

## BIOGRAPHICAL INFORMATION

Charles (Chuck) H. Drinnan  
Executive Consultant  
LogicaCMG

### Specific Responsibilities:

Mr. Drinnan is responsible for defining LogicaCMG's strategy and solutions for GIS applications within the Asset and Resource Management (ARM) product suite. ARM combines work management, asset management, compliance tracking, mobile computing and state-of-the-art integration capability to provide a comprehensive, unified business solution for the utility industry. As the executive consultant for LogicaCMG, Energy and Utilities Division, Mr. Drinnan provides a wide range of consulting services including system selection, business case development, implementation evaluation and improvement, data model development, application requirements development, and industry business analysis.

### Past Experience:

Mr. Drinnan has 40 years of experience in consulting, technical, and marketing management for software solutions. He has worked in the GIS industry for over 30 years. Mr. Drinnan was the system architect for the Integrated Geographic Information and Work Management System for Dominion and the Atlanta Gas Light FLAME project. He has performed numerous consulting engagements such as recommending improvements in the mapping procedures within Southwest Gas and system requirements definition and procurement assistance for large utilities. In these roles he defines and helps guide the implementation of enterprise wide solutions including GIS, WMIS, asset management, field units, engineering design packages, and interfaces to ERP systems and trouble management systems.

Mr. Drinnan has authored over 25 professional papers and is a member of the GeoWorld Editorial Advisory Board. As a member of the Technical Review Board for the national Spatial Data Transfer Standard he expanded the mapping standard to support utility applications.

### Educational Information:

BA – Mathematics, Rice University

### Professional Memberships:

GITA

GeoWorld Editorial Board

Chuck Drinnan  
Executive Consultant  
Energy & Utilities Division  
LogicaCMG  
10375 Richmond Avenue, Suite 1000  
Houston, TX 77042  
Tel: 713-954-7004  
Chuck.Drinnan@LogicaCMG.com

## **THE MULTI-FACETED ASSET – THE JEWEL OF THE ASSET INTENSIVE UTILITY**

### **Introduction**

As the US utility industry turns away from de-regulation and unregulated business segments, utilities are focusing on optimizing their existing assets and reducing their capital budgets. Since the regulated business segments (Wires and Pipes) spend most of their revenue in acquiring and maintaining assets rather than generating or selling power they are asset-intensive companies with asset ownership as their core business. This emphasis on asset ownership is the new business driver for the evolving utility industry.

In today's environment, utilities are unifying their critical systems, operating more on an enterprise wide basis, and providing system access to the desktop, over the web, and in the field. Integrating systems such as work management, asset management, and GIS on an enterprise wide basis spreads the process and productivity gains throughout the utility.

Utilities have a number of systems that manage specialized portions of the utility's asset related work. However, asset managers are finding that they do not have the unified, enterprise wide data and systems readily available to manage the assets to extend and optimize their useful life; to measure the return on asset investment; and to monitor the asset's full life cycle. Without new tools and new data stores, they are forced to manage the assets in virtually the same manner as their predecessors did fifteen years ago.

A utility often has eight existing systems that manage asset data. None of these asset systems define assets in the same manner. This paper identifies the typical existing systems that capture and use asset data, discusses additional asset data requirements, recommends unifying full asset life cycle data and recommends a practical approach for asset data management in a modern IT environment.

### **Typical Existing Asset related Systems**

As asset managers place a greater emphasis on managing their assets, extending their useful life and using them effectively they need to know the full cost of ownership and everything that has happened to the asset. They need to understand the return on investment for each asset. Most utilities have the following systems that manage various aspects of the asset life cycle:

- Asset Management (maintenance, inspection, etc.)
- Planning
- Analysis
- Trouble
- Financial
- Materials
- Work Management

