

ARC WHITE PAPER

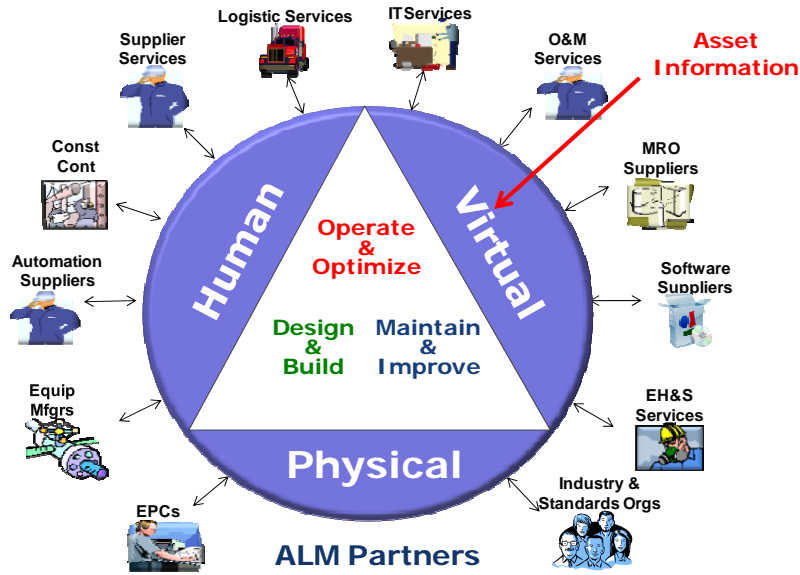
By ARC Advisory Group

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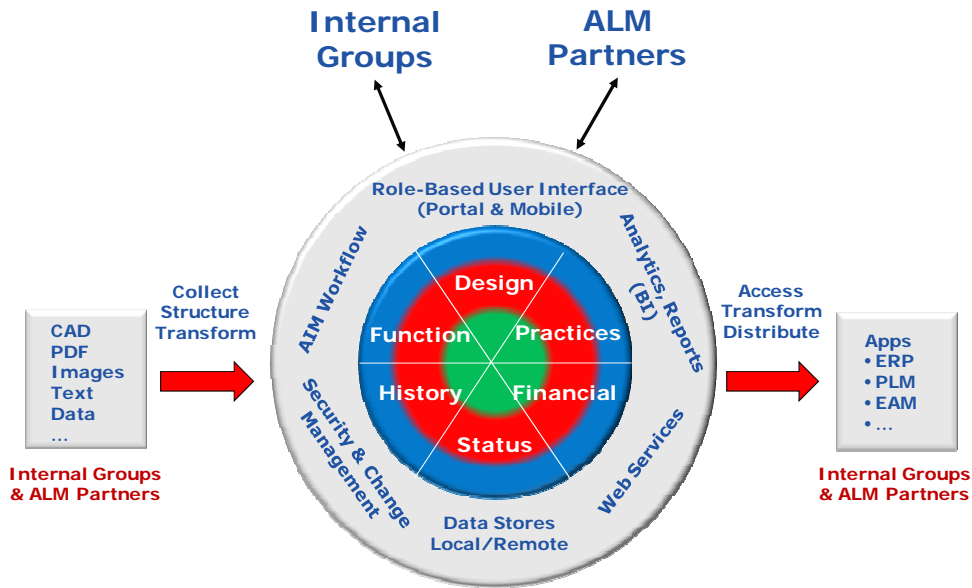
Strategies for Asset Information Management

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Asset Information Management (AIM) Enables Performance over the Life of All Types of Assets



Evolving Technologies Provide a Platform for AIM Solutions Enabling a More Comprehensive AIM Strategy

Executive Overview

Most businesses, especially process manufacturing industries, utilities and government organizations have been driven by efforts to maximize their return on asset investments and the pressure for continued improvement increases. Presently, the cost of existing asset management practices is excessive and the opportunities for savings are large. Furthermore, several

Most large asset intensive businesses such as those in the process industries and utilities are under increasing pressure to get the most out of their investments at a lower cost. They are also under pressure to increase employee productivity and comply with a growing number of regulations around the world. Fortunately, emerging information technologies and practices make a new generation of Asset Information Management (AIM) possible.

factors such as globalization, contract manufacturing, compliance to regulations and even sustainability (“Green”) considerations will drive almost all businesses to examine their asset management practices.

