

BIOGRAPHICAL INFORMATION

Dudley J. Sondeno
Senior Vice President
Chief Knowledge and Technology Officer
Southwest Gas Corporation
5241 Spring Mountain Road
Las Vegas, Nevada 89150

Specific Responsibilities

Dudley Sondeno joined Southwest Gas Corporation in 1980. In his current duties as Senior Vice President, Chief Knowledge & Technology Officer, he is responsible for Information Services, Telecommunications, Engineering Staff, Corporate and Administrative Services, Fleet Management, Customer Relations Support Staff, Gas Operations Support Staff, and Technical Training.

Past Experience

Sondeno has been with the Company for 24 years. He has served as a senior transmission planning engineer, manager of the LNG Plant in Lovelock, manager of engineering and manager of gas operations for the Southern Arizona Division, Vice President/Engineering and Operations Support. He was promoted to Senior Vice President/Staff Operations in May 1993, then to Senior Vice President/Chief Knowledge and Technology Officer in July 1996.

Educational Information

BSME California Polytechnic State University
 San Luis Obispo, California

Professional Memberships

GITA
Registered Professional Engineer (Mechanical Engineer) State of California
Member NSPE (Nevada Society of Professional Engineers)
Past Chairman of the Advisory Board of The Salvation Army of Las Vegas

DEALING WITH EXTREME GROWTH: INTEGRATING OFFICE AND FIELD OPERATIONS INTO A SINGLE ASSET AND RESOURCE MANAGEMENT ENVIRONMENT

Dudley J. Sondeno
Senior Vice President / Chief Knowledge and Technology Officer
Southwest Gas Corporation
5241 Spring Mountain Road
Las Vegas, NV 89150

ABSTRACT

"Extreme" often refers to sports endeavors that are more challenging, more strenuous and more intense than the norm. These words also describe the significant challenges faced by Southwest Gas in dealing with the continuing customer growth in the company's service territory. Southwest Gas serves Nevada, Arizona and California, including two of the fastest-growing metropolitan areas in the U.S., Las Vegas and Phoenix. Southwest Gas has long understood that to succeed means embracing new, integrated technology that helps its people manage their work better -- from capital projects, maintenance and inspection, to regulatory code compliance -- within a rapidly expanding infrastructure.

This paper focuses on how Southwest Gas is employing its new computerized Asset and Resource Management ("ARM") solution to deliver service excellence in an *"extreme growth"* environment. It emphasizes how, as part of this new solution, the company now exports to the field in "paperless" form the map (GIS) data Southwest Gas invested many years in accumulating, as well as the drawings used for new construction of facilities.

The paper discusses how ARM combines office and field capabilities (Work Management, Mobile Computing, Asset Management, and Compliance Tracking) in a fully-integrated work environment that gives Southwest Gas personnel new productivity tools while laying a foundation for key future compliance initiatives such as Pipeline Integrity Management.

SOUTHWEST GAS -- "THE GROWTH CHALLENGE"

One of the most significant challenges faced by Southwest Gas is dealing with growth in the company's service territory. The Company has over 1.5 million customers, 32 offices and just over 2,500 employees. Over the past 10 years Southwest Gas has added almost 600,000 customers within its service areas (Nevada, Arizona, California). The Las Vegas and Phoenix metropolitan areas continue to be among the fastest growing service territories in the country... the ninth year running for this distinction.

So how does a company deal with extreme growth and increase the efficiency of the gas operations workforce (office and field), so new customers can be added without the proportional addition of employees, and still maintain exceptional customer service?

To meet these objectives, Southwest Gas needed to:

- improve business processes
- do a better job of coordinating all resources
- better manage the growing gas compliance and maintenance requirements including new code requirements imposed by state and federal regulators.
- leverage its experience with mobile computing to increase the efficiency of maintenance and repair activities, inspections, surveys and field design

Southwest Gas realized that an office and field-based work management solution, integrated with other enterprise systems, was the mechanism to achieve these goals.

In December 2001, Southwest Gas partnered with LogicaCMG to implement LogicaCMG's Asset & Resource Management (ARM) product suite, which included work management, asset management, Department of Transportation (DOT) code compliance activity management and additional mobile capabilities for the operations side of the business.

What makes this ARM solution unique is not only its size and complexity, but also the fact that Southwest Gas was integrating for the first time in the company's history both capital and inspection and maintenance work into one system. The aged mainframe capital work request management system Southwest Gas had been using for over 15 years handled an average of 180,000 work requests per year. With the addition of inspection and maintenance work requests, this number of work requests was scheduled to grow to over 500,000 work requests per year with the new ARM system. Add to this the integration of GIS related functions that send and receive maps and drawings related to the work requests and the challenge of just developing the new ARM system was significant. Data cleansing and conversion, training and onsite support all add up to another significant challenge: implementation of the ARM system.

