiences for day one of OMS implementation were operators and key operational support positions. Had training been provided too early using the base vendor model greater risks would have occurred for users. Training on an OMS whose features or underlying distribution system model was not an accurate representation of the final system was not considered feasible, as it had the potential to result in user dissatisfaction. The Change Management team also felt that there would be a higher occurrence of users forgetting what they learned prior to BGE specific training and users not being motivated to practice on a generic system model.

A phased approach was used to deliver OMS training. This approach was designed to increase user familiarity and exposure to new OMS technology. The two phases were:

- Phase One – OMS Overview

  The first phase of training focused on an overview of OMS capabilities and user interaction. The objective of OMS technology use during phase one classroom instruction is to engage core users to interact with one another, training support personnel, and the new technology. This course provides a basic understanding of OMS features. Post-class practice environments were made available for day-one core users.

- Phase Two – BGE OMS Specific Functionality

  The second phase of training provided reinforcement, additional details, process changes and supplementary modules. Post-implementation training and support plans to address remedial/refresher training or additional training to lower priority users were identified.

Trainee participants were identified and user requirements were analyzed to develop training requirements for 450 trainees. Training requirements were based on the priority functions performed in each work area and projected OMS utilization. Training modules were developed to present BGE process specific training to meet the training skill requirements for each skill set group. The curriculum was structured into modules that married OMS functions and operation processes. Dedicated trainee workstations were set up for class instruction for operators and users at service centers. A total of 65 training sessions were conducted in two months.

The BGE OMS Training Team was comprised of OMS Functional Project Team members as well as representatives from user areas. OMS Functional Team Members delivered all OMS training. Designated representatives from user areas were selected to assist with OMS user support at their respective work locations on an on-going basis after training is conducted. The BGE training team received train-the-trainer instruction with practice training exercises. Change agents assisting at various service centers participated in train-the-trainer sessions to get advance knowledge of training structure and provide trainers with suggestions and training material evaluation.

Communications

Process change requires clear and direct communications to project teams as well as all employees affected by change. Employees in all areas affected by the OMS needed to understand their roles. Various communication mechanisms were used to move stakeholders along the path from awareness to advocacy and ownership of OMS. In addition, project status communications were critical. A Communication Plan kept all BGE and external stakeholders aware of the progress of the project, particularly the business transformations that would occur when the new OMS was placed in service.

The BGE communication approach is built around the following principles and strategies:

- Communications target project team members and employees that are critical to the success of the OMS Project
- Necessary information is communicated on a timely basis
- Documentation of team meetings is maintained
- Status meetings are conducted
- Status reports are maintained and distributed
- A BGE OMS Project Team member acts as primary contact with stakeholder groups to ensure their input and involvement.

Key communication mechanisms that were successful were:

- OMS Web Site

  A web site with the OMS Project logo was posted on the BGE intranet. The web site provided information on the project history, scope, OMS vendor, change management, news, frequently asked questions, and project contact information.

- OMS Newsletter

  A newsletter was used to distribute information to a large audience and provide links to additional information posted on the web site. Articles included project status information, training information, process information, references to information on the web site, and user interviews.

- OMS Presentations

  Formal presentations to various groups within and outside BGE were crucial to gaining and maintaining support for the project. Presentations were developed for three primary audiences: executives, user areas, and external company audiences. In addition, storm organization presentations were developed to address changes in storm duties. Periodic updates of these presentations were performed, because frequent repetitions of the key underlying messages overlaid by up-to-date status information are essential to successful communication with each of these groups.

  - Executive Presentations

    The executive presentation summarized the business benefits, technical directions, budget, project progress, and expected major business process and organizational changes. Presentations were routinely made to the project steering committee.

  - User Presentations

    OMS presentations were designed from the point of view of the various groups of users who will interact with it. These presentations were created with a flexible structure that could be tailored for various groups, such as control room personnel, outage schedulers, field personnel, marketing personnel, storm support roles, and others. Demonstrations of the OMS were included.

  - External Presentation

    Presentations were developed that summarize the capabilities and benefits of the system as they apply to customers, emergency management agencies, and other external parties.

The web site, newsletter, presentations, staff meetings and project meetings are all standard and accepted means of communications; however BGE realized that these methods had to be reinforced constantly by face-to-face communications and interaction with users for feedback. A

dedicated Change Management position on the project team and change agents in affected user areas were crucial to gaining and maintaining support for the project.

Conclusion

Processes revised or developed during this project prepared BGE for the initial implementation phase of OMS. As we develop additional experience with the new OMS model some processes will require additional review as a result of any changes in system capabilities or interfaces with other work areas. An important result of the OMS process-oriented approach was the identified opportunities to improve operation effectiveness and maximize use of technology.

The following factors were critical to the project success:

- A dedicated full-time Change Management Project Lead was assigned to the project team. This assignment ensured successful integration of operator processes and technology.

- Designated Change Agent representation in affected OMS user areas assisted in supporting OMS process changes, answering user questions, and provided feedback to the Change Management team.

- A Change Management Plan was used to define the process analysis and training scope, deliverables, project roles and schedule.

- The Business Process Model was created and maintained in an easily accessible, dynamic, on-line form.

- A Project Tracking Database was used to record, report, and document Change Management items.

- Training modules were designed to contain a balanced content of lecture, demonstration, process knowledge, and hands-on learning.

- A minimum of two trainers were used for operator training classes. One trainer ran the OMS demonstrations and exercises and the second trainer conducted the course. Both trainers provided “walk around” assistance to trainees.

- Obtaining the appropriate level of process detail was critical. High-level process overviews do not support OMS process implementation. The OMS Project Team met with process owners and users to define process changes.

- Advance OMS demonstrations informed user areas about the overall capabilities and benefits of the new system. These presentations established a communication channel and created a relationship with OMS Project Team members.

- The Communications Plan was developed to suit the BGE culture and different communication mechanisms were used.

- Operator advance "practice" on the OMS between courses was effective.

- Users who were interviewed and participated in process design documentation have benefited from an increased understanding of OMS system capabilities as well as process interfaces.

- The "life cycle of a job" was an effective presentation format for demonstrations and training.

Processes will continually be reviewed for increased performance efficiencies and maximum use of technology. Different approaches will be tried and reviewed by process owners. OMS technology itself will improve service restoration, but the full realization of BGE's objectives is dependent on people, business processes, and technology moving forward together.