Most asset intensive businesses have some form of Asset Lifecycle Management program (ALM), but the current situation demands that they be evaluated. ARC research indicates that this should be done

from a broad perspective, while considering the benefits that new information technologies and practices can offer. Many of these benefits come from better Asset Information Management (AIM), which is the collection, management and distribution of information related to design, construction, operation and maintenance of all types of assets. The images on page 2 portray some of ARC’s ALM and AIM concepts.

Most businesses will find that they need a more comprehensive AIM strategy and that solutions are complex. Solutions are complex because asset information is diverse and spread across many applications. This is at odds with the need for standardized information sharing. One approach is to use an existing application as a platform for building an AIM solution. This is often problematic because these applications have limited capability to satisfy information needs outside of their domain.

Alternatively, modern IT infrastructures provide a more flexible platform but, by themselves, lack AIM specific workflows, integrations, information structure and relationships, visualizations, etc. Consequently, owner-operators must create business specific AIM solutions, using application software such as that from BlueCielo ECM Solutions, which not only provides engineering content management but also contains integrations with other AIM elements.

Business Drivers for Investing in Asset Management

Most businesses, especially process manufacturing industries, utilities and government organizations have been driven by efforts to maximize their return on asset investments and the pressure for continued improvements continues. However, several factors are stimulating additional interest in asset management practices and related industry collaborations.

Some industries are building new plants and factories and others are re-purposing existing facilities. All want to get the most out of their asset investments.

The impact of globalization on supply chains gets ample attention, but the impact on asset management strategies can be equally pronounced. Globalization, in combination with other trends, changes the asset investment equation for many industries. Emerging consumer markets and the associated supply chains make it more

beneficial to locate in new regions, possibly away from suppliers, partners, and current sites. In turn, the changing cost of labor and availability of skills influence asset design, especially the level of automation, in addition to asset management practices.

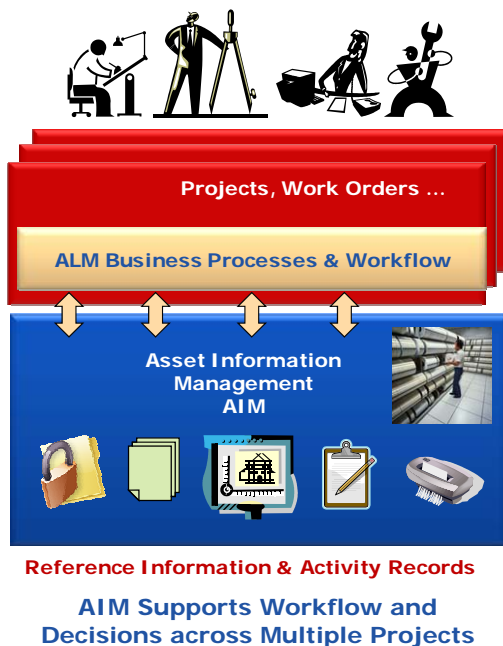
Several areas related to regulations are also driving increased attention to asset management strategies. Overall Environmental, Health and Safety (EH&S) and product quality issues continue to drive improvements in asset information practices in most industries, but some industries have additional challenges associated with compliance. For example, the food, pharmaceutical, biotech and medical devices industries must also address FDA (US Federal Drug Administration) regulations such as 21 CFR Part 11. FDA regulations have been driving manufacturers' asset management programs for some time. However, new FDA regulations encourage risk-based methods that require more attention to regulations in the design phase. Consequently, manufacturers must now provide better asset information transfers and broader change management to support ongoing compliance effectiveness. As a final example, the influence of "green" (sustainability) considerations such as the cost of energy, environmental and trade regulations is also changing how we invest in and manage assets globally.

Even if there were no trends driving change, there is ample evidence that the high cost of existing asset management practices is enough to cause us

to examine our asset related practices. A 2004 NIST study¹ estimated losses of \$15.8 billion in the US alone, mostly incurred during asset operation and maintenance, within a sample of businesses with a \$374 billion capital spend. These losses were associated with the effort expended to avoid, mitigate and correct problems caused by poor asset information practices, indicating that the opportunity is significant.

To address these issues and enable better performance, traditional Asset Lifecycle Management (ALM) needs to evolve. ALM needs to take on a broader perspective. It also needs to better represent each phase of an assets life, starting with design, through operations and maintenance. To begin this process, ARC recommends that businesses focus on improving the overall management of asset information, as an essential step in improving ALM.

Asset Information Management (AIM) Enables Better Performance



Emerging ALM strategies continue to focus on traditional physical assets, but additionally consider the associated human and virtual assets. (See the images on page 2.) Virtual assets include all the models and information needed to optimize performance. *Asset Information Management (AIM) is the collection, management and distribution of virtual assets needed by people for design, construction, operation, and maintenance of physical assets.*

AIM provides information management capabilities in support of ALM processes and workflow for the entire life of assets. Some asset information is created when the asset is created, updated to as-built status when the asset is installed, and passed to asset owner-operators, typically through purchasing and the Engineering organization. The Engineering organiza-

¹ **Cost Analysis of Inadequate Interoperability in the U.S. Capital Facilities Industry**, National Institute of Standards and Technology, NIST GCR-04-867, August 2004.

tion usually validates information received, stores it in department systems and enriches it in preparation for a handover to operations and maintenance. Both Operations and Maintenance further enrich the information for their purposes. Although this sounds very sequential, in practice information is flowing in many directions and this complicates change management considerably. Concurrent improvement projects add yet another dimension.

AIM Objectives

- Common asset information services for ALM Processes
- Foundation for analytics and optimizing return on assets
- Foundation for physical and human asset performance and productivity
- Foundation for improved business planning
- Support for diverse roles
- Support continuous improvement

AIM involves a wide variety of *reference* and *activity information* about assets. For example, AIM can include design drawings, data and specifications, manuals, inspection reports, test data, MRO inventory, operating instructions, equipment performance data, maintenance history, and more. Some of this information is used within a single department but a large majority of it is used by several departments, usually for different purposes. Consequently, AIM strategies must provide common access services for asset information in various applications as well as to information stored within IT infrastructure, such as relational databases and content management systems.

It is important to note that asset information management today is more than document management. Diverse asset information is created over the entire asset lifecycle. The cycle starts with electronic requirements documents from Engineering. These are transformed, typically by outside organizations such as EPCs, into designs represented in related CAD files, databases, PDF, spreadsheets, etc. Information about reviews, approvals, comments, and changes have contractual implications and must also be

carefully maintained. Operations and maintenance adds to all of this.

In addition to information storage, AIM strategies now include strategies for workflow, integration, security, role-based portals, and workspaces.

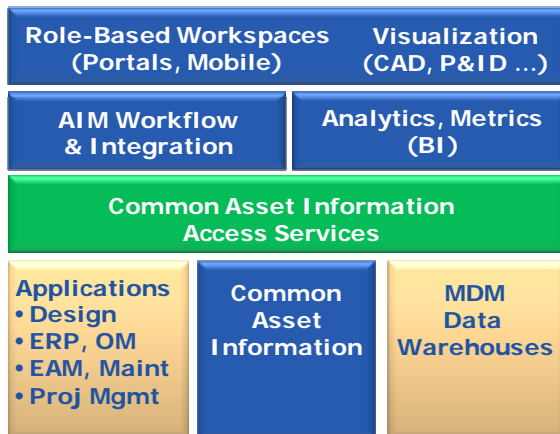
Originally, asset information management was paper-based and cumbersome but information technology advancements enabled more comprehensive AIM strategies.