As mentioned earlier, LogicaCMG partnered with Southwest Gas on the ARM project and acted as the prime contractor. MapFrame was a sub-contractor to LogicaCMG and handled the mapping, drawing and field (mobile computing) related portions of the overall system.

The following discussion highlights the specific challenges faced by Southwest Gas prior to implementing the new ARM solution, and how ARM helped the company meet those challenges.

GEOSPATIAL / MAP CHALLENGE

Southwest Gas currently maintains an automated mapping system (Geographic Information System or GIS) that was fully implemented in the mid-1990. Since its initial implementation, the system has gone through numerous upgrades and currently is the system of record for inventorying and locating all of Southwest Gas' distribution and transmission facilities. The map data is stored in both raster and vector formats, with the gas facilities stored as vector data and a new portion of the land base stored as vector data, with the remaining original paper based portions of the service territory still in raster images.

The biggest challenge facing Southwest Gas in maintaining this system is keeping up with the posting of completed as-built drawings. This challenge is mainly due to the large amount of paper based as-builts generated each year as a result of the fast growth, and partially due to the strict quality control parameters placed on data entry, (map quality is an essential ingredient to accurate field line locating). These two items have in the past resulted in a backlog of un-posted as-builts.

With the implementation of the ARM solution, Southwest Gas will be able to access information currently maintained in both the GIS and the Work Management System (WMS) and view them both in a spatial relationship. Each field technician will have the ability to view work request information overlaid onto the corresponding land base and existing facilities information while in service truck or at the job site. In addition to the graphic view capability, the technicians will have the ability to query existing work request information along with geographic database information associated to all gas facilities in the immediate vicinity.

As as-built work is completed in the field, the critical information will be recorded onto the field computer in its correct geographic location and passed back to the office. Once the implementation is complete, any and all information gathered and recorded in the field will be imported directly into the WMS and then easily posted into the GIS. This automated passing of data will minimize manual intervention in the posting process. Not only will this process decrease the amount of time required to update both GIS and WMS data, it will also ensure that field technicians have the most up-to-date and accurate information. By accessing information more quickly and accurately, field personnel will be able to make better decisions and provide their customers with better service.

REGULATORY CHALLENGE

Code Compliance for a pure gas company like Southwest Gas must be woven into the corporate fabric, as it permeates everything undertaken by operations. Southwest Gas takes Code Compliance activities very seriously, not because of the fines that can be levied by state and federal regulators, but because public safety has always been and will always be the company's number one concern. The best marketing effort in the world will not be successful if the product can't be delivered and used safely by customers.

To meet Southwest's Code Compliance requirements, the company needed a solution that would stand up to the scrutiny of annual state commission audits and be user friendly enough to enhance the productivity of the field work force. It was essential to create a paperless system that could prompt field workers for needed compliance information in the correct procedural order without burdening them with requests for unneeded information. An example of this would be certain pieces of compliance data that would be required on a steel facility but would not be necessary for a plastic facility.

Southwest Gas has “configured” the solution so that based on the answer given to a particular question, the field technician will be presented with the next relevant piece of information to gather. This provides a very practical way of assuring that field technicians do the right thing in the correct sequence.

Figure 1 illustrates how Southwest Gas is using the ARM solution components (WMIS, the Work Management Information System; FMDR, the Facilities Management Data Repository for Asset Management; CTS, the Compliance Tracking System and the Mobile Gas Suite) to meet the company’s compliance requirements. The compliance process will pass facility related information from the office to the field and back again in a repetitive cycle for the lifetime of the facility.

