

GEM Case Study
Baltimore Gas and Electric Company
**Outage Management System and Work Force
Management System Testing**

Situation

Baltimore Gas and Electric (BGE) contracted for a new OpsCentricity outage management system (OMS) from the Configured Energy Systems¹ and required a structured testing approach. The OMS was to be modified to meet BGE requirements, and included four new OMS applications, so a wide range of new functionality had to be fully tested. The scale of BGE's implementation was larger than any other that the OMS vendor had delivered to date, so BGE needed to ensure the system performed as expected under major storm situations. In addition, the OMS would be tightly integrated with a new mobile Work Force Management System (WFMS) from CGI, and the interaction between the systems would require thorough review.

Solution

The implementation schedules had the OMS and WFMS project running in parallel, and the OMS was planned for go-live first. BGE focused on testing the systems independently, then prior to the WFMS going live for electric operations and maintenance, the integrated testing was executed. The goal of the testing was to validate that the software was delivered with the expected functionality and performance.

The OMS testing focused on full spectrum of Centricity that had been configured to BGE specifications; this covered all of the tools and screens that operators and dispatchers would use for day-to-day work as well as during storms. The OMS implementation included the OpCentricity (with Switch Management, Storm Management, Scada Extensions, and Web Call Entry), CommandCentricity, and MyCentricity modules. The OMS vendor provided the interface between the OMS and WFMS systems. The WFMS system was comprised of PragmaCAD and MobLITE systems with specialized views developed for each BGE business Unit. The BGE implementation also utilized the MobileSUPERVISOR, PragmaROAD, and SkyVIEW subsystems.

Testing

To ensure that the testing achieved the testing goals the testing methodology, test materials, and testing documentation was designed to provide clear information and reproducible tests. The testing went through three main phases; Factory Acceptance, Site Acceptance and Final Acceptance testing. The complete battery of tests was run on the system each time. Variances were identified and reported to the vendor for resolution. In each subsequent test phase, the

¹ Now SPL Centricity



System Consulting

corrections were verified and new problems documented. When the number and severity of variances reached the agreed upon levels the testing was completed. Through testing over 2,000 variances were identified and the majority were resolved.

Functional Testing

The functional tests were written to focus on basic function and end-to-end function. Basic function tests that each component of the system was configured properly. End-to-end function tests that the system supports the BGE business processes. The functional and end-to-end testing included the following:

- The tests were written to ensure they were repeatable with explicit setup requirements, user instructions, and expected results.
- A database was developed to hold the test plans and testing results.
- The database supported and tracked regression testing.
- Testing was performed by a team of contractors and BGE functional personnel with up to 16 participants involved.
- The testers recorded all results in the database as the testing was performed.
- The variance tracking and reporting was performed directly from the database

During formal testing the results were reviewed internally at BGE and delivered to the vendor each day. The vendor was given detailed information about the test, with descriptions of test action, the expected results, and the actual results. An electronic copy of the test plans were provided so the vendor technical staff could reproduce the problems.

Performance Testing

The performance of the OMS was a crucial concern for BGE, so performance testing was a key success factor for going live. In a major storm, the OMS could have up to 70 users performing various restoration roles, which far exceeded prior implementations. BGE and the vendor invested a significant amount of time and labor to ensure the software and the work processes could support that level of usage. The performance testing had to validate that the system remained stable and that the user's sessions were responsive under high stress loading.

- A coordinated suite of testing scripts were written for all the major roles in a Storm
- The performance criteria were written into the test activities.
- Automated testing programs were developed to increase loading
- Testing used 18 live testers and automated testers making up the balance of user sessions.
- System response times were recorded by the testers during the test
- The performance statistics were calculated and compared to the requirements.

The performance test was a run numerous times and adjustments were made to both the system and the requirements. As the vendor modified the software to improve performance,



BGE also identified requirements that could be relaxed. BGE identified alternative work processes that could to satisfy the business needs and reduce the demands on the system.

OMS/WFMS Integration

The OMS and WFMS systems were integrated to support a high level of interaction, and a great deal of real-time information was exchanged between the OMS and WFMS. The functional and performance aspects of this integration required testing that mirrored the real life work processes. The OMS end-to-end tests and the performance tests were expanded and enhanced to incorporate the additional WFMS functionality. Through the integration testing, the interface functionality and overall system performance was validated.

GEM's Role

GEM was engaged by BGE to lead the testing on the OMS, and was subsequently asked to lead the integration testing of the OMS and WFMS systems. GEM was a leader or an active participant in the following activities:

- Developed the OMS testing strategy
- Designed the testing database and tracking reports.
- Managed the team of test plan writers (BGE, GEM and other consultants) (the combined team of BGE, GEM, and consultants prepared over 300 test plans)
- Managed the testing activities for Factory Acceptance, Site Acceptance and Final Acceptance testing
- Designed and wrote the OMS Performance Testing scenarios
- Coordinated the performance tests for the OMS system
- Developed the Integrated OMS/WFMS test strategy
- Wrote additional functional test plans for OMS/WFMS
- Designed and wrote the OMS/WFMS Performance Testing scenarios
- Coordinated the performance tests for the integrated OMS/WFMS systems.
- Assisted BGE with variance tracking and reporting



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