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AIM Strategies and Solutions

Traditionally, asset information has been managed largely at a departmental or application level and this limitation has been problematic. Even solutions designed to be enterprise-wide were often built without a comprehensive set of requirements. The result is missing and out of date information, error prone manual re-entry of information, laborious information collection processes, reports that do not represent reality and many others. The management of legacy asset information (paper drawings, manuals, etc.) is especially problematic in today's electronic world.

AIM strategies, because of their broad scope, are naturally comprised of a variety of software products, data stores, and technologies. Department



Reference Information & Activity Records

An AIM Platform-Centric Approach
Builds on Common Access Services

solutions (CAD, maintenance management, condition monitoring, etc.) will always be essential and no single solution will serve all AIM needs. Consequently, AIM strategies must provide common methods for aggregating, storing, synchronizing, managing and sharing *selected information*. Therefore, one challenge for AIM strategies is to identify the information that should be managed centrally versus that which should be left to the applications. Furthermore, information from both the central store and application databases must be shared consistently through a set of common access services.

AIM Strategies must provide several capabilities beyond central data management and there are questions about how to implement these capabilities. For example, some workflows can be accommodated within an application, but others cross multiple applications and should be implemented separately. Also, information should be presented consistently for all stakeholders, but all businesses have many work environments and supporting technologies from different suppliers.

Building a Technology-based AIM Solution

While it is possible to adopt a dominant application as the central AIM platform, in practice this requires extensive customization that often results in a limited and inflexible solution. Consequently, it is better focus on the AIM requirements that are common across applications, such as ways to provide

a consistent presentation, cross-functional workflow, common access services, unified information structure, and single approach to integration and synchronization. These capabilities are typically found in *technology platforms* and may actually already be part of your standard IT landscape.

Architecturally, a technology platform decouples an AIM strategy from application dependencies and fills gaps left by applications. A technology platform for AIM may be comprised of portal environment, content management, workflow engine, integration engine, database management, data quality tools, and others, depending on need.

Enterprise Content Management systems serve a valuable role in many businesses but they do not provide a complete AIM solution by themselves.

Generic technology platforms must be extended somehow to handle the documents, data structures, information relationships, workflow, and environments needed for a business's AIM. Content management, portal environments and relational databases provide a foundation for common information management, but they lack AIM specific capabilities such as standardized information structures, categorization, linkages, transformations, etc. Similarly, portal software provides a role-based framework but lacks definition of AIM specific roles and visualization of diverse asset information.

Consequently, owner-operators must either extend technology platforms themselves or select domain applications with built-in AIM capabilities. In most cases, the later is preferred because it presents a lower risk, requires less time, and is easier to maintain. Fortunately, a growing number of suppliers offer ready-to-go AIM capabilities that complement technology platforms.

One category of such AIM solutions is Engineering Information Management (EIM). As the name implies the EIM focal point is on the Engineering organization needs, but the trend is for EIM solutions to expand beyond basic Engineering documents and into operations, maintenance and beyond.

BlueCielo AIM Offerings

BlueCielo ECM Solutions is an EIM supplier (BlueCielo calls this Engineering Content Management) that was originally focused on CAD related content such as drawings but has expanded to cover a larger AIM footprint for Owner/Operators. For example, BlueCielo recently expanded their offerings by acquiring ImandrA, which is built on IBM FileNet content management with more sophisticated capabilities needed by EPCs for managing large engineering projects. BlueCielo's overall approach is to recognize that AIM can be an enterprise-wide strategy, requiring many parts and that they cannot provide all the needed technology or all the business specific capabilities. BlueCielo focuses on providing software that both customers and partners can easily integrate with other elements of AIM.

BlueCielo specializes in Oil & Gas, Pharmaceutical, Process, and Utility industries and has enjoyed particular success with their FDA Module in regulated industries. They have well known customers across several industries such as BASF, ExxonMobil, Pfizer, RWE, Shell, Total, Wyeth, and others, reporting over 250,000 users. This level of industry presence classifies them as one of leaders in EIM.

