

BIOGRAPHICAL INFORMATION

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Specific Responsibilities

Ted joined LogicaCMG in July 1999, and now holds the position of Product Manager for Asset Management. In this role, he is responsible for overseeing the strategic and functional direction of LogicaCMG's Asset Management products and solutions for the Energy & Utilities sector. With over 8 years of experience, Ted brings to LogicaCMG a vast range of knowledge and skills, including: Product Management, Business Process Re-Engineering, System and Integration Requirements Analysis, Solution Development, Systems Implementation and Change Management.

Past Experience

Previous LogicaCMG experience includes having served as a Lead Business Consultant for a Customer Choice Implementation at AEP, Solution Analyst for a project at CBEE (Brazil), and Change Management Lead for projects at NSTAR and British Petroleum Chemicals.

Prior to joining LogicaCMG, Ted was a consultant with WJ Murray & Associates, where he provided strategic planning, market assessment, business process reengineering, and economic analysis to the energy and utility industry. While at WJ Murray, Ted was engaged on projects at Chevron Oronite, Shell Deer Park Refinery, and Waukesha Engines – a division of Halliburton.

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IT'S ONLY NATURAL: UNDERSTANDING THE RELATIONSHIP BETWEEN ASSETS AND THE RESOURCES DEPLOYED TO MANAGE THEM

ABSTRACT

Asset Management has become “en vogue” in recent years as leading utilities return to a traditional tenet of the industry... “Assets are King”.

Asset Management and Resource Management are often thought of as independent processes and systems. However, a logical analysis of asset management business processes quickly reveals the interdependence of these two functional disciplines. In straightforward terms, Asset Management is about determining the right work to do (or not do) and when to do it, while Resource Management is about determining the most efficient way to do the work.

INTRODUCTION

Utilities need to understand and exploit the natural (and symbiotic) relationship between their Asset Management and Resource Management activities.

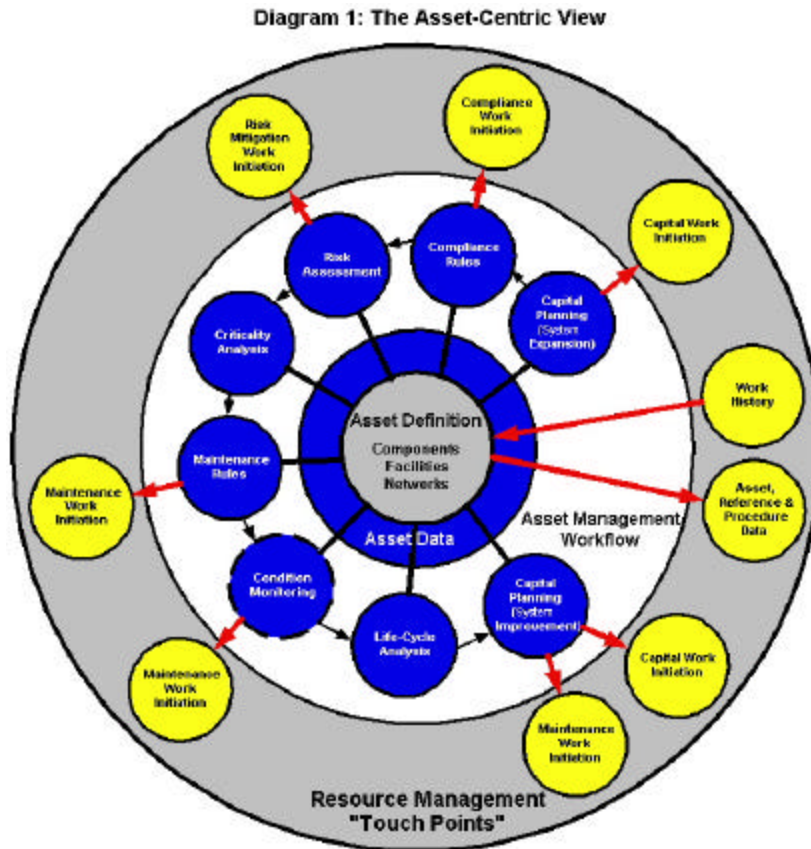
To demonstrate the interrelationship between Asset and Resource Management, I derived two context diagrams, which I will later unify into an enterprise view of these activities.