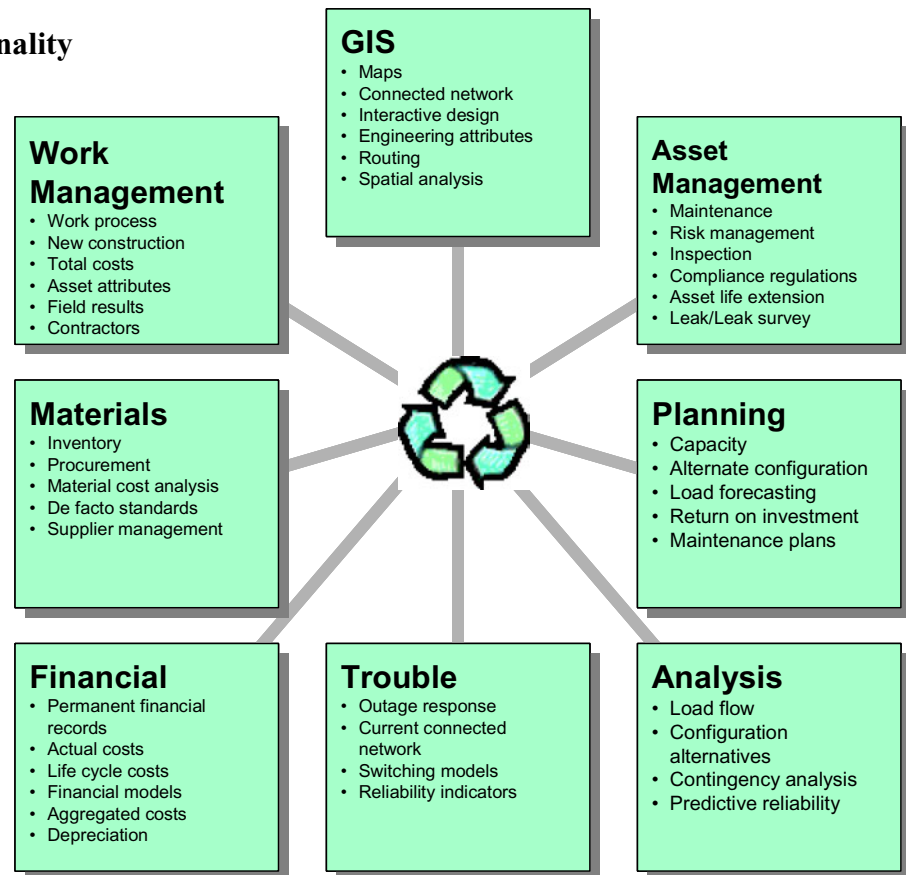
The above systems work cooperatively throughout the life of the asset.

### Asset System Functionality

The diagram to the right presents the primary functions of the typical existing asset systems.

### A Decade in the Life of a Network Asset

The useful life of a network asset ranges from several years for consumables and protection equipment to centuries for permanent facilities in stable environments. Some water facilities in the northeast were installed at the time of the revolution.



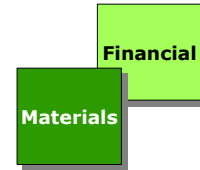
### Systems That Manage Assets and Their Functions

The life cycle of an asset is presented in the steps below. For each step the preferred data associated with the asset is listed. In many utilities the items highlighted are available only at the time the step is performed yet these data items are necessary to manage the assets effectively. The primary systems associated with the steps are shown in the

graphics. **Dark green** represents the responsible systems and **light green** represents the secondary systems (systems that record the information).

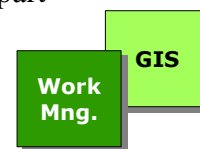
1. **Procurement:** The asset starts its life in the utility when it is purchased and put into inventory.

