

The EAM Market Shows Growth and Consolidation

Enterprise asset management (EAM) is crucial to asset-intensive organizations. The expansion of enterprise resource planning vendors into the EAM market will reduce the number of niche vendors providing solutions.

Management Summary

Enterprise asset management (EAM), which evolved 10 years ago from computerized maintenance management systems (CMMSs), is a specific segment within enterprise resource planning (ERP). There are hundreds of pure-play EAM, CMMS and general maintenance-related application providers worldwide, some of which have been in business for more than 20 years. This is anomalous when compared to other software areas, where the maturity of the market parallels a consolidation of vendors.

Many of these survivors are small, niche vendors, offering simple systems for departmental or workshop needs. By being focused on a specific vertical — or even a micro-vertical — market, they are able to sell their expertise and to fit with what is traditionally seen as an isolated IT requirement. Enterprise application software (EAS) suite vendors, particularly the traditional ERP vendors seeking new sales opportunities, have also explored additional EAM functionality. However, in many cases, these vendors' offerings provide companies with less-comprehensive functionality, but are more tightly integrated with the balance of business applications from the same vendor. The spread of ubiquitous ERP systems and their EAM modules will make life difficult for the niche vendors.

Strategic Planning Assumption: By 2006, ERP vendors will satisfy the EAM requirements of customers in 70 percent of organizations (0.8 probability).

The focus on leveraging the EAM offerings from suite vendors will trigger further consolidation of revenue in the EAM ranks, although many companies will continue to survive. Currently, nearly 70 percent of the EAM license revenue comes from the top 20 companies; however, this will shift even further to a few top vendors during the next two years.

Strategic Planning Assumption: By 2007, 80 percent of new sales of EAM and CMMS vendor products will be centered around the top 20 CMMS, EAM and ERP vendors by revenue (0.8 probability).

The smaller vendors in the marketplace will not necessarily stop trading or be acquired. With managed cost control, they can continue doing business in the market, but, increasingly, they will be selling additional modules and services to their customer bases.

Strategic Planning Assumption: By 2006, 80 percent of the CMMS and EAM vendors will get most of their revenue from their customer base, rather than from new sales (0.8 probability).

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Although the current economic environment and depressed IT spending have been easy to blame for the general market woes reported by software companies, these factors are only part of the equation, as evidenced by the growth and success of some of the individual vendors. These inhibitors are significant in stalling a market rebound. Factors that created much of the market's sluggish performance (a 3 percent annual decline in license revenue in 2003) include:

- The saturation of the functionality
- Contraction of the target vertical industries
- Renewed interest by EAS in this sector
- Pure-play providers' historical struggle to provide rich, robust and reliable integration with other business applications

Despite these obstacles and its recent performance, the EAM market has historically been a consistent growth segment amid the swirl of hype and the ups and downs of the software industry in general.

The lack of substantial dynamic historical growth is counterintuitive. EAM offers functionality deemed paramount for asset management by asset-intensive industries. The EAM market is perceived as offering good return on investment (ROI), and it should theoretically encourage rapid user adoption; however, to date, it has only remained a steady and predictable segment within ERP. Like the maintenance staffs that use these applications, the EAM software segment toils in the background without public scrutiny or visibility, except in asset-intensive companies that value asset reliability and availability above all else.

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1.0 Introduction

Strategic Planning Assumption: The EAM market will resume growth of 4 percent to 5 percent through 2006, with best-of-breed vendors experiencing the brunt of market share losses (0.8 probability).

The EAM market entered a product transformation in 2001 through 2002 with many pure-play vendors advancing their offerings through a cycle of product updates in functionality and technology. Although these enhancements were needed, many — for example, in usability and deployment with Web access, and in statutory compliance with Code of Federal Regulation (CFR) 21 Part 11 — are now considered mainstream. The reawakening of ERP and EAS suite vendors seeking new sales opportunities has also refreshed or added maintenance functionality, particularly Oracle and J.D. Edwards (JDE) prior to its acquisition by PeopleSoft. Combined with a general market malaise toward buying software and a conservative and risk-averse buying approach, the market is poised for consolidation and competitive landscape adjustments.

2.0 The Value of EAM

Strategic Imperative: Asset management applications are crucial to equipment-reliant organizations.

EAM, and asset management in general, have the potential to save companies money and increase capacity without significant capital outlay. Many organizations have pursued or acquired advanced and automated machine control systems. Because modern control systems in manufacturing and asset-intensive operations can compensate beyond typical human limits, many processes are running in environments in which asset destruction is eminent when control fails. Nonetheless, simple alerting of asset degradation and perfunctory scheduling of maintenance activities without consideration of production activities merely restores the status quo of asset use without addressing overall asset performance. The value, then, is in the holistic integration of actual performance, asset health and production activity planning to maximize not throughput as well as economic return on assets (ROA) to the company. Consequently, businesses that focus on asset optimization, including in-process diagnostics, will have the lowest long-term overall operating costs.

Manufacturing organizations with critical equipment, 24x7 operations or maintenance downtime that exceeds industry norms (that is, based on equipment type) can maximize output and minimize costs by taking a closer look at asset management solutions. Plant and equipment downtime can interrupt production schedules in manufacturing facilities that require high availability to a point where the best sales integration and the most-sophisticated supply chain planning (SCP) become superfluous.

Contributing to the management interest in asset management is the drive to minimize product cost, including plant maintenance, which can consume as much as 10 percent of operational expenditures in manufacturing environments and more than 50 percent in mining and utility environments. Improved maintenance practices can provide some of the most-short-term ROI paybacks by ensuring that equipment such as presses, dies and milling machines are maintained optimally with minimal spares inventories. Companies in steel fabrication and aerospace have reportedly paid for the implementation costs in inventory reductions.

Another benefit to discrete manufacturers is proactive tolerance maintenance through asset management solutions, which include calibration and machine-monitoring capabilities. Reliability-centered maintenance and total productivity maintenance are also used by proactive organizations to engineer out future failures and, therefore, improve equipment availability long term

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In other industries that are more purely asset-intensive without a manufacturing aspect (such as utilities, transportation or natural resource extraction), the maintenance component of costs is even higher — as much as 60 percent of the overall cost of operation. In those environments, the return from tuning maintenance costs is even higher; and, since most of those asset-intensive operations are affected by "unrecoverable loss" from failed assets, the importance can be even higher.

2.1 The ROI Contributors From EAM Systems

Strategic Planning Assumption: Through 2005, more than 30 percent of EAM implementation projects will be considered failures by their business sponsors due to inadequate upfront identification of goals and benefits (0.7 probability).

The need for measurable ROI has led businesses to document business cases for investing in ROI.