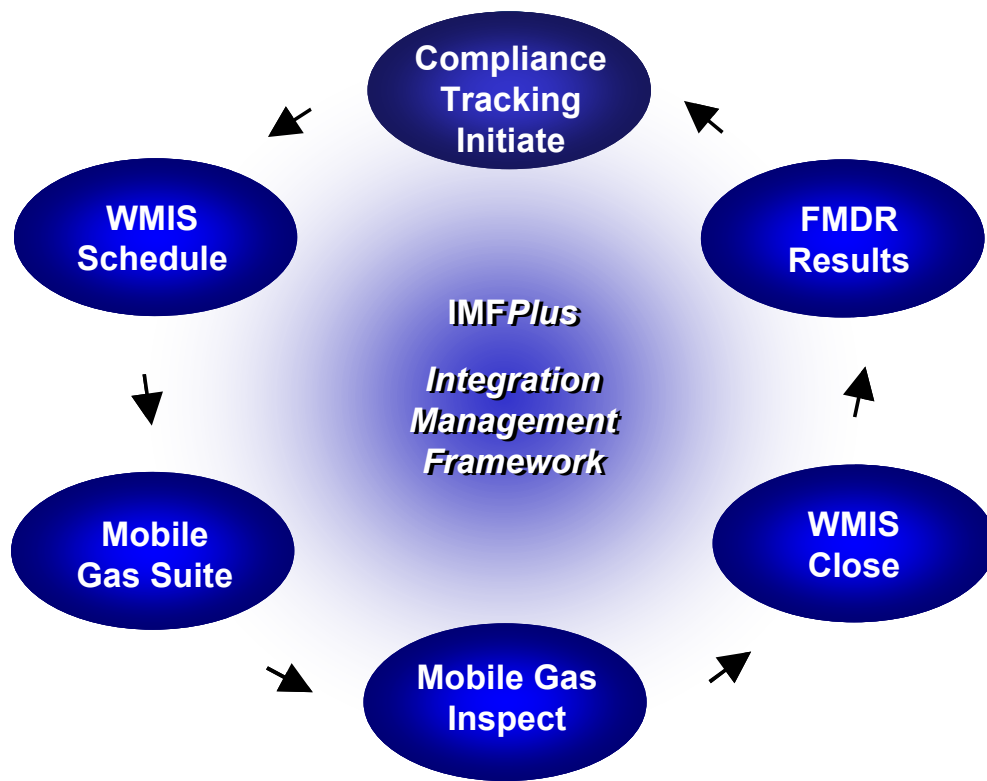


Figure 1
High-Level Work Flow Cycle of Compliance Activities

HEADCOUNT CHALLENGE

Increased employee productivity is every company’s goal. Incorporating new technology is one way to increase the productivity of existing employees, thus offsetting or delaying the need to hire additional personnel.

If Southwest Gas had maintained the 1991 customer to employee ratio (388/1), the company would have over 3,700 employees today! Instead the company has used technology and prudent management to keep its headcount down to just over 2,500.

To continue to meet its headcount challenge, the company required a solution that would help avoid adding employees and make existing employees more productive. This meant a solution that applied technology that eliminated redundant data input and used intelligent input edits to eliminate errors inherent with a paper-based system.

The efficiency yardstick in common use in the industry is the overall customer to employee ratio. As shown in Figure 2, the Southwest Gas employee/customer ratio has grown from 388:1 in 1991 to 594:1 in 2003. This is in large part due to the innovative use of technology to support the company's field activities.

Employee Productivity

■ Increased Productivity

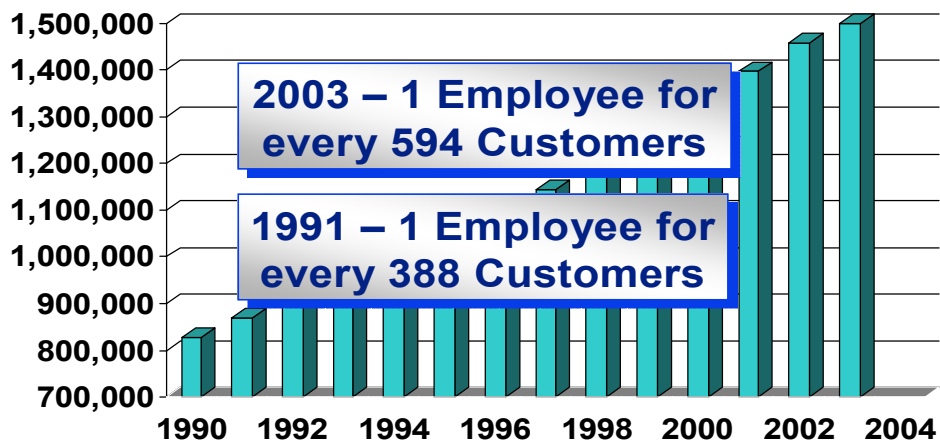


Figure 2

Southwest Gas' Customer/Employee ratio

The following Figure 3 shows actual technology related costs experienced in the Southwest Gas Data Center. The trend is an unmistakable decrease in cost and increase in performance for both computing horsepower (MIP's) and storage capacity (gigabytes). Superimpose the cost of labor experienced during the same timeframe and labor costs continue to increase, while technology costs continue to decrease. Prudent investment in technology would appear to be a path that should be thoughtfully considered before adding significant headcount.