- **Actual cost**
- Routine attributes – size, material, etc.
- Nameplate attributes – manufacturer, year of manufacture, serial number
- Detailed attributes – attributes for detailed analysis



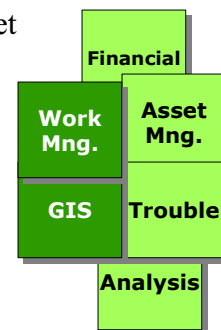
2. **Installation:** The process that installs the asset. (Design is considered part of the implementation process)

- **Implementation cost**
- Configuration and connection details
- **Field notes**



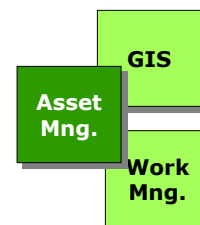
3. **Recording into Permanent Records:** The process that records the asset into the utility's records:

- **Actual costs (often aggregated with other like facilities and lost as an attribute of the specific asset)**
- Connection into the as built configurations
- Routine attributes – size, material, nameplate, dates
- Detailed attributes for analysis



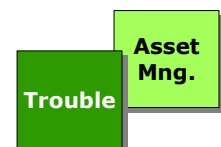
4. **Inspection, Maintenance, and Repair:** The utility inspects the asset, maintains it if appropriate, and repairs it if required.

- **Maintenance and inspection records**
- **Status and condition**



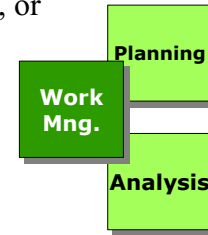
5. **Trouble:** Network fails (or is compromised) and repaired.

- **Outage identification (from inspection, outage or leak information, etc.)**
- **Date, class, status**
- **Repair**
- **Cost (allocated to asset)**



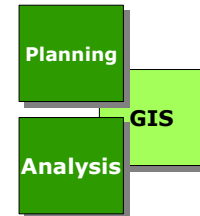
6. **Configuration Change:** The asset is moved, configuration is changed, or life extension operations are performed (sealed, coated, protected, etc.)

- Changes recorded
- Cost captured
- Configuration changes in network model



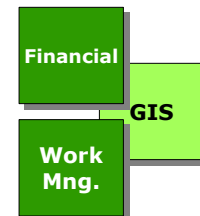
7. **Analysis and Planning:** The analysis of the facility in the network under a particular configuration selection. (This doesn't "happen" to the facility but is part of the evaluation of the value of the asset.) Planning results in reconfiguration or system betterment.

- Network configuration and alternatives
- Analysis results



8. **Removal or Abandonment:** Remove the facility or abandon it in place.

- Permanent records
- Cost



### The Asset Manager Has Additional Requirements

With eight mature functional system capabilities, many of the asset manager's needs are met particularly if they are taken "one at a time". For example the Materials system manages procurement, distribution, and other related functions but doesn't know where the facilities are located, how they are used, or what has happened to them. The Work Management system manages the work process but doesn't maintain an asset database. The GIS system knows where the assets are located and how they are connected but it doesn't know much about the origins of the assets, their cost history, or the required maintenance that has been performed. Asset Management systems manage inspection, maintenance, and compliance issues and don't retain the origins of the asset, its location, connectivity, etc. Outage, Analysis, and Planning systems are special purpose systems in the context of maintaining the history of the asset. The Financial systems do have an "official" record of the asset although information about the specific asset is often lost as the financial information is aggregated into collections of data – all the poles installed in 1988 for example. If the specific financial system maintains detailed information by asset it is often not organized effectively for the functional areas outside the financial realm.

What is the asset manager is missing is a holistic view of the asset – a view that develops a comprehensive lifecycle asset plan that unifies short and long term financial, risk, and

reliability considerations.<sup>1</sup> Where is the complete life cycle history including costs and loads, what is the impact (value) of the asset as a component of the network, where is the data to define indicators and to measure and compare performance for functional classes of work or types of assets? Individual systems satisfy some of these requirements but it is difficult to bring the data together so that the knowledge gained from the data can be brought to bear on the operations of the utilities – so the utility can make continued process improvements, can consider life cycle costs in procurement, can measure itself against its peers, etc. Forward looking utilities are implementing a solution that unifies all asset data within a single Asset Repository. The Asset Repository is the database of record for asset life cycle history.