- Labor use improvements of 10 percent to 20 percent (that is, reduced man-hours for the same level of work) — With better scheduling advanced planning of work activities, labor is more focused on what needs to be done. There is less delay and downtime for staff, and fewer hours are allocated to staff that is not trained, qualified or available to carry out the work.
- Inventory reductions of 20 percent to 30 percent with the same service level for issues — The matching of inventory levels to planned and unplanned job levels means that there is a tuning process of matching inventory to jobs that will be done. Companies are able to reduce the level of inventory for parts that are not going to be needed immediately, while ensuring that the parts are at levels that cater to the planned work, as well as an allow for unplanned work (such as emergency, breakdown and historically predictable damage).
- Reduced inventory carrying costs (that is, from storage, insurance and handling) of 20 percent — As a consequence of the reduced inventory, there is less carrying cost. In many organizations, there are significant storage and insurance costs associated with spare parts. Unless the planning and forecasting is accurate, there is a cascading effect of wasted money and resources.
- Decreases in new equipment purchases of 3 percent to 5 percent — By improving reliability, the equipment in use often has an extended life. Catastrophic failure is reduced, and useful life is extended. As a related benefit, the purchases of new equipment can be made with more confidence that the brands and models selected for purchase will be more reliable and cost-effective.
- Fleet availability increases of 3 percent to 10 percent — In many organizations that use mobile and fleet equipment, there is a margin allowed for equipment failure and repair. Although normal maintenance will always mean that some equipment will be in the workshop awaiting repair, ensuring that fewer breakdowns occur can minimize this. It also ensures that, when in the workshop, there are no undue delays for spare parts not in stock or staff that is not available.
- Improvements in cost recovery from the manufacturer (in circumstances where repairs are carried out on equipment already covered by a warranty) from 10 percent to more than 50 percent — In organizations that use manufactured goods, many of the material and equipment used is under some form of warranty. However, in practical terms, because it is often not possible to send the part or equipment back to the manufacturer, most repairs are done in-house, and later cost charges are made back to the manufacturer. A good EAM system will separate out the warranty-related work — including parts and labor — and support a regular reconciliation with the manufacturer responsible for the warranty

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- Material cost reductions (that is, by minimizing waste and rework) of 5 percent to 10 percent — The actual material used in repairs and maintenance is often more than the manufacturer's recommendations or the "minimum needed" because of inevitable waste by incorrect job assignments or machine failures resulting in damaged parts or mismatches of model and type. In addition, the incorrect repairs or maintenance that comes from not having a documented and coordinated plan means that there are some repairs that will be done again.
- Purchasing cost reductions (that is, the time to make an order) of 10 percent to 50 percent — As with all electronically managed systems, there is a reduction in the manual labor and effort required to order, purchase and pay for parts. By replacing manual systems, significant costs in staff can be reduced.

Many companies will find it difficult to achieve these potential savings. It requires coordination across business groups and a focus on the goals to be achieved, with tactical plans on progressively applying technology to business problems. Projects will also encounter significant "political" problems acquiring business sponsorship and clearly identified goals. It is more likely that the perception of success will not lie in the metrics listed above, but in having the goals clearly outlined, even conservatively, at the outset and reporting achievements throughout the life of the project.

3.0 Definitions and Methodology

Strategic Imperative: Because ERP vendors include asset care within their suite offerings, companies must choose integrated or best-of-breed solutions.

For 2002, Gartner redefined and restated its numbers for the ERP market. In an attempt to depict the changes within the markets accurately, Gartner shifted the historical application license revenue for direct and indirect procurement applications, formally sub-segments of financial and traditional ERP, to the supply chain management (SCM) market. This separation is crucial when looking at the EAM market. Indirect goods — such as blue-collar maintenance, repair and operations (MRO) — that are the internally consumed technical material and parts used to support production equipment are subject to different sourcing processes and algorithms than items for resale or use in direct manufacturing.

The restatement also reflects expansion of coverage, vendor restatements of revenue and new information in Gartner's research-gathering process. Gartner's market statistics methodology combines primary and secondary sources to produce the market statistics, trends and forecast reports. Gartner surveyed 84 major software application providers within the ERP software industry in the Asia/Pacific, European, Japanese, North American and Latin American regions.

Gartner tracks the EAM market as a subsegment of ERP that has historically concentrated on asset-intensive industries. Although EAM has historically been reported within the ERP market statistics reports, this is the first year that Gartner has created a vendor market share and trends report specifically for the EAM market. There are many acronyms and definitions in this market; however, Gartner simplifies this by focusing on four market subsections, which are expanded on in this section:

- CMMS
- EAM
- Asset life cycle management (ALM)
- Asset-intensive ERP

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Each subsection has a progressively greater functional scope. Gartner does not differentiate between the particular technologies deployed in each of these — such as Web-centric, collaborative commerce (sometimes referred to as c-commerce) or e-commerce based — because this is constantly evolving and should be thought of as the "state of the market" in asset care. The first two categories (that is, CMMS and EAM) are typically the domain of best-of-breed vendors. These are software companies that provide a set of modules that focus on specific functional area and not the full scope of business needs. There are exceptions to this where an ERP suite vendor actively markets and sells its EAM module to "non-ERP clients." EAS vendors typically provide the ALM and asset-intensive-ERP categories.

3.1 CMMS

CMMS is the core maintenance functionality encapsulated in software systems. EAM functionality evolved from the CMMS applications that encompass work and materials management for fault repair, regular preventative maintenance and service activities. CMMS is not limited to manufacturing; it is also applicable to utilities, facilities, transportation and other activities where equipment subject to wear, failure or repair is used. A CMMS solution usually includes work order creation, planned maintenance, maintenance history, purchasing and procurement, and inventory management, as well as equipment, component and asset tracking for hierarchical contracts of equipment. CMMS applications do not have financial (beyond cost recording) or human resource management capabilities (beyond basic staffing IDs). They are typically purchased to integrate with the applications that support financial and human resources tasks more fully. These functions are often being sourced from ERP suites. These CMMS applications are also typically smaller scale, in that they are designed to run at and for a single site of operations.

3.2 EAM

Developed from the more-basic CMMS functionality, EAM systems have been a key tool in asset care and MRO procurement and the most-widely deployed variant of these systems. The CMMS functionality is extended by the addition of financial management modules, such as accounts payable, more advanced cost recording in ledgers — at least — and more-advanced human resource management for rostering and skills recording. Technically, the EAM applications are also designed to scale to larger numbers of users (for example, beyond 100 concurrent users) and run on multiple sites from a single central database, thereby catering to business requirements, rather than departmental or site requirements.

EAM is part of a strategy to increase plant capacity using IT in lieu of new construction in large, asset-intensive businesses. It can integrate key plant control systems (PCSs) and ERP with maintenance activities and functions to reduce downtime and minimize maintenance spending. In its most-complete form, it equates to an ERP solution for a nonmanufacturing environment (such as a utility, mining operation, defense or transportation operation).

Ultimately, EAM consists of asset management, materials management, some human resource management system (HRMS) and financials.