Both of these context diagrams have at their core (the small grey circle at the center of the diagram) the foundational elements around which activities are centered. The first blue ring around the core represents the orientation by which the data is structured (e.g. Asset-centric for Asset Management, Work-centric for Resource Management). The second ring (the white circle) represents the high-level workflow for the discipline. The final grey ring depicts the “touch-points” between the disciplines.

To set the context for the unified diagram, I will first introduce the individual diagrams and discuss some key aspects of the discipline.

A BRIEF REVIEW OF ASSET MANAGEMENT SYSTEMS AND WORKFLOW

The success of any asset management strategy requires unifying key asset data in a manner that facilitates analysis and decision-making. The optimal solution for this requirement involves implementing a dedicated Asset Repository that records all the things that happen to the asset – the full asset life cycle history. This approach represents the overall best long-term solution, and is a distinctly better solution than attempting to artificially expand the functionality and purpose of a work management, maintenance, or GIS system.



As depicted in Diagram 1, the Asset Repository should support not only the assets themselves but also a network model, which defines their interconnection to other assets. An embedded network model within an Asset Repository provides the asset manager with the flexibility to understand how decisions about one asset will impact the overall delivery of energy. The Asset Repository should have the flexibility of not only capturing the relationship between the facilities, but also how the facilities are grouped into meaningful systems or networks. The grey circle in the center of Diagram 1 depicts this core function of the asset repository.

Once an asset is defined (including its relationship to other assets) the next task is to determine the key data for the asset. The data, stored as attributes and characteristics, serve to further distinguish the asset. At the individual asset level, any unique characteristics that differentiate the asset within its asset type are captured. For example, key operational readings and/or tolerances are captured and stored.

The ultimate differentiator of assets is the unique work history of the asset itself. Work history is the first “touch point” between Asset Management and Resource Management. To the asset manager having a consolidated record of an asset’s work history is priceless. The origins of this work history are obvious to most in the industry; the work history is built up each time resources are deployed to the field to “do work” on the asset. The work history begins with the initial

installation of the asset, which most often occurs as part of a large capital project (system enhancement), includes multiple instances of maintenance and inspection work, and ends with the final decommissioning or retirement of the asset, which ultimately triggers some capital projects to enhance the system by replacing one or more of the existing assets. Each time “work” is done on the asset, a work history record is added to the comprehensive work history of the asset.

Keeping track of an asset’s work history is just one instance of a “touch point” between Asset Management and Resource Management. To understand where the other “touch points” are, we must look deeper into some of the business analytics asset managers do. Regulations serve to define some “must do work”. An asset manager needs functionality to automate the initiation and track the results of compliance work (regulatory required work). This requirement represents another “touch point”, the initiation and tracking of compliance work.

After basic compliance is assured, the asset manager must have functionality that aids in making key decisions about various “risks” an asset faces. The Asset Repository should support analytical tools to determine risk assessments for specific types of assets. One example is the Department of Transportation requirements for Pipeline Integrity, which requires gas utilities to assess any risks to their transmission network. Analytical packages can determine risk based on a variety of variables, like the pipeline’s environment (soil type), material dimensions (wall thickness), material type (plastic), etc. If the analysis indicates risk mitigation work is required, the asset manager needs the software functionality to initiate this work, along with the ability to enter each risk assessment, actions taken, and results as part of the asset’s work history. Managing the risks associated with assets creates yet another “touch point”.

Related to asset risk management, asset managers often need to determine an asset’s criticality to the delivery of energy. Reliability Centered Maintenance approaches use this criticality to manage when assets are inspected and maintained, which reduces costs, increases the useful life of the asset, and increases network reliability. Asset criticality and asset return on investment are the basis of intelligently evaluating system betterment and asset expansion alternatives.