More than just managing files, BlueCielo structures information as related objects, documents and projects. *Objects* contain all information about assets including design data, purchasing information, vendor data, operating history, etc. *Documents* may be drawings, instructions, data sheets, design specifications, etc. And *Projects* provide a model for managing change and keeping information current, throughout the asset lifecycle.

BlueCielo manages shared Engineering content in a common repository that was designed with revision management and support for critical "as built" processes in mind. Customers can use Oracle, Microsoft or BlueCielo database technologies.

For example, their solution can relate documents (such as P&IDs, Process and Instrument Diagrams) to asset object data (pumps, valves, instruments, etc.), and properly manage their use on *concurrent projects*

that can simultaneously work on the same document under separate release schedules. Of course, document packages (secure briefcases) are provided that can be distributed in review, comment and approval workflows, including external collaborative activities with partners and suppliers.

BlueCielo embeds the language of AIM throughout the user work environments and provides modules to support asset management, flexible project workflow, 3D based global collaboration, transmittal management and a publisher framework.

In line with AIM integration requirements, the asset management module keeps engineering content synchronized with popular maintenance management solutions such as IBM Maximo, SAP Plant Maintenance, Infor Datastream and Ultimo. BlueCielo solutions also integrate with Microsoft SharePoint and EMC Documentum as well as IBM FileNet as mentioned above.

For many businesses, BlueCielo offerings can result in fast time to value, high AIM stakeholder productivity and more flexibility in the users' hands. Businesses needing to select or replace their ECM solution in an AIM context should evaluate BlueCielo offerings.

Conclusions

Today's business environment - globalization, attention to sustainability, increased regulations, etc. - requires better asset management and more comprehensive AIM strategies. More comprehensive AIM strategies enable opportunities for better asset-related business planning as well as eliminating losses associated with weak programs and poor information.

- A more comprehensive AIM strategy requires covering the entire asset life - Design & build, Operate & Optimize, and Maintain & Improve. The handover of information from asset builder to owner-operator is a critical step in AIM where information and the as-built assets must be consistent. A more comprehensive AIM program also means enriching engineering data with operating and maintenance data.
- Asset information resides in several applications used during various phases of an assets life, and information needs differ for each phase. This creates a very complex AIM architectural problem. No single application will contain all asset information, and the AIM strategy and solution must be designed with this in mind.

- Evolving information technologies offer opportunities for improved AIM programs. Many of the technical requirements for AIM are similar to those in other information management domains. Consequently AIM solutions can utilize many of the same components.
- A technology platform itself is also insufficient as an AIM solution. Technology platforms require the development of specific capabilities for the asset management domain: information structures and linkages, workflows, role-based environments, visualization, data management and versioning, and other more specific capabilities.
- Businesses looking for rapid deployment and less customization should determine how AIM specific products, such as those from BlueCielo ECM Solutions can complement their AIM technical platforms. Traditionally, Engineering Information Management offerings have been engineering focused but they now commonly address a broader need.

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Acronym Reference: For a complete list of industry acronyms, refer to our web page at www.arcweb.com/Research/IndustryTerms/

AIM Asset Information Management	EPC Engineering, Procurement and Construction contractors
ALM Asset Lifecycle Management	NIST National Institute of Standards & Technology
Apps Applications	OpX Operational Excellence
BI Business Intelligence	OEE Operational Equipment Effectiveness
BPM Business Process Management	MDM Master Data Management
CAD Computer Automated Design	MRO Maintenance Repair Operations
CMM Collaborative Manufacturing Management	PAM Plant Asset Management
DOM Design, Operate, Maintain	P&ID Process & Instrument Diagram
EAM Enterprise Asset Management	PLM Product Lifecycle Management
ECM Enterprise Content Management <i>OR</i> Engineering Content Management	ROA Return on Assets
EIM Engineering Information Management	SCM Supply Chain Management
ERP Enterprise Resource Planning	XML Extensible Markup Language
	WMS Warehouse Management System

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