Technology Cost Trends - Labor

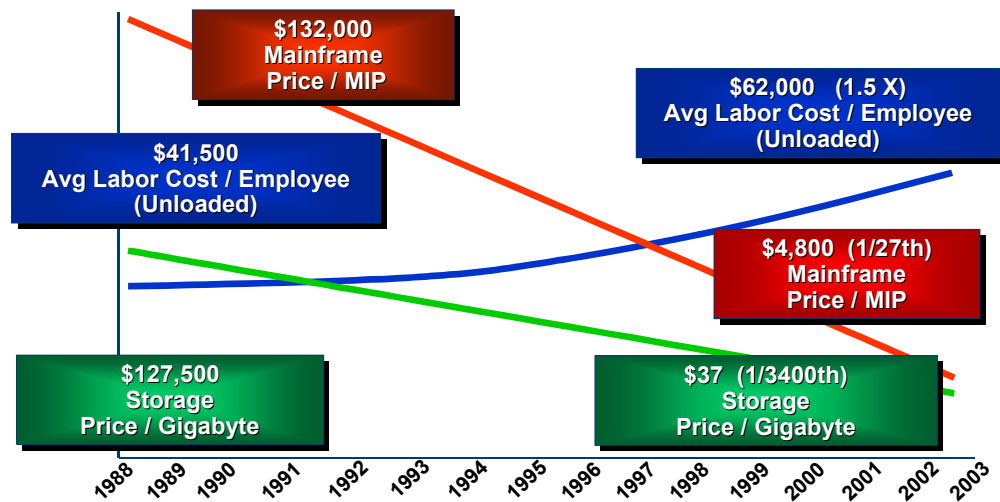


Figure 3

Making Existing Employees More Productive By Using Technology That Is Cost-effective

The adoption of new technology focused on enhancing field workers' productivity has allowed Southwest Gas to grow its customer base without a proportionate growth in employees. This has translated into avoided costs that help keep customer costs from increasing while maintaining high customer satisfaction ratings (average 90+ in all operating divisions). The costs of systems are recovered through regulated rate charges, and all savings benefits in productivity and customer satisfaction accrue to customers, employees and shareholders alike.

MOBILE COMPUTING CHALLENGE

Ten years ago, Southwest Gas began using mobile computing to increase the safety, efficiency, and customer satisfaction of the company's service related field workforce. Customer Service technicians use mobile computing to receive and complete their orders. This system provides a paperless path for customer related field activities to interface with Southwest Gas' Customer Information System, eliminating the redundant data input associated with the old "paper" system.

Significant efficiencies have been derived from the mobile computing system since it was first deployed in 1992. Based on the success of mobile computing, Southwest Gas moved its gas facility maps (all of which are electronically stored in the GIS) out to all field technicians in early 2001. The “Maps to Field” phase of the ARM solution not only provides all of the GIS information to field technicians; it has also enabled the company to supply all of the technicians with electronic manuals, eliminating the bulky, never up-to-date binders of field procedures. These successes have given Southwest Gas the efficiency gains that have enabled it to be one of the most efficient gas utilities in the nation.

ARM SOLUTION COMPONENTS

Work Management Information System (WMIS): WMIS supports managing, scheduling and tracking all types of work. It also supports the definition, management, and recording of inspection results by defining this work as standard work requests. These work requests are automatically scheduled on a periodic basis (yearly for example). Each work request may be associated with a facility. Using this approach compliance work is scheduled, managed, and reported in a consistent manner with the other work Southwest Gas performs.

FMDR (Facilities Management Data Repository): The FMDR provides integrated storage of cost, revenue and operational data on all assets for planning purposes. This solution supplies a management platform for capital planning, maintenance planning and for performance monitoring.

CTS (Compliance Tracking System): Compliance Tracking provides a repository for inspection and maintenance work performed on a facility; and the capability to create inspection and maintenance schedules by facility type, generate work requests based on these schedules, and view asset and work history details. The Compliance Tracking module will utilize the asset information maintained in the FMDR to identify valves, mains, regulators, and other facilities that require periodic maintenance and inspection work.

Mobile Gas Suite: a map-based solution suite, which is fully integrated with WMIS. The Mobile component can remotely access large volumes of spatial data to eliminate the printing and distribution of maps and other large data sets. Functionality includes work request creation, field design, estimating, data collection, inspections, compliance tracking and other field computing needs.

IMFPlus (Integration Management Framework) Application Edition: Enables the connectivity of the ARM applications to the enterprise using a message-oriented approach. IMFPlus puts in place a forward-looking integration architecture that will interface the ARM with the CIS, Dispatch, Materials, GIS and Financials systems. IMFPlus enables ARM to act as the vehicle for integrating ARM with existing “legacy” information systems. The integration provides a re-engineered, customer-focused energy distribution work process.

ARM Solution

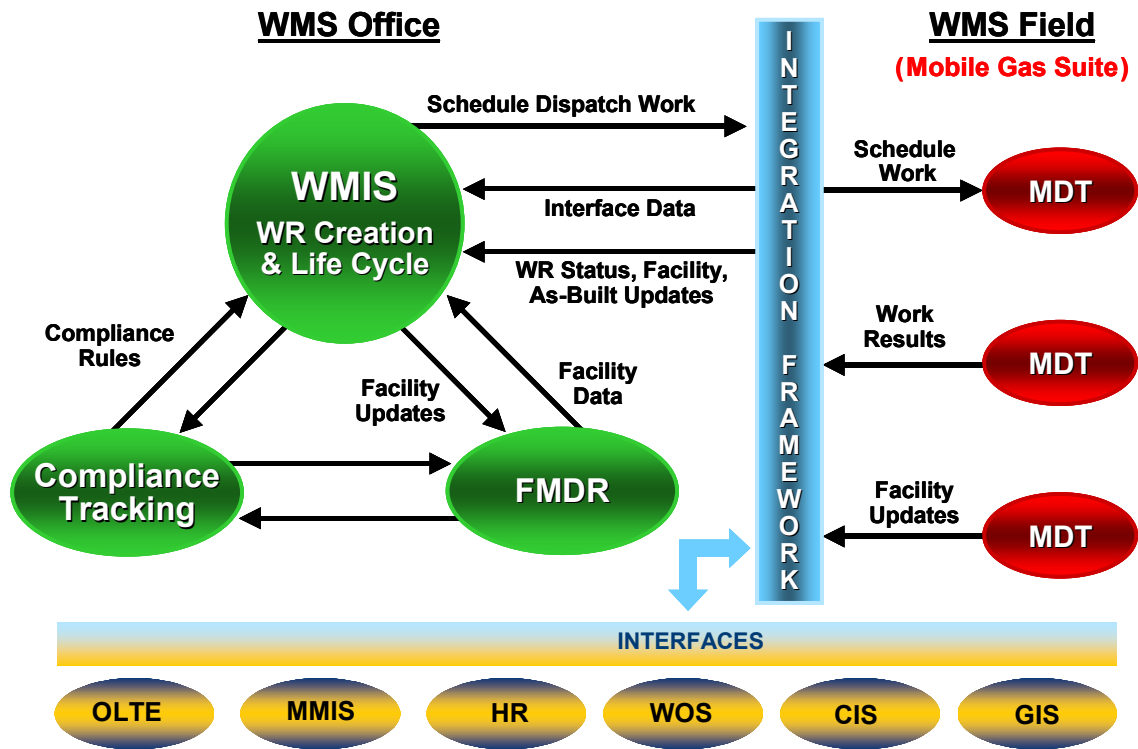


Figure 4

ARM – from the office to the field – handles capital, operations and maintenance work in one system, and seamlessly tracks and schedules all code compliance activities.

DELIVERING MEASURABLE RESULTS

The capabilities and technologies built into the ARM Solution deliver benefits that will continue to grow. Southwest Gas is expecting substantial direct annual savings, but the ARM Solution provides far greater value in terms of public and employee safety and productivity improvements to deal with the company's growth challenge. That value is demonstrated by:

- maintaining one of the highest customer-to-employee ratios in the utility industry while continuing its fast growth. This measure is in common use in the industry as an indicator of overall productivity. The ratio has grown from 388:1 in 1991 to 594:1 in 2003, in large part due to innovative use of technology to support field activities.

- smoothing and accelerating the “new customer” process, through electronic communications and information sharing among sales, engineering, construction, and technical services personnel.
- contributing to customer satisfaction ratings of over 90%, by having current information to answer customer questions.
- further developing the company’s ability for quick, effective response to emergency situations.
- reducing the risk of gas line breaks through accurate marking of gas line locations.
- playing an important role in complying with the new Office of Pipeline Safety regulations on Pipeline Integrity, starting in 2004.

CONCLUSION

The ARM Solution is no longer a vision. Currently implemented in three of five operating divisions, the solution supports and integrates the entire new customer process – sales, design, and construction – and the inspection and maintenance process. This integration enables efficiency, and assures that information on new gas facilities automatically initiates the ongoing inspection process. The system supports code compliance for gas facilities and operator qualification for personnel, all under frequently changing federal pipeline safety regulations. The enhanced mobile solution downloads updates to facilities maps and the 1900 page operations manual onto GPS-equipped, ruggedized mobile computers. The complete rollout to all operating divisions is scheduled to be substantially complete in 2004.