- *Asset management:* Its application functionality assists in identifying assets and activities, and manages requests for service and work schedules. In addition, these applications manage job costing, work orders, asset registration, fixed assets, and predictive and preventative maintenance.
- *Materials management:* The application functionality in this segment assists in planning parts and material requirements for maintenance. This is the true origin of MRO procurement. The applications in this segment have capabilities to:
 - Integrate with procurement management

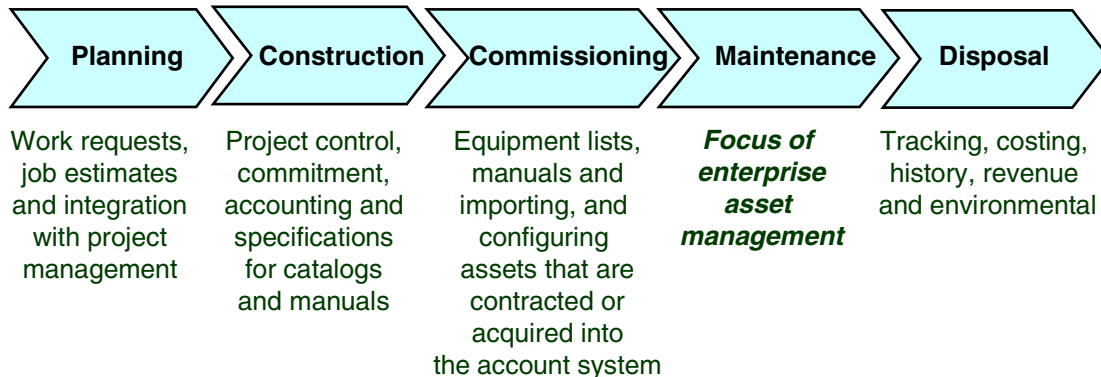
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- Enable automatic assignment of activity-based costing (ABC) classes to stock, multiple alternative parts codes, manufacturers and supplies for a single stock code
- Calculate optimal inventory based on forecast usage and prior usage
- Support cycle counting. Modules in this segment include parts, inventory, orders management and bill of materials (BOM) oriented toward job, rather than BOM for manufacturing.
- *HRMS*: Although it is part of an integrated solution, the pure-play HRMS functionality will be tracked under the HRMS segment.
- *Financials*: Although part of an integrated solution, the detail of financial management system (FMS) functionality will be tracked under the FMS segment.

3.3 ALM

A further extension of this concept is demonstrated in some ERP-derived systems. This is an application suite that caters to the whole cycle of asset care from procurement or construction — requiring product life cycle management (PLM) connections or functionality — through commissioning, on through the maintenance cycles and finally to decommission and disposal. This class of system has been of particular interest to companies that construct their own assets, as well as those fleet operators for whom disposal is an important economic contributor.

Maintenance control and planning provided by the EAM system is only one stage of a full ALM. ALM is the functionality to plan and execute large projects over the life of assets (that is, a complete picture can be built up of the asset, its full service history and costs), so that an informed decision can be made on the disposal strategy (see Figure 1).



Source: Gartner Research

Figure 1. ALM

With this approach, the equipment can be operated and maintained with a full asset history right through to disposal from the first day it's commissioned. This extends the functionality beyond simple maintenance to include acquisition, procurement, project management and even a sales process to support disposal.

3.4 Asset-Intensive ERP

The highest-level system can be described as an industry-specific variation of the ERP suite. This category contains all of the required business functionality being offered from a single vendor on a single architecture as a pre-integrated suite. Sometimes, the vendor may also offer the components by themselves as point solutions, but they are also available as a suite. The variation from "standard" ERP is

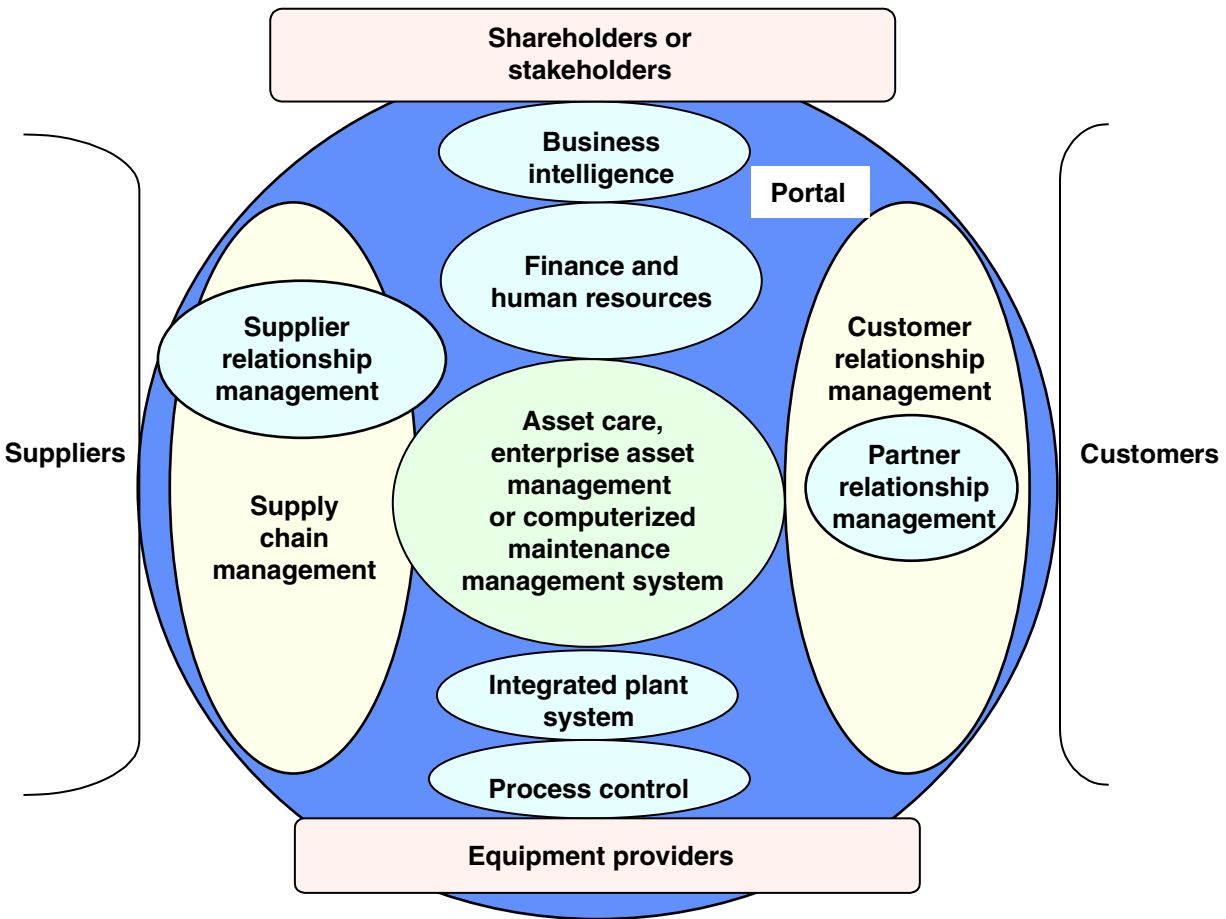
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that there is not necessarily a manufacturing component — that is, no manufacturing resource planning (MRP II), and the EAM functionality is more robust and capable of supporting the needs of asset care as the major focus of the business.

Asset-intensive ERP also differs from EAM in that there is the inclusion of more-complete financial and human resource functionality to the point where additional software products are superfluous in those areas (see Figure 2). EAM sits within the asset-intensive ERP solution in much the same position that material requirements planning (MRP) would be in a production-oriented ERP system. For many asset-intensive manufacturers, there will also be an MRP engine in the business application environment. In the case of asset-intensive ERP, the supply chain is primarily an incoming process to manage the sourcing and internal assignment and distribution of parts for internal consumption. The customer relationship management (CRM) component (which will not always be applicable) is providing the capability of external customer service (for example, field service in a utility or manufacturer's warranty support environment).