Asset criticality should be calculated at the individual asset level, based on the location of the asset within the network. Locational asset criticality overcomes the inherent limitations of assigning criticality as if assets resided in a vacuum, rather than within a network. Assignment of criticality solely by asset type does not recognize that two identical assets may sit at different locations in the network and have very different loads, risks, and work histories. Locational asset criticality should be calculated and then utilized in determining the type of maintenance regime under which the asset will be placed.

Another benefit of implementing an Asset Repository is that targeted maintenance rules can be run against assets stored in the repository. This eliminates the need to implement a large stand-alone maintenance system. Using this approach, maintenance rules can leverage the comprehensive structure of the Asset Repository to better utilize the embedded asset hierarchies, network modeling, attributes and characteristics, and the work history functionality. Because different assets have different locational criticality values, a utility’s asset management strategy should support various maintenance regimes including preventive maintenance, corrective

maintenance, predictive maintenance, reliability centered maintenance, condition monitoring and route inspections. Each of these maintenance regimes (along with the compliance regime) has unique business rules that drive work initiation. Independent of the regime type implemented for an asset, the initiation of maintenance work is yet another “touch point” between Asset Management and Resource Management.

Condition monitoring is a unique maintenance regime because it deals with the collection of critical asset status data. Condition monitoring data collection efforts should be integrated with the centralized Asset Repository so this data is added to the asset’s record. This data collection is often automated using digital collection devices. Note that as a part of condition monitoring, rules should be defined to utilize the data collected and determine if maintenance work should be initiated.

At various points in an asset’s life cycle, asset managers conduct analysis to determine key aspects of the asset’s condition, like its point on the decay curve. This life cycle analysis determines things like whether continued maintenance will yield the lowest cost solution for the defined level of service or whether a capital replacement should be considered. This Asset Management task does not often result in direct work initiation, but serves to define the context in which future actions may be taken.

If the life cycle analysis indicates an asset is nearing the end of its life cycle, capital planning options need to be analyzed. Once again asset managers benefit from having a comprehensive asset repository at their disposal. It is especially important, at this point, that the asset repository provides the asset manager a view of the network in which the asset is installed and the expected return on investment of changes in the asset and the network. This lets the asset manager consider the business case for capital improvements for a logical grouping of assets, rather than attempting to make isolated “one off” decisions about asset replacement.

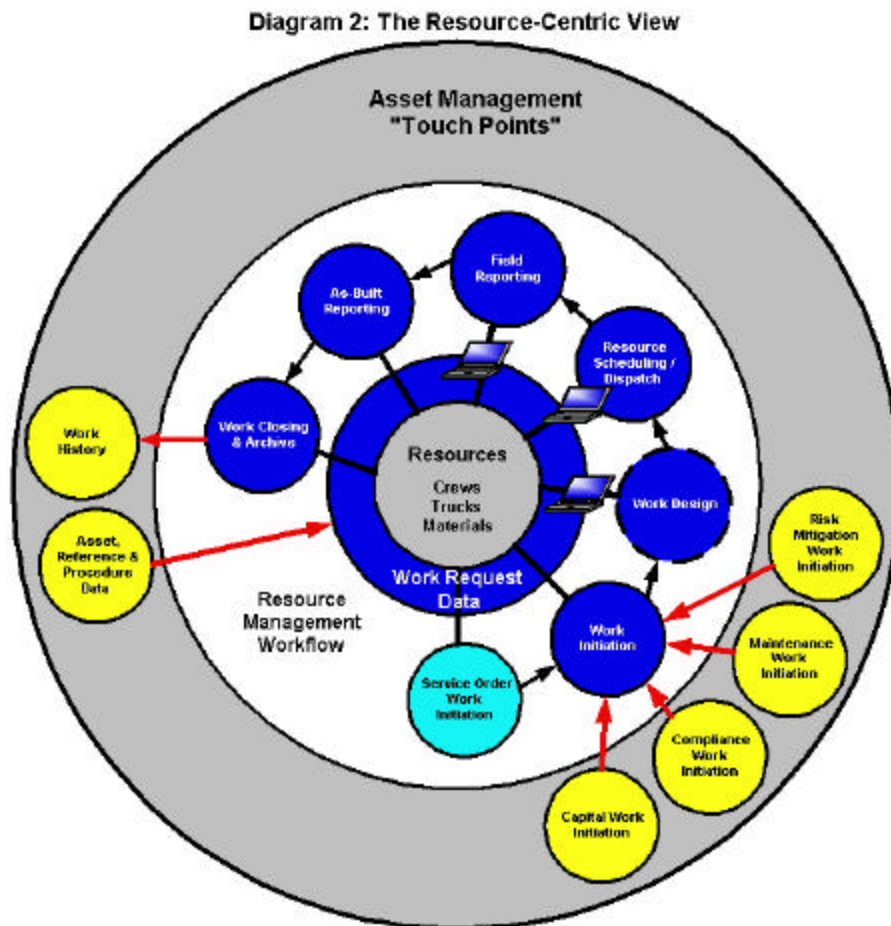
With maintenance and capital planning alternatives ready, the asset manager needs to determine the optimal solution; one which will balance the Return on Investment (ROI), Service Level Agreements (SLA), safety, reliability, load growth benefits, etc. At this decision point, we have yet another “touch point”, because either maintenance or capital work needs to be initiated.

