BIOGRAPHICAL INFORMATION

Bradley S. Kitterman
Senior Vice President
LogicaCMG
Energy & Utilities Division

Specific Responsibilities

Mr. Kitterman joined LogicaCMG in May 2004, as Senior Vice President and General Manager of the Energy & Utilities Division. His responsibilities include the overall management of the company's business and technology strategies and product solutions for the energy and utilities market throughout North America. With over 20 years of experience, Brad brings to LogicaCMG a solid track record of positioning, companies for growth and market leadership.

Past Experience

Prior to joining LogicaCMG, Mr. Kitterman was the President and COO of the US Pipe & Foundry Division of Walter Industries. From 1998 to 2002, he was President of Schlumberger's Resource Management Services, North American Utilities Division. In this role he managed extraordinary growth of sales, revenue and profit and positioned his company as a market leader in a variety of market sectors.

Mr. Kitterman built a wide range of experience during his13-year career at Schlumberger. As general manager of its Distributed Measurement Solutions division, he led a data services startup operation, and prior to that, he was Director of Engineering for the North American Electricity Division.

Educational Information

B.S. – Electrical Engineering , Auburn University

Professional Memberships

GITA
IEEE

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RIDING THE RIGHT WAVE -- DRIVING OUT UTILITY COSTS THE INTELLIGENT WAY

ABSTRACT

To achieve the next wave of efficiencies in the asset intensive utility industry, many utilities are adopting new asset-based business models. By organizing their data by assets rather than by capital and operating expenditures, utilities can then determine core business interests, meet compliance requirements, manage assets to increase return on investment and better control costs. These utilities are implementing new systems that process asset data intelligently. The systems derive knowledge to drive better asset decision-making, implement continual process improvement, and increase return on investment.

In utilities today existing asset systems support a gamut of functions from relatively simple asset data management to proactive decision support systems that help manage the utility. To support the new requirements vendors are developing new Intelligent Asset Management systems that capture knowledge about the assets, monitor key asset performance indices, manage maintenance and compliance efforts, and determine profitable expansion investments.

With over $800 billion in total estimated asset value, $240 billion in distribution assets, and revenues of $247 billion per year, the United States electric utility industry is one of the most asset intensive industries. The financial success of these utilities is dependent on their ability to manage these assets to achieve shareholder value.[1]

This paper discusses the asset maintenance opportunities and their affect on utilities. It explains how utilities are adopting Intelligent Asset Management solutions to manage their assets resulting in the same class of business performance as other major asset intensive companies

[1] *"Grid 2030" A National Vision for Electricity's Second 100 Years*, United States Department of Energy Office of Electric Transmission and Distribution, July 2003

UTILITIES ARE LARGE ASSET INTENSIVE COMPANIES

Asset intensive companies are companies that spend a large percentage of their revenues on expansion and maintenance of their asset base. In a utility that has generation, transmission, distribution, and retail segments, the transmission and distribution segments spend most of their revenues on the utility network. They don't manufacture or purchase energy but they do own and manage the "wires and pipes".

The largest US utilities are presented in Figure 1 with their Market Capitalization and their Property, Plant, and Equipment assets. With assets as high as $35 billion, these utilities are in the business of managing their assets to increase return on investment.

Electric Utility	Market Capitalization	Assets	Gas Utility	Market Capitalization	Assets
EXC	$24B	$20B	SRE	$8.4B	$10.5B
SO	$22B	$28B	KSE	$6.2B	$8.9B
Dom	$21B	$26B	NI	$5.5B	$9.3B
Duke	$21B	$35B	STR	$3.8B	$2.8B
TXU	$14B	$22B	OKE	$2.6B	$3.7B

Notes: Some utilities are joint gas and electric utilities and some have other components.
Assets equal Property, Plant and Equipment from published balance sheets.
Utilities must have large US components and must have a large distribution component.