Figure 2 has two dimensions: the vertical stack includes a connection to EAM from the physical equipment being used, through manufacturing execution systems, integrated plant systems or some other remote monitoring and control environment. Above this, but still internal to the organization, the EAM system will rely on interaction with the human resources system, interact and feed the financial control system, be used as "feedstock" for the business intelligence (BI) and corporate performance management (CPM) capabilities and, ultimately, be part of the supporting information base for stakeholders in the company.

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Source: Gartner Research

Figure 2. Schematic View of the Major Product Relationships in an Asset-Intensive Environment

Vendors such as SAP, PeopleSoft (with EnterpriseOne), Industrial and Financial Systems (IFS) and Intenia have progressively added more-mature maintenance functionality to their solutions. The result is sufficient functionality so that only the most-advanced maintenance users would seek specialist best-of-breed systems and then only because of preferences in usability or inclusive integration with plant control systems.

Although the leading ERP suite systems offer integration with plant control systems, they tend to be generic. The best-of-breed vendors are increasingly aligned with a single PCS vendor. However, an advantage that integrated systems offer is overlaying the manufacturing schedule with the maintenance schedule to recognize and coordinate them so the shutdown of critical manufacturing equipment for maintenance can occur without conflict.

This feature can yield advantages, but it needs to be validated in the specific configuration of the customer environment. Users of other ERP solutions such as PeopleSoft Enterprise (that is, until the release of its EAM module), QAD and other midtier ERP vendors must include maintenance specialists to form the complete solution. These partnerships make integration of the production schedule — in addition to the financial and human resource functions — more costly and complex, particularly at times of upgrade. The significance of maintenance is reflected in Oracle's release in 2002 of its own maintenance module, eAM. This is comparatively late to market, as Oracle makes the transition from a best-of-breed component assembler to a single-vendor provider. Having completed areas such as SCM and CRM, Oracle now turns its attention to EAM, thus obviating the use of best-of-breed providers.

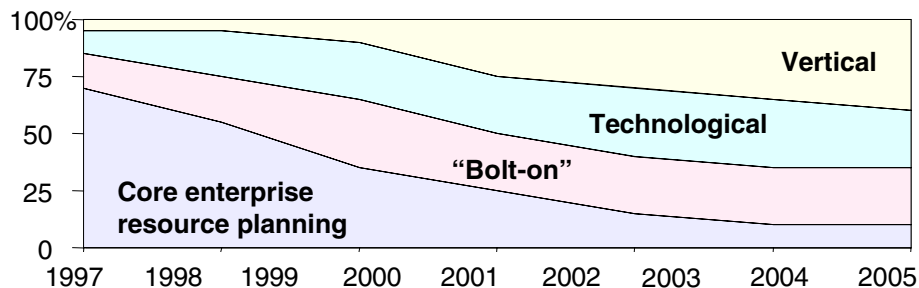
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An emerging benefit of integrated ERP systems is that they increasingly provide functionality to enable manufacturers' support of their products' life cycle, which provides an asset management perspective for high-value manufacturers from design through maintenance services, as well as for their plant and equipment. The advantage of having the ERP vendor support integrated design and manufacture through maintenance is that the product life cycle can be viewed and managed seamlessly. SAP has articulated this well to manufacturers with its PLM module set. Other ERP vendors will match the product design through manufacture-to-maintenance life cycle as the demand grows in industries where manufacturer support after delivery is a critical differentiator.

Companies that already have an ERP package should look to that vendor first and examine its asset-management solution. Of particular concern is whether the vendor offers an integrated EAM or CMMS module, and whether it offers the features of leading packages. Alternatively, does the vendor have a partner where a formal relationship exists with supported integration? If neither of these conditions is evident, consider a best-of-breed provider.

4.0 The Vendor Drive to Verticalization: The R&D Balancing Act

The current focus on the functional expansion of horizontal processes has virtually ended. Vendors slowed core-ERP development and moved on to deliver integrated EAS "bolt-ons" — for example, CRM, SCM and BI — that the market has demanded (see Figure 3). However, even these projects were de-emphasized in favor of whatever the latest e-business "hot topic" may be. As the user community realizes that the move to "bricks and clicks" business demands even tighter integration of fulfillment functions, companies will demand solutions that are as functionally rich as those provided by the narrowly focused best-of-breed vendors and competitors. Deep vertical functionality will become the mainstream battleground for all surviving vendors.



Source: Gartner Research

Figure 3. Average ERP/ERP II Enhancements by Type

Action Item: Favor application software vendors that balance research and development investments in deeper industry functionality and outward-facing technologies. Beware vendors that proceed with unbalanced allocations and rapid redeployments of staff from one "catch-up" project to the next.

4.1 Industry Domains

In response to early trends in vertical industry strategies for vendors and customers, Gartner defined four domains of vertical expertise in 2000:

- Process-insensitive manufacturing
- Discrete-focused manufacturing
- Service-intensive industries

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- Asset-intensive industries (that is, the focus of this report) (see Figure 4)

Domain	Industry Examples
Process-intensive	Includes food and beverage, tobacco, textile, paper, chemical, pharmaceutical, rubber and plastics, stone, clay, glass and concrete products, and primary metal industries
Discrete-intensive	Ranges from engineer-to-order job shops to make-to-stock assembly facilities; includes automotive, heavy equipment, metal forming, industrial products, electronics and consumer products
Asset-intensive	Includes utilities — electric, gas distribution and transport, and water (that is, fresh and waste); mining — oil, gas and minerals (that is, metals and nonmetals); transportation — rail, shipping, road and air; defense and infrastructure support — telecommunication, pipelines, facilities, roads, ports, bridges; and high-capital, continuous-processing plants (such as pulp and paper mills, refineries, primary hydrocarbon processing, cement production and desalination)
Service-intensive	Includes professional services, consulting, finance and banking, public sector and outsourcing