In reviewing the Asset Management Systems and workflow we identified a number of “touch points” with the Resources Management side of the utility. In fact it should be obvious, at this point, that the analysis and decisions asset managers make ultimately manifest themselves (in one manner or another) as “work”.

Asset managers need functionality that allows them not only to define the rules by which work occurs, but also to effectively automate work initiation, work status tracking, and reporting of work history for the assets they manage. So why have these two functions, asset management and resource management, been viewed as independent of one another? To answer that question, we need to consider how “work” is structured, scheduled, performed, and reported. To do this we will briefly look at the context of Resources Management.

A BRIEF REVIEW OF RESOURCE MANAGEMENT SYSTEMS AND WORKFLOW

Just as an asset manager takes an asset-centric view, the resource manager takes a Work-Centric View. In and of itself this should not create a disconnect between the two efforts, but the fact that one piece of “work” can be defined to address multiple assets does seem to do this.



The resource manager’s aim is to organize “work” in a logical fashion to maximize the utilization and performance of resources. What this means is that, especially for capital work, one Work Request is often structured to address “work” across multiple assets. In essence, the resources manager may have reason to take “by asset” Work Initiations, turn them on their side, perhaps group them, and then define this group of “work” as one Work Request.

This is where the Stephen Covey adage of “Starting with the End in Mind” comes into play.

Under a unified Asset and Resources Management Strategy, the method the resource manager selects to logically group work **MUST** be designed in a way that allows the reporting for that work to be disaggregated down to the individual asset level. This is a key point, because without the ability to report work history against the specific asset, the asset manager is forever denied a complete work history of the assets. This impedes everything Asset Management is intended to address, because the asset manager is left with a “patchy”, incomplete record from which to make key asset decisions.

The Resource-Centric View (Diagram 2) presents the processes that the utility uses to organize work effectively and optimize its valuable resources. At the center of the Resource-Centric View are the resources (e.g. field crews, trucks/equipment, and materials) available to execute the “work”. Because these resources are limited, they are the real variables that must be managed.

The first thing you note is that, as you might suspect, Work Initiation is the initial trigger point of Resource Management. Note the various Asset-Life Cycle Initiation “touch points” that were previously identified on the Asset Management Context Diagram. One additional Work Initiation “touch point” is also identified; this “touch point” relates to Service Order Work and is most often initiated from the CIS.

Note that, depending on the work type, a number of different resource management systems may be utilized to manage the workflow. For example, a Work Management System is recommended for managing complex capital work, because this work is based on compatible units (CUs). Alternatively, service orders and other non-CU work types may be managed within a different type of work management system such as a Services and Inspections Management System. The Resource Management Workflow presented in the diagram is generic to avoid focusing on the various deviations that different applications may interject.