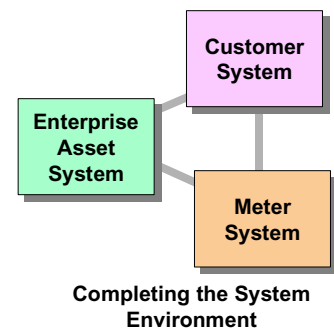
### **Asset Repository**

To achieve a holistic view of the assets and proactively drive the utility’s asset policy and practices, the asset manager requires a new logical data store that includes:

- Basic Asset data including location
- Full life cycle events from procurement to abandonment
- Complete cost history
- Compliance history (inspection, maintenance, and repair)
- Measures of financial value of the asset
- Configuration history and loads

### **Completing the Asset Knowledge Base**

The asset manager wants to relate the asset to the financial benefit and results – return on asset investment. To do this the manager must know not only the life history and the cycle costs but also the value of the asset to the utility and the delivery of energy. To present the manager with effective executive dashboards, reliability centered procedures, and key performance indicators, the value of the asset must be compared to the value of other assets. To maximize the effective value of the asset, the manager must know how the asset is actually used and what its potential capabilities are in the energy delivery network. This requires additional auxiliary information – specifically meter and customer information. With the combination of asset data, customer data including loads and planned expansion, and actual load data the system can determine the value of segments of the network and help the manager make intelligent system expansion and system betterment decisions.



---

<sup>1</sup> Principles of Asset Management – The Holistic Model, David Sklar, Energy Central EnergyPulse

## Implementing the Asset Repository

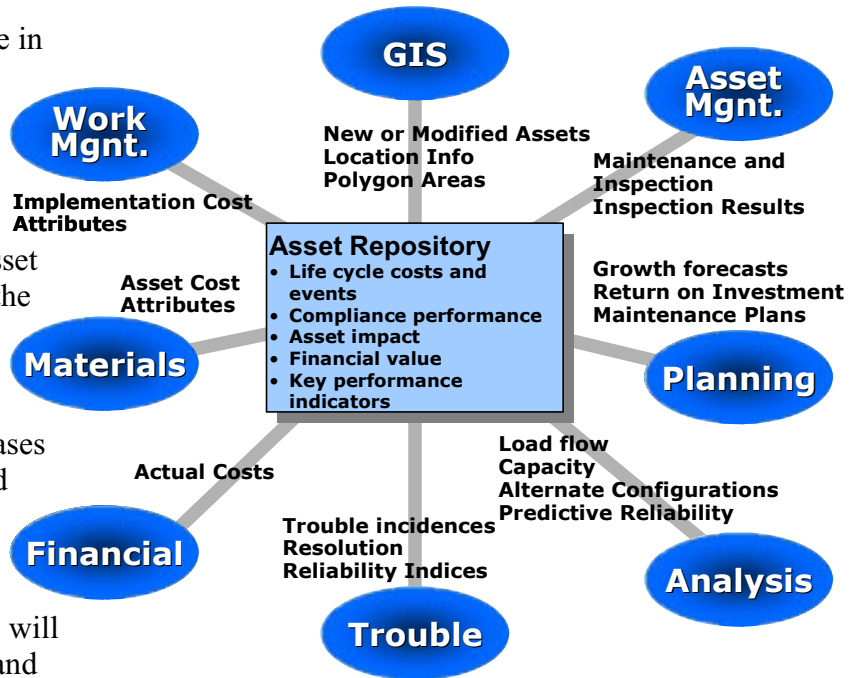
The aggregation of asset data into a central database is, of course, not a new concept. Central databases, systems, and warehouses have been proposed before but have had limited success. This paper considers the implementation of the Asset Repository in the light of the current systems in place at most utilities as well as modern integration techniques (Enterprise Application Integration (EAI)) and much wider access to systems and services within the full enterprise.

The new Asset Repository augments the systems that are in place. It provides a unified view of the assets so the manager can make strategic asset management decisions effectively. For most implementations the Asset Repository does not replace the large established systems and data. (It often does replace smaller, single purpose, isolated asset databases such as valve cards or limited maintenance databases.)

With the implementation of the Asset Repository the GIS will still manage the spatial data and the connected network; the Financial system will still have the data and capability to meet the CFO requirements; etc. The existing systems perform their functions well and there is no requirement or need to replace these systems.

The Asset Repository is not visualized as a classical Data Warehouse. The Asset Repository is driven from specific requirements and will not contain copies of all the asset information maintained by the various systems. The system may, however, pre-process and aggregate data as required to effectively calculate performance indicators and measurements.

In today's environment of web services, modern integration capability (EAI and XML for example), and enterprise access to many systems, the Asset Repository stores foreign logical and/or physical keys to provide automated or easy access into the other asset systems for the detailed specific information. Logically the database may look like and function as a single database store but physically it is more a combination of selected data and links to other systems where required. In actual implementation the Asset Repository



### Systems Steward the Data for the Asset Repository

is a combination of data stored in a standard database (Oracle) and virtual data stored in other locations and integrated with the standard database.

### **Data Stewards and Redundant Data**

The Asset Repository takes cost, performance, life cycle and other enterprise data and transforms it into asset knowledge to help the asset manager make effective decisions. As such it doesn't generate new data but rather processes data that already exists. To perform the required asset management functions effectively the Asset Repository stores some of the data redundantly.

Implemented in a modern IT architecture the Asset Repository expects other systems to "steward" the data. A steward system performs the primary functions associated with the data it is responsible for. The steward system is solely responsible for the entry, maintenance, and integrity of the data and provides the data to other systems that require it including the Asset Repository. In this manner initial data capture and maintenance functions are performed in a non-redundant manner and data integrity and consistency is assured.

With modern EAI capability most systems can automatically broadcast new and modified data over the network and any system that needs the data can reliably accept all or a portion of the data.

For example in many utilities new assets are entered into the system through the work management or the GIS system. With the final approval of the work within the work management system or the posting of the facilities to the installed record of the spatial data in the GIS system, the systems broadcast the new asset through a standard XML message on message queues. The Asset Repository is expecting the message and automatically defines the new asset within its environment and stores the portion of the asset data that it requires. The whole process is transparent to the user and delivery of the messages is guaranteed. The data always remains in sync. Any operation on the asset such as asset data modification, maintenance operations performed on the asset, abandonment and removal etc. are recorded in the same non-redundant manner. The work management or the GIS system is responsible for all the entry and maintenance of the asset data – they steward the asset data. Other systems are responsible for stewarding the inspection and maintenance data.

With modern EAI approaches the Asset Database of Record system doesn't know or care what system originated the asset and the messages associated with the new asset. In this sense the systems are loosely coupled so that each system may be maintained, replaced, upgraded, etc. with limited impact on the other systems and messaging process.

From an IT point of view multiple data stores require maintenance, backup, hardware, and support. However, it is mostly the various systems that require support and not the underlying data. With the cost of storage mediums today another disk is just not a consideration when compared to communication and network direct and indirect costs.

## **Utility Experience**

The proposed Asset Repository concept has been implemented and is in successful production at Southwest Gas, Washington Gas, and other utilities. These utility implementations include new work management, asset repository, and asset management (compliance tracking, inspection, and maintenance) systems. At Southwest Gas the system that originates the asset is the work management system; while at Washington Gas the originating system is the GIS system.

## **Conclusion**

Modern utilities are recognizing that they are asset intensive companies and that their focus is properly on asset management. The asset manager has a multitude of specific systems that manage various processes associated with the asset life cycle. However, these systems do not provide a unified view of the asset and limit the manager's ability to determine and maximize return on asset investment.

Utilities are defining new data stores that provide Asset Repository capabilities. These data stores include full life cycle costs, measurements of the importance of the asset in the network, and key performance indicators to help the asset manager make cost effective asset decisions. The proposed Asset Repository works cooperatively with other utility systems that steward portions of the asset data. The systems in production today provide the asset manager with new and effective decision support tools.