Source: Gartner Research

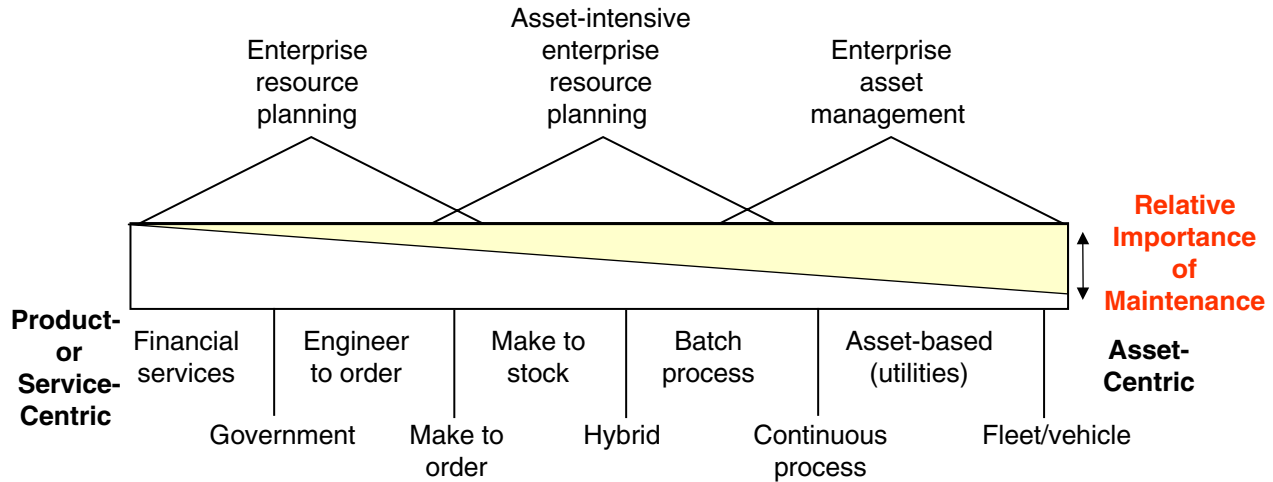
Figure 4. ERP Industry Domains

The focus of these asset-intensive companies tends to be on the plants and on the equipment they use, rather than the products they produce or services they provide. The applications in this category have strong functionality in the areas of asset tracking and maintenance, but little, or none at all, in the area of manufacturing planning. Because all businesses have some element of assets and maintenance, but are not as clearly separated as the domains outlined above, this leads to a propensity of best-of-breed solutions being offered to customers where the incumbent ERP vendor in use by the company is not strong in maintenance, but the users of the system demand functional capabilities that an EAM system might provide.

4.2 Vertical Industries in Which Businesses Should Consider Alternatives to ERP

EAM is not the best model for managing all companies. Asset-centric operations are the ideal implementation ground for EAM, although the model is also useful in other forms of business, such as manufacturing or facilities providers. In asset-intensive industries, MRO purchases typically outnumber raw-material purchases by at least 10-to-1 on a transaction volume basis. For some industries, the ratio may be as high as 100-to-1. In addition, asset-intensive industries tend to be 24x7 operations in which downtime results in a production loss that is essentially unrecoverable (see Figure 5).

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Source: Gartner Research

Figure 5. Which Types of Companies Does EAM Fit?

Finally, an asset-intensive industry might not be a manufacturer at all; instead, it might be a utility or service provider (such as transportation) in which the loss of use of a physical asset (such as a bus or generator in a power plant) creates a situation in which irrecoverable revenue loss occurs.

EAM is also a useful adjunct to ERP in many industries that are product-focused, but capacity-limited. In environments in which everything that's made can be sold, and plants are on a 24x7 production schedule, EAM provides essential capacity to the manufacturing process, and a hybrid ERP/EAM implementation is necessary. Even for service organizations focused on customer satisfaction (such as theme parks or other real-time entertainment venues), EAM extends ERP to provide higher asset use than is possible with a pure product-centric ERP implementation that is loosely integrated with basic CMMS functionality.

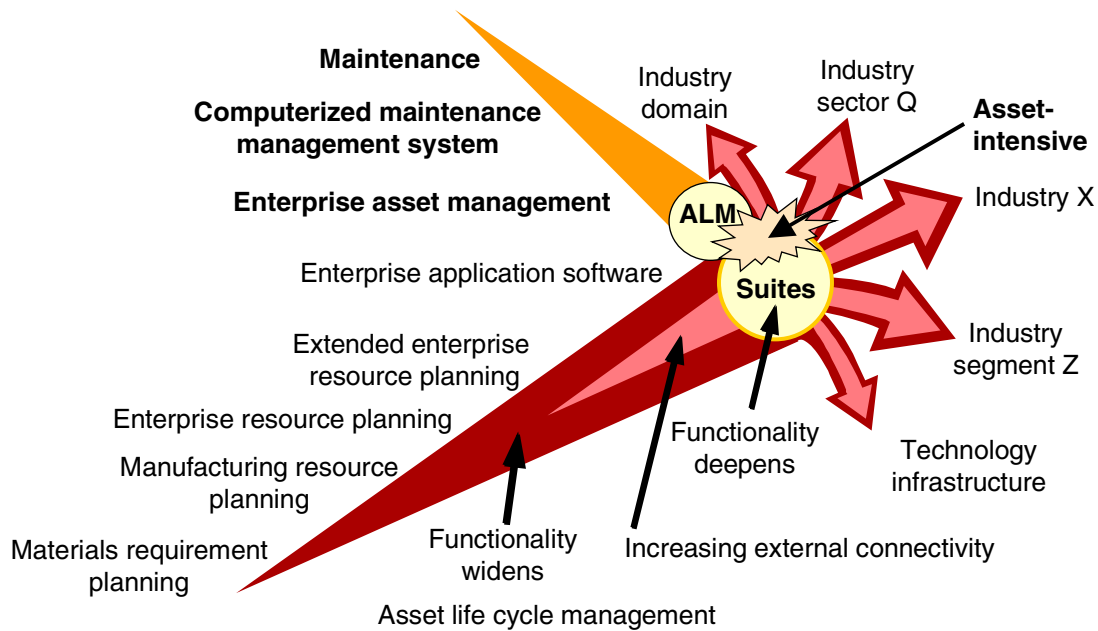
Action Item: Asset-intensive companies, or those with a significant proportion of their profitability tied to capital equipment availability, should adopt either EAM or hybrid approaches to the corporate application infrastructure.

5.0 Asset Management Intersects ERP

After advancing from materials requirement planning (MRP) to MRP II, Gartner's 1990 articulation of ERP established a new vision for the resource-planning domain. That vision centered on resource planning, inventory accuracy, and visibility beyond the plant and throughout the manufacturing organization — regardless of whether the company was a process manufacturer, discrete manufacturer or both. That vision has since evolved beyond manufacturing and resource planning to "extended ERP," where other industries turned to ERP systems to provide "backbone" financial transaction processing capability. As ERP deployment became less capable of providing competitive advantage, companies looked to such applications as SCM, CRM and, more recently, e-business functions to move past their competitors. ERP vendors responded by pursuing the vision of the EAS suite through partnerships, acquisitions or native product development.

However, EAS' unwritten mantra of providing "all things to all people" within the company renders it ill-suited for a future that will demand focus and external connectivity. The suite vision addresses the future by focusing on deep industry domain expertise and intercompany — not just within the organization — business processes. Intersecting this is the progressive development of maintenance-focused software, from CMMS to EAM to ALM (see Figure 6).