Now you might be saying to yourself, “How do the initiating systems know what “Work” they are initiating”? This is a good question. It is very important that any “work initiating” system understand the structure of their partner resource management system. This involves mapping compliance, maintenance, and other Asset Management procedures to a Work Request Type used by the Resource Management systems. This integration effort can prove challenging, but there are significant benefits of automating this workflow. Leading utilities have recognized the benefits of unifying the Asset Management and Resource Management system workflows.

Once the “work” is created, the resources manager’s challenge is to determine how best to schedule the work. As previously mentioned, this is where constraints enter into the picture. In a perfect world, the resource manager would have infinite crews, trucks, and materials; unfortunately this ideal situation does not exist. Basic scheduling packages are available; most work management applications include an embedded scheduler. More comprehensive constraint-based scheduling packages can be used to further automate the scheduling process and reduce travel and crew costs.

Because Service Order Work has a shorter cycle by nature, it requires more real-time management of resources. In many utilities, this type of work is scheduled with a work force management application within the dispatch application.

Once work is scheduled or dispatched, the work is assigned to field crews and trucks, equipment, and materials are requisitioned to support the job. The Materials Requisition process constitutes another opportunity for a “touch point”. Specifically for Maintenance Procedures, material requirements can be defined within the procedure itself. Additionally “parts and kit” data can be stored against the asset record to communicate this information to crews and to the materials requisition process itself.

The following section addresses the role of mobile technologies within the Asset and Resource Management workflows.

TODAY'S MOBILE TECHNOLOGIES INTEGRATE FIELDWORK WITHIN ONE SEAMLESS ENTERPRISE-WIDE ASSET AND RESOURCE MANAGEMENT PROCESS

From a process standpoint, mobile technologies represent the logical extension of Asset and Resource Management workflow out to the field and back again (please take note of the representation of mobile technologies in Diagram 2). Utilities have long looked to mobile solutions to replace the historical process of assigning work to crews using a paper-based process. However, today's generation of mobile technologies let utilities do more than simply electronically communicate work assignments to the field and capture work request results. These applications now provide field crews with much needed reference data on the assets and provide managed procedures that streamline a utility's ability to deploy new or revised processes in the field.

The importance of mobile technologies is reflected in the resource management context diagram. Because resources are at the center of process, it is logical that the tools used by field crews are also a central focus.

A key development on the mobile front is the trend of adopting a "work is work" philosophy about the assignment of work to crews. Because utilities want to schedule/dispatch work more effectively, many are choosing to review crew specializations closely to remove any unproductive historic division of labor. This is important because service order crews often utilize different mobile devices than crews assigned to maintenance or capital work. The "work is work" concept drives utilities to adopt one unified mobile device, supported by applications that embrace this convergence.

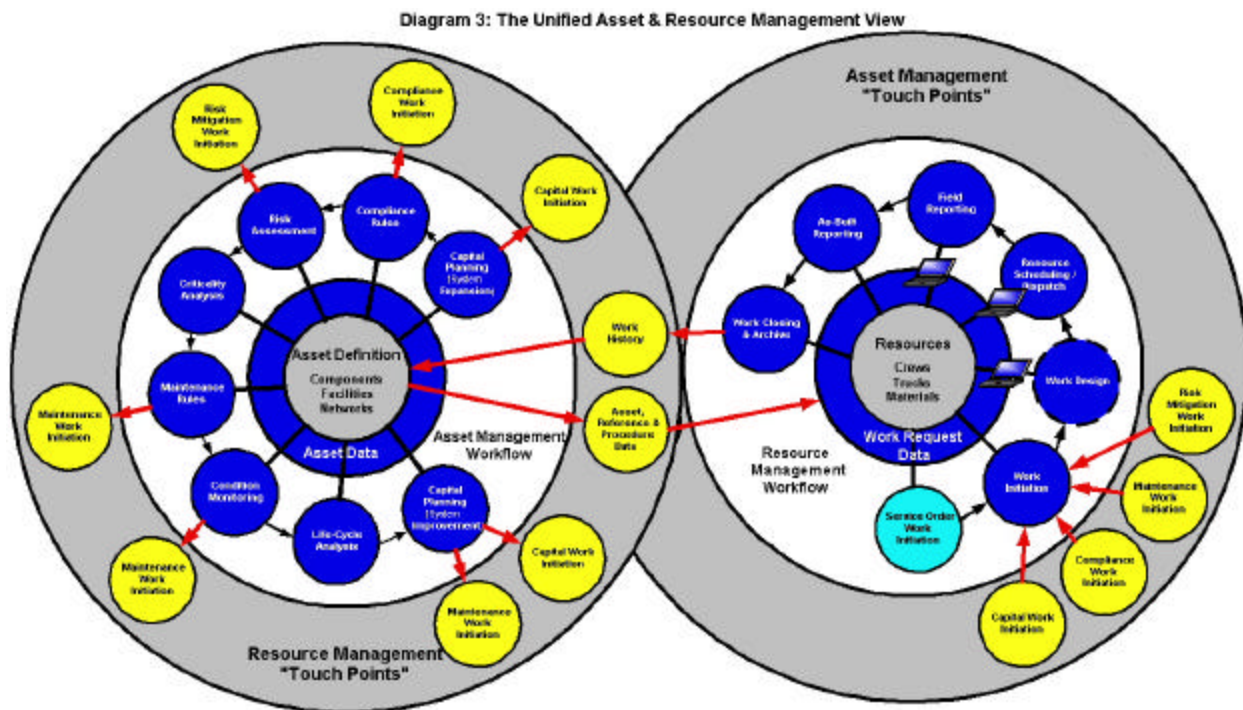
A number of data transfers need to occur between the back office Asset and Resource Management systems and Mobile Asset and Resource Management devices. As previously mentioned the assignment of work and reporting of work results are core transfers between back office and mobile systems. However, utilities should not overlook the benefits they can gain by passing asset data, geospatial data, and reference data for procedures. By providing this information to the mobile device, the utility is giving key operational data to field crews. Additionally the utility can exert more control over the data collection process, which improves data accuracy across all enterprise systems.

Once work is completed in the field, the next step is to have this data passed back to the enterprise systems. At which point both Asset Management and Resource Management systems can update their "views". The resource manager can close the "work" and report costs incurred, while the asset manager is provided with the corresponding work history updates for each asset.

THE UNIFIED ASSET AND RESOURCE MANAGEMENT PROCESS

Thus far we have identified that there are numerous “touch points” between Asset and Resource Management; but what may not yet be clear is how interdependent these workflows truly are. In order to illustrate this we need to look at these two context diagrams side-by-side.

These diagrams aim to show the continuous interaction between the Asset & Resource workflows that exists throughout the life cycle of an asset. For this reason a linear representation of these workflows was not used. This does present one challenge when interpreting the diagrams side-by-side; with the exception of Work History and Asset Reference and Procedure Data (which are placed within the “joined” portion of the circles) the other touch points must be viewed as pseudo off-circle connectors (e.g. if compliance work was initiated from the “Asset-Centric View” the reader should look for the equivalent Compliance Work Initiation “touch point” on the “Resource-Centric View”). This work initiation “touch point” would trigger the “work” to be completed, cumulating with the work history being reported against the asset’s record.



The other reason for using a non-linear workflow is that this context diagram approach intends to illustrate the numerous instances by which “work” will be initiated over the course of an assets life. Whether this work initiation is the result of externally driven compliance rules, risk mitigation efforts, or standard maintenance; it is important that a utility has properly aligned their Asset & Resource Management processes. By looking Asset Management and Resource Management workflows side-by-side, it should be evident that these disciplines are interdependent, and that they do share a natural (symbiotic) relationship to each other.

Too often utilities have spent significant dollars implementing separate, point solutions to support their Asset Management and Resource Management activities. Often these solution had similar functionality, like work initiation or workflow management; but their scope was limited to specific types of “work”. Once a Utility understands the fundamental inter-dependence between Asset Management and Resource Management activities; it can avoid the artificial limitations of point solutions aimed at only one part of the organization, thus allowing the Utility to explore the benefits of implementing a true enterprise-wide Asset and Resource Management solution.