Figure 1: Largest US Electric and Gas Utilities Capitalization and Assets

UTILITIES ARE REDIRECTING THEIR ATTENTION TO THEIR ASSETS

The continuing change in the utility business model over the last decade can be viewed as a shifting emphasis in the balance between customer service, asset utilization optimization, and costs. Since these components are tightly linked the utility can not optimize the components independently. See Figure 2.

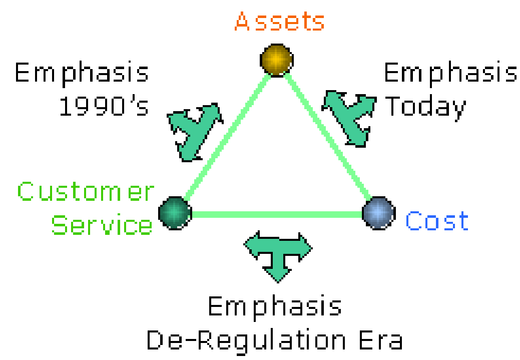

Figure 2: The Changing Utility Business Model

In the 1990's utilities emphasized customer service (service, capacity, reliability) and asset expansion at the expense of increased rates. In the de-regulation era the utilities reduced costs and provided better customer service (particularly the customer relationship type of service) and sacrificed asset maintenance and capacity expansion. In today's environment the utility having taken staff reductions to improve costs in the de-regulation era is recognizing that it is an asset intensive company. The emphasis is on asset preservation and reducing cost through better asset utilization. Today utilities are balancing customer service to maintain regulatory compliance but the emphasis is on return on asset investment.

In Europe and Australia the de-regulation (market liberalization) started before the US de-regulation. The pace of the liberalization of the market has not slowed as it has in the US so these utilities are more rigidly segmented into generation, transmission, distribution, and retail. The regulated portions of the utilities understand that they are asset owners and emphasize asset management and asset life extension to achieve good return on investment and as a major component of their business models.

As the focus of the US industry turns away from de-regulation and merger / acquisitions, utilities have returned to the bottom line issues of reducing costs, improving services, and meeting compliance requirements by providing reliable, safe energy delivery in a regulated environment. Utilities are again dealing with rate cases and utility commissions but the emphasis of the regulatory organizations has turned towards better management of the utility's assets (performance based rates for example) rather than funding of network expansion. The challenge for the utility industry is that they have already cut their operating budgets and taken cuts in resources yet their stockholders expect even higher returns, their customers demand lower rates and the regulators are increasing reliability regulations and setting improved performance standards.

The regulators are not returning to an environment where investment in new infrastructure is encouraged through higher energy rates. In fact today utilities are fortunate if they have locked their rates and can maintain their current rates. Utility executives are tightly controlling capital expense by freezing their staffs while the number of customers increases and the customers demand more energy.

To meet these challenges utilities are turning to new technology. In Las Vegas, the fastest growing metropolitan area in the United States, Southwest Gas[2] has improved their customer service while retaining essentially a constant staff by implementing new Asset Management technology.

NEW ACCOUNTING RULES REQUIRE ASSET DATA

The accounting rules for public, state, and municipal utility companies have changed to put greater emphasis on the value of the assets. For public companies it is the Sarbanes-Oxley Act that requires the CEO and CFO to certify the financial results of the company and the procedures and policies enforced to acquire the financial data.

For utilities owned by state and local companies it is the Government Accounting Standards Board (GASB) standards that require the governmental entity to evaluate all its substantial assets

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[2] *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, GITA 2004 Proceedings.

and to apply the accrual depreciation method for new construction. For existing construction or infrastructure renovated since 1976 there are two alternatives: the historical cost capitalization accounting approach or an alternate method that doesn't depreciate the asset if the governmental entity follows strict maintenance procedures. Thus, to avoid depreciating capital assets, government officials must understand the value of their assets and spend money maintaining the existing network infrastructure.

The federal government is also changing the rules for maintaining the transmission assets for both gas and electric utilities. The DOT mandated Pipeline Integrity Management rule defines gas transmission pipe as a function of diameter, construction, and pressure and requires periodic inspection, maintenance, and reporting of the maintenance results for all transmission pipe. Many gas utilities are finding that some of their distribution pipes are classified as transmission and are now part of the new rules.

For electric utilities new transmission rules are the fallout from the August 14, 2003 blackout affecting 50 million people in eight states and two providences and resulting in a $4-$6 billion loss in economic activity. The DOE is leading a national effort to implement President Bush's call for "…modernizing America's electric delivery system" and implementing the 51 recommendations made in the National Transmission Grid Study[3].

The gas and electric transmission efforts are driven by reliability and safety considerations. The result is a greater emphasis on the assets and providing the required maintenance that will assure reliable operations and extend the useful life of the assets.

ASSET MANAGEMENT IN THE T&D ENVIRONMENT

For this paper, the term asset means the physical equipment that makes up the utility's network that delivers energy to the customer. In a "Wires and Pipe" company, as utilities sometimes call themselves, assets are the wires and pipes as well as the poles, transformers, valves, regulators, etc. In an Asset and Resource Management system this definition distinguishes assets from resources, which include labor, materials, vehicles, etc. and are generally movable and expendable.

Asset management is the business discipline including the processes and systems which manage the assets through their lifecycle (acquisition or implementation to abandonment or destruction). The objective of asset management is to minimize the cost of delivering energy while balancing useful asset life cycle, performance and reliability of the network as a whole, and implementation, maintenance, and compliance costs. Asset management as a discipline utilizes a number systems capabilities including database management, connectivity, optimization, maintenance, compliance, planning and scheduling, etc.

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[3] *National Transmission Grid Study,* United States Department of Energy, May 2002

ASSET MANAGEMENT PRIORITIES

In the utility industry asset management systems and processes run the spectrum from mere record keeping in a financial system or on paper to a valuable resource used daily to make intelligent strategic and tactical decisions. During the de-regulation era with its merger or acquisition driven activities, the emphasis was on short-term gain and asset systems languished for many utilities. Executives made the short term argument that the benefits of an asset system won't be in my watch – why should my company invest in systems to improve asset performance and reliability over the long term.

ASSET MANAGEMENT – A BALANCE

Today utilities and regulators are recognizing the value of an Intelligent Asset Management strategy that balances long term asset performance, risk, and cost (Figure 3). Long term asset performance includes maximizing the useful life of the asset, using the asset to perform its designed purpose, and retaining asset history to determine the optimal strategy for current asset utilization. Maximizing asset performance without balancing risks and costs leads to under utilization of the assets, high costs for a higher degree of redundancy, more expensive equipment, and higher rates.

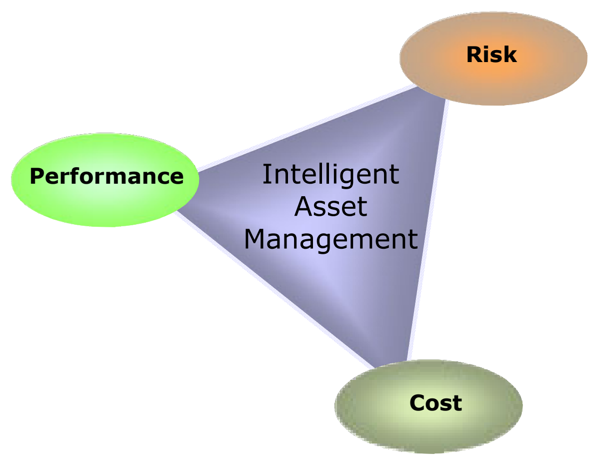

Figure 3: Intelligent Asset Management - Balancing Performance, Risk, and Cost

Risk is the second component of the Intelligent Asset Management balance. Risk includes the possibility of minor disturbances or catastrophic blackout, unexpected costs, performance degradation, etc. A catastrophic failure in a high consequence area often affects customer well being, the value of the company's stockholder's investment, and the company's reputation in the community and the industry. The risk component also includes the prevention of small outages, the monitoring and measurement of key performance indicators, and maintaining fair rates in a performance oriented regulatory environment. For many industries a momentary outage causes as much damage and loss of work as a major outage.

Cost is the other component to be balanced. Cost associated with the asset should include:

- labor to install and maintain the asset,
- initial cost of the asset,
- inspection and maintenance cost during the useful life of the asset, and
- replacement costs

These costs should be compared to the value the asset brings to the network and the revenue from the delivered energy. Asset records help the utility purchase the optimal new facilities, make intelligent decisions about system betterment, design a reliable network, and maintain the critical components of the network. Minimizing costs while ignoring the effects of asset performance or the impact of compromising reliability inevitably leads the utility to reliability failures, lower rates, shorter asset life cycles, and other negative long term impacts.

A SPECTRUM OF ASSET MANAGEMENT CAPABILITY

Figure 4 below presents the spectrum of utility asset management systems leading towards Intelligent Asset Management. Each of the stages is supported by a variety of software products that are rapidly evolving to meet the new demand for asset management support systems.

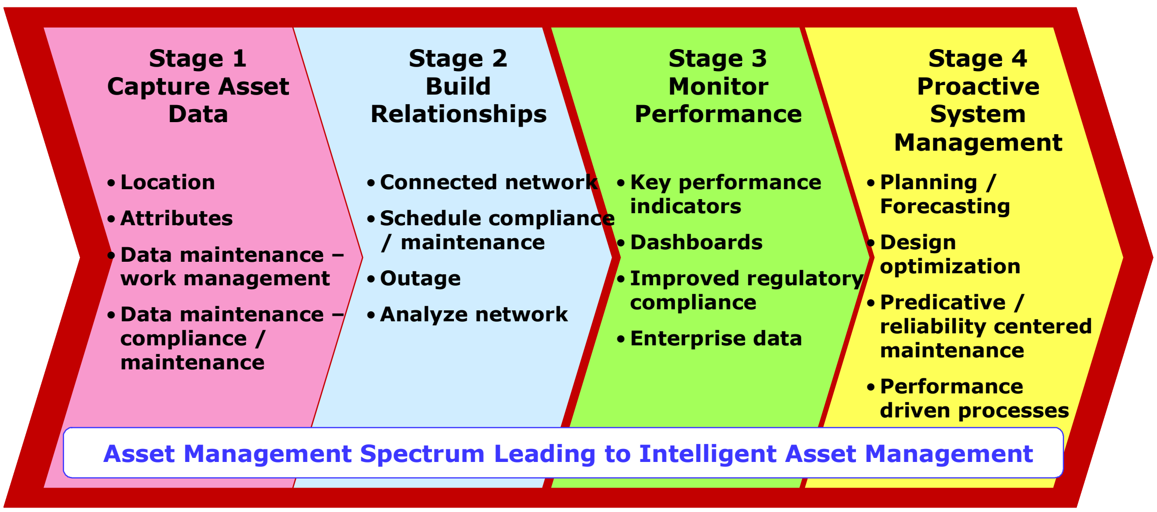

Figure 4: Stages of Asset Management System Capabilities

During the **Capture Asset Data** stage the utility begins to organize their records by asset. Source information may be the financial system if the utility has maintained individual assets, paper records and maps, GIS systems, and/or departmental systems. Some utilities are forced to perform a field inventory or conversion from paper records.

During this stage processes and systems are defined to reliably maintain the asset data. Today, integration with work management and compliance/maintenance systems assures that any new assets, changes to the assets, and abandonment or removal are recorded in the asset database. A measure of the success of the **Capture Asset Data** stage is the magnitude of backlog in posting new or changing facilities (the average time from facility installation to final recording of the asset record). In the utility industry this measure varies from weeks to years.

Today data requirements are carefully scrutinized to eliminate the conversion of data that has little or no practical application. Quality control is an integral component of the data capture and maintenance processes. Minimum asset data includes the type and physical attributes of the asset and the asset location. Assets are tracked from purchase (or installation) to abandonment. Significant events – construction, maintenance, refurbishment, movement, faults, etc. are captured to develop a history of the asset. Costs for each activity are associated with each asset operation.

Asset management systems are often integrated systems with component systems maintaining particular portions of the asset data. The location of the data is not the important aspect of the database in comparison to the data content, quality, and accessibility.

The **Build Relationships** stage defines relationships between the assets. (This is often done concurrently with building the asset database. For example GIS systems build relationships as the data is entered or modified.) In this stage a connected network is defined and customers are linked to asset features. Control assets, valves, switches etc., are added and their function modeled. These networks are often integrated with an outage system, a leak survey/management system, or a cathodic protection system. Systems that define the compliance and maintenance work for the network as well as network analysis systems are implemented in this stage. A measure of the success of the **Build Relationships** stage is the ability to automate switching procedures in the electric utility and to determine gas network flow in a gas utility.

The **Build Relationships** stage includes the first steps toward the transformation of raw collected data into knowledge to achieve an Intelligent Asset Management system. In this stage the utility often has disjointed tools to manage separated aspects of the network. For examples leaks are managed by one department while a different one performs the load analysis, and yet a different organization plans system betterment and new construction. Data and functional integration is done by individuals seeking information from others. Effective operational managers often use network, facility knowledge, and experience to fill in the blanks necessary to run the utility well.

The **Monitor Performance** stage integrates the disparate systems that have been developed for isolated functions into an enterprise system. Access is throughout the utility typically with workstations, web access, and field access. For example a planner can access the leak system to determine where leaks are prevalent, access the network analysis system to determine loads and pressure, apply a demographic model to determine expected system growth, access other plans that may affect the planner's work, examine the life cycle costs of specific types of facilities, and make an informed decision on how to best spend the budget to get the most out of capital investment.

Perhaps more importantly, the asset data is accessed and analyzed to determine key performance indicators so that managers can effectively direct their staffs, change ineffective procedures, motivate their staffs to maintain and improve these indicators, and demonstrate to the regulators and others that the utility is performing at a high level.

A measure of the success of the **Monitor Performance** stage is the ability of the utility to compare its performance to industry standards and to implement a program of continued process improvement. Performance Monitoring becomes valuable as the utility continues to gain reference data over several years.

The final stage, **Proactive System Management** utilizes the asset data and the life cycle history to direct the user to the most effective solution considering cost, reliability, performance etc. For example, planning and forecasting capability takes all the information available, applies company set priorities and proactively recommends changes to be considered. Another example is that during the design effort the features to be constructed are determined optimally to meet load requirements, physical constraints, and optimal cost.

On the maintenance/compliance front, predictive/reliability centered maintenance suggests and schedules maintenance so that the facilities that impact the most customers if they fail are maintained on a priority basis considering their condition and when they were last maintained. With these techniques the engineer allocates the maintenance budget so that the reliability is maximized while the life cycle of the facilities is extended. Maintenance or compliance routes are determined optimally to reduce cost and equalize the work crew to crew.

The concept of this stage is for the systems to strongly recommend what needs to be done and when to assure the necessary capacity, increase system reliability, and reduce costs. The results to-date using design optimization and automated routing have been dramatic. As this stage matures we can expect other optimal techniques to be developed to provide further success.

CONCLUSION

As the industry moves from short term objectives to reduce cost through staff reductions, which many utilities have virtually exhausted, to asset data driven, productive, long term objectives, asset management procedures and processes come to the forefront. These procedures and associated systems optimize the useful life of the asset, assure the facility is used effectively, and promote an acceptable level of reliability and risk. Four stages of asset management have been defined with each stage providing further cost reductions and increased operational efficiencies. These stages outline a path for the utility to manage it assets effectively. Vendors are developing and enhancing systems in all of the stages.

Dramatic improvements have been achieved and other improvements are expected as vendors and users combine all their systems and data into Intelligent Asset Management processes and systems.