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Source: Gartner Research

Figure 6. EAM and ERP Intersect

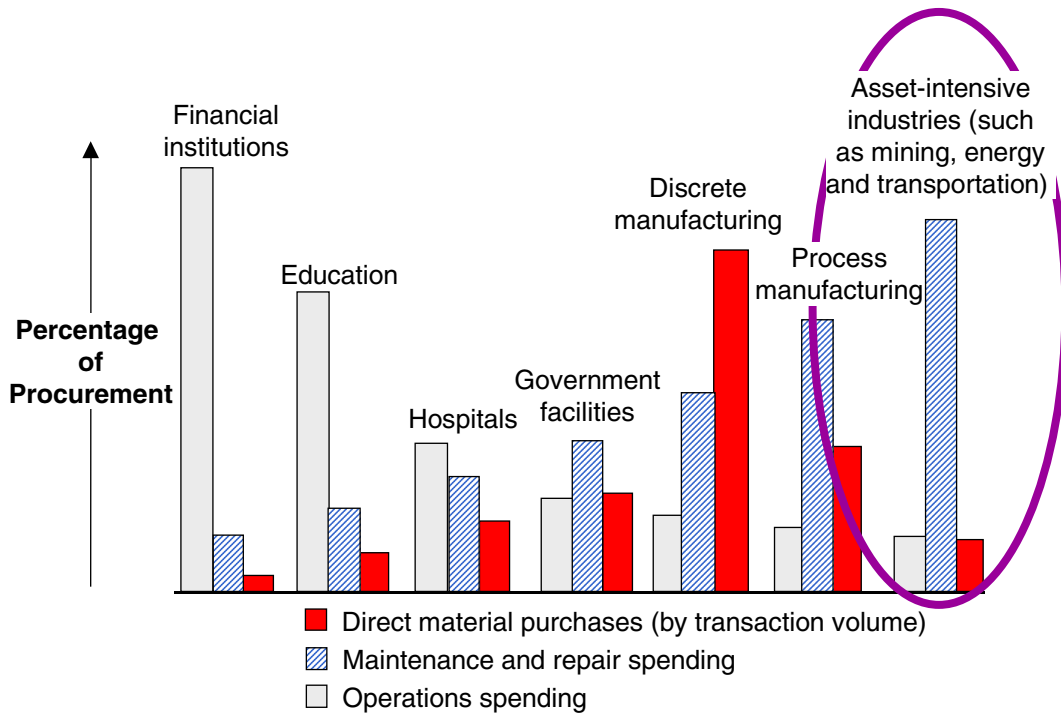
The selection process is complicated by the fact that individual divisions or departments may have asset-intensive requirements, even within non-asset-focused businesses, such as banking, insurance or consulting institutions. The asset-intensive companies categorized in this research display the following characteristics, all or in part:

- They are capital-intensive — that is, through the use of large amounts of equipment in the performance of the corporate mission

- They are resource-centric — focused around the delivery, extraction, or movement of resources and bulk commodities or services
- Their operational goal is to keep plant, equipment and facilities available with minimum downtime at a minimum cost to maximize revenue and profit
- Lost production results in an unrecoverable loss of revenue, good will or future business.
- Their number of purchase transactions — which are typically blue-collar and MRO-based — will be orders of magnitude greater than selling and direct materials procurement transactions

Vertical-industry applications vary significantly as one moves across the spectrum from financial institutions to asset-intensive nonmanufacturing industries (see Figure 7).

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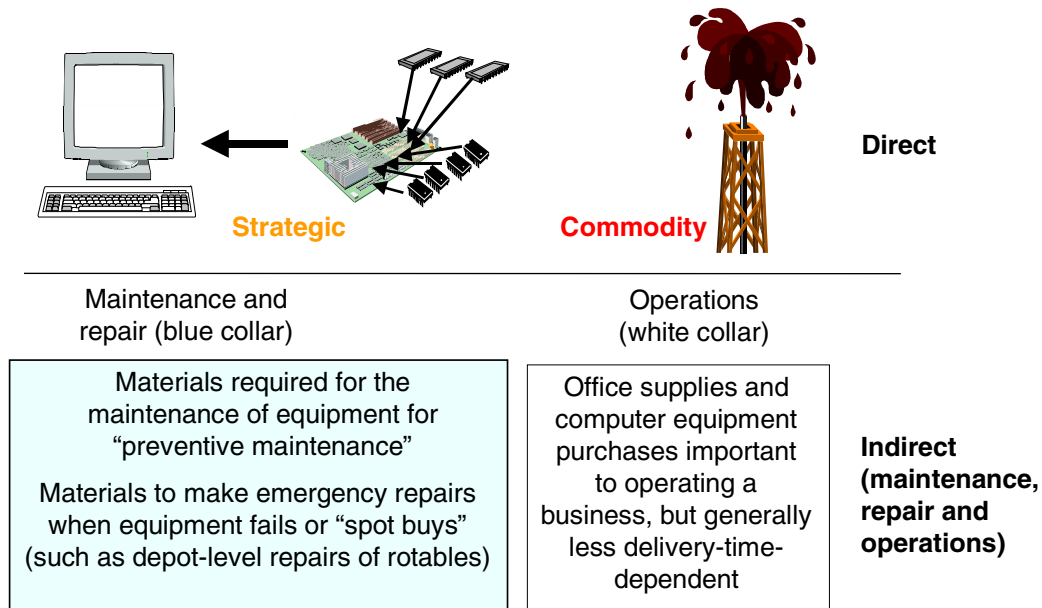
Source: Gartner Research

Figure 7. Procurement: Direct, Blue-Collar and White-Collar, by Industry

5.1 Differing Types of MRO Procurement

The distinction between indirect and direct procurement solutions is important. Most of the hype in business-to-business (B2B) procurement concerns indirect procurement. Direct procurement deals with the acquisition of parts or raw materials consumed during the production of goods — items that have unique characteristics. Direct materials can be strategic (such as assemblies of specific components) or commodities (such as packaging material). Indirect materials are more diverse in that they include any material supporting the production of goods and services, ranging from food served in a company cafeteria to tools consumed in a lathe while machining actual finished goods. Indirect goods are often referred to as MRO items (see Figure 8).

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Source: Gartner Research

Figure 8. Direct vs. Indirect: MRO

MRO is one of the most ill-defined terms in the procurement market. Although the "M" refers to "maintenance" and the "R" to "repair," different suppliers variously refer to the "O" as "operations," "other" or even "overhaul." White-collar MRO refers to items that support a company's office and administrative functions (such as office supplies, miscellaneous commodities like batteries or tape, and services such as travel). Blue-collar MRO, on the other hand, refers to industrial purchases associated with spare parts for capital equipment and plant facilities, as well as tools and consumables for manufacturing processes — and, within the scope of plant construction or refurbishment, includes capital items.

Action Item: Companies should make an accounting of how their procurement money is spent (that is, direct vs. indirect purchases and, within indirect, white-collar vs. blue-collar purchases) before entering strategic relationships.

5.2 Stages of Maintenance Maturity

Maintenance of assets is a balancing act between efficiency (that is, the cost of providing the equipment) and effectiveness (that is, the availability of the equipment). Think of CMMS and EAM as a balancing tool. It is easy without technology to provide a low-cost service if availability is not important — simply run the asset to failure and buy what is needed at the lowest possible cost. Availability will suffer, but the maintenance department might minimize its costs. The opposite extreme is to "over maintain" the asset by doing every conceivable inspection and replacement in advance of need and regardless of cost. The asset would be available, but the costs would be onerous. Imagine, for example, trying to run an organization using the maintenance regimes of the "Air Force One" jets used to transport the President of the United States. Every part is inspected, and no cost is spared in maintenance and duplicate components.

The essence of most maintenance strategies is to balance the availability of assets against the costs of providing that availability. Because companies have many assets and components to worry about, software is the best solution to this. However, within that scope, there is not one best-practice maintenance strategy. It will depend on the characteristics of the asset, the value of the asset to production, the maturity of the organization and the maturity of the technology available.

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In Gartner's observations, most organizations — and, correspondingly, the software to support them — go through stages of maturity. As each level is reached, it adds to the portfolio of possible maintenance tools to support the objectives of the organization.

Most companies develop their maintenance practices progressively along the following stages. Software companies fall into these categories with respect to their capabilities. Generally, the most-basic packages and the most-basic maintenance strategies employ the first two categories. The more complex and advanced the equipment, the more reliance on the higher tiers of maintenance practices, so there is interest in these advanced techniques in certain industries.

- *Reactive*: run-to-failure or "breakdown-repair." This is the starting point. For most organizations and even mature companies, a significant amount of work will still take place. The software to support these activities needs to have the capabilities of easy job entry and scheduling, and be able to assign resources readily to prioritized work.
- *Preventative planned on time*: typically, maintenance based on manufacturers' schedules. As most maintenance organizations evolve, they start to carry out preventative maintenance based on time (that is, days, hours or months of usage). This will generally be in accordance with manufacturer guidelines. There will continue to be a role for reactive maintenance, either deliverable, where it is seen as cost-effective, or "accidental," because not all failures will be prevented.
- *Preventative planned on usage*: Preventative maintenance based on operational observations is the next step and it adds sophistication. This can be a form of predictive maintenance because equipment use will be a predictor of failure, more so than time for many items. Equipment with a steady or constant usage does not benefit as much from this sophistication because time and usage will be closely paralleled. However, planning for equipment whose use is highly variable will result in a more-accurate program of maintenance, thus preventing failures. Good software systems should cater to the recording of "meters" that indicate usage. Good systems will support multiple meters per asset, a "flow down" of readings to all components fitted to that asset, and different work orders automatically triggered when thresholds are exceeded. Most companies stop at this level — and continue to use the levels below where appropriate. Most of the software products Gartner assesses in this market cater to all of these functions as well.
- *Condition triggers*: monitoring-based maintenance, to assess the condition of assets. As organizations generate more data on their assets, and have a more-complete picture of failure contributors, they need to measure the condition of assets to intervene before failure. This also requires enhanced technology to monitor the assets. Due to the cost and complexity, only a subset of all assets is suited to condition-based maintenance. The systems that support it need to be able to compare an observed data element (for example, temperature, vibration or oil samples) with a benchmark. Then, on exceeding one or more of these thresholds, the system triggers a maintenance activity. Few organizations actually use condition-based triggers widely, although the number is increasing with the introduction of "intelligent assets" that provide this data in the course of normal operations.
- *Predictive*: maintenance based on projections of wear characteristics. Although there is a form of predictive maintenance based on usage statistics, the more-advanced form enables wear characteristics and rate, wear or degradation to be used to predict the point of failure or suboptimal performance. This can be valuable for assets that progressively wear or degrade with time and use. If an actual key element (for example, tread depth on a tire) can be measured, instead of time or distance, the prediction of failure will be more accurate. This function requires advanced algorithms and generic software applications, although there are third-party products that can support it.

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- *Reliability centered maintenance (RCM)*: improvements based on failure code analysis. For some companies and some high-value assets within those companies, the RCM strategies available can assist in improving reliability by engineering out failure. By keeping a record of failures, symptoms and causes in a structured way, an organization can detect trends that may not be apparent in the "infoglut" of data that comes from electronic asset monitoring. Although costly in manpower to set up and monitor, this is a useful strategy for improving the overall performance of the assets.
- *RCM based on financial optimization of replacement and repair*: Although rarely seen and difficult to support in software, it is theoretically possible to build models and algorithms in a software package to advise on the optimal time for replacement or intervention, based purely on the cost to an organization. Not all assets lend themselves to this; however, for high-value assets for which economy of operation is crucial (that is, excluding those dealing with health, safety or environmental impact), this approach can take into account the cost of value, the cost of planned replacement and the probability of failure, plus — with sufficient access to data — historical or forecast advice on the optimal replacement time.

5.3 Asset Classification

The types of assets employed by an organization also affect the choice of asset management systems and the functionalities required. These types of assets fall into four broad categories:

- Fixed
- Fleet
- Continuous
- Component assemblies

These categories are significant because differences in the types of asset require differences in the functionality offered by EAM vendors beyond the "normal" maintenance planning requirements.

Fixed plant requires a strong asset hierarchy capability. Implicit in this is a concept of component change out, of asset dependencies to production capability, plant walk through and inspections, synchronizing maintenance plans with production work plans, and often-unique assets and structures. Fleet maintenance needs a system that has strong replication capabilities so asset definitions, maintenance plans and parts can be reproduced across an entire fleet. The use of statistics also needs to support rotatable components (that is, parts that may be taken off one piece of equipment and used on another).

Continuous — or "linear" — assets require unique definitions of asset segments that are flexible, so assets can be treated as a whole or in segments for planning, costing and reporting.

Component assemblies (such as aircraft) are unique because of the life cycle costing of individual components, the gathering of usage statistics, and the correlation of a component and a "temporary asset" construct (see Figure 9).

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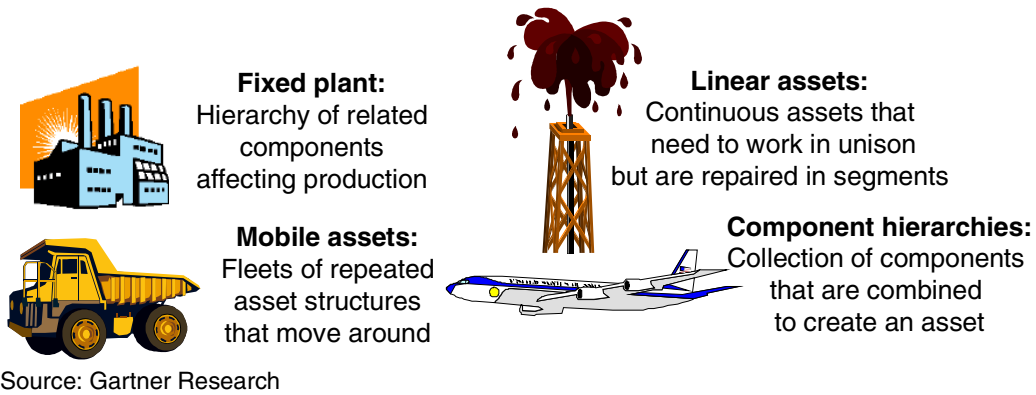


Figure 9. Differentiation of Fixed, Mobile, Continuous and Component Maintenance

6.0 Vendor Analysis

6.1 Historical Vendor Performance

Vendor performance in 2003 differed from that experienced in previous years. From 1998, suite providers experienced years of dominating growth, compared to the pure-play vendors. For 2003, annual growth performance changed, as most suite providers posted annual license revenue declines. Despite this performance shift, market share was not significantly affected, with little adjustment occurring in 2003 market-shares for new application license sales.

MRO Software (see Figure 10) retained the leading global market share with its Maximo product, showing an increase of 3.2 percent in 2003. Its EAM license revenue, with 13.5 percent of the 2003 worldwide market, increased slightly from 12.7 percent in 2002. SAP's increase in market share in 2003 was driven in part by the appreciation of the euro and circumstances that enabled SAP to leverage its large manufacturing installed base for its Asset Life-Cycle Management solution, which has been the selling vehicle primarily for the module formerly known as Plant Maintenance. ERP suite vendor Intenia increased its market share in 2002, but witnessed a decline in 2003 that is consistent with declines in its ERP sales as its EAM modules are only rarely delivered separately from its full ERP suite. EAM application license revenue for best-of-breed specialist Datastream increased 3 percent; but, as a result of the overall decline of the market, Datastream was able to increase its global market share 0.5 percent. This fragmented market includes hundreds of lesser niche vendors.

Vendor	2002 Market Share	2003 Market Share
MRO Software	12.7%	13.5%
SAP	12.0%	12.1%
Datastream	7.5%	8.0%
Intenia	8.0%	7.6%
J.D. Edwards (PeopleSoft EnterpriseOne)	9.8%	7.3%

Source: Gartner Dataquest, August 2003

Figure 10. Worldwide EAM Software Application License Market Share (2002 Through 2003)

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The increased competition and the changing buying characteristics that the EAM market is experiencing are affecting pure-play and suite vendors' license sales and profitability. Although, as a market, EAM has shown consistent, measurable growth, it has not necessarily done so from those niche providers. By no means are the best-of-breed/pure-play products dead, nor are they necessarily more expensive to implement or manage. However, a single year's improvement does not necessarily indicate a shift in future performance or user buying behavior.

Many companies are looking to consolidate their vendor and application portfolios toward single-vendor solutions. Although this trend provides fewer risks in relationship management and future upgrades, it can present a substantial risk if it leads to an overdependence on one or a few vendors for an organization's application needs. Typically, companies interested in single-vendor solutions are willing to compromise functionality, which, in the EAM market, may be appropriate for companies requiring basic run-to-failure and log-book-based planned maintenance regimes. Many companies consider the additional features of predictive maintenance and RCM to be the proverbial "sledge hammer to crack a nut" and, therefore, may want the vendor to "check the box" in vendor evaluations and selections, but rarely implement these technologies and are reluctant to pay a premium for them.

6.2 Current Offerings

Although hundreds of EAM or CMMS applications have a minor license revenue market share, Gartner documents license revenue performance and analysis on a few selected providers that, by their size or relevance to Gartner clients, warrant more detailed coverage. (For more complete comparisons and descriptions of these vendors, refer to Gartner Magic Quadrants.)

MRO Software's Maximo version 5.2 software continues to lead in overall license fees or best-of-breed EAM packages. In 2003, MRO continued to lead in worldwide market share with 13.3 percent. The decline of 21.5 percent in license revenue during 2002 could well be attributed to a slow adoption for its Web-based v.5.0, exacerbated by improvements in ERP EAM offerings and a general slowdown in the software market. This has since recovered with the later release of v 5.1. Its license revenue increase in 2003 indicates greater acceptance and execution.

SAP continues its pervasive consistency in the EAM market through its own ERP customer base. In 2002, SAP gained considerable traction, growing its license revenue by 24.6 percent, and closing its market share gap with MRO to within 2 percentage points. SAP's presence in Europe, which is more than 50 percent of its 2002 EAM license revenue, is significantly greater than its market penetration in the United States, which is less than 20 percent of its 2002 EAM license revenue. SAP is able to leverage its large manufacturing installed base for its EAM module, helping sales considerably. SAP continues to develop the EAM module, not through core functionality but through the value of additions in such areas as portals, native mobile support, radio frequency identification (RFID), BI and SCM. As a consequence, customer take up of the EAM offering in preference to best-of-breed offerings is improving.

Strategic planning assumption: By 2006, two-thirds of SAP customers will use the SAP EAM module (0.8 probability). The exceptions will be where rich functionality or ease of use is paramount.

Intentia steadily increased its license revenue and market share within EAM up to 2003. *Intentia* focuses primarily on process and discrete manufacturers, and transportation. *Intentia's* EAM license revenue decreased 8.4 percent during 2003, giving the vendor a 7.6 percent worldwide market share. Like SAP, a majority of its revenue is derived from the European region, primarily from its own customer base. It is rare that a customer takes on the *Intentia* EAM module as a best-of-breed component, but there are cases of this emerging as *Intentia* embarks on specialist marketing.

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PeopleSoft EnterpriseOne (JDE 5): Prior to its acquisition, it announced greater investment and focus on asset management. Since 2002, the increased effort resulted in additional code being written for the module. Having created a specific asset-intensive industry group with design, sales and implementation resources, it has demonstrated commitment to the opportunities in asset-intensive industries. Gartner has yet to see if that momentum can carry on in the new organization, because PeopleSoft — prior to the acquisition — had very little capability in asset management and sold to asset-intensive industries mainly on the basis of human resource functionality.

PeopleSoft Enterprise: Prior to the acquisition of JDE, PeopleSoft had integrated its ERP offering with a number of best-of-breed partners. Although there was no exclusive relationship enforced, there have been joint bids from PeopleSoft and Indus International, particularly with the PassPort product. More frequently in the past two years, there were joint bids with MRO Software. Since the acquisition, however, there have been announcements of a two-stage leveraging of the erstwhile JDE functionality. Available in the first quarter of 2004, it is the simple interfacing of EnterpriseOne EAM functionality to the general ledger of the Enterprise product, intended to obviate any use of third-party, best-of-breed offerings. The second phase, planned for late 2004, is to recode the logic of the EAM module into Peopletools for use as an imbedded module in Enterprise integrated with the SCM and supplier relationship management (SRM) modules already within PeopleSoft Enterprise.

Datastream Systems' 2003 license revenue increased 3.3 percent over 2002. With the release of its Web-centric product 7i, Datastream expanded across many industries in all geographic regions; and sales are growing again in previously neglected countries. Datastream has placed less emphasis on the iProcure buying hub and more on the core EAM modules in Datastream 7i. It continues to be a good choice for manufacturers, particularly in North America.

IFS is an integrated EAS provider with stand-alone EAM as an option. The product offers above-average functionality and a strong, componentized, Web-based technology that integrates readily with other business applications. IFS does not focus on the best-of-breed market. Although it has a strong presence in North America through its manufacturing suite sales, Gartner has not seen the EAM component offered on a stand-alone basis there, although it has been sold as a module separately in Europe and Asia/Pacific (APAC). In particular, customers are in utilities, aviation and transportation with operations in Europe or Asia.

Oracle: Oracle's new EAM product offers a reliable and conservative package with minimal risk to those companies whose needs match the limited functionality offered. It is not as complete as leading best-of-breed packages, but Oracle has a development schedule that will bring it much closer by the end of 2004, if it keeps to its stated delivery dates. Oracle's EAM module is more than two years old, and it has been successful in its targeted industries (that is, facilities and manufacturing plants that are Oracle customers already) in the asset-intensive domain. The software is also sold to small mining and petrochemical companies, as well as some small local government operations. Oracle has also released a related, but separate Complex MRO product targeted at the aircraft maintenance market. This software has many of the same underlying constructs as the Oracle eBusiness Suite and the EAM module, but the functionality and user interface is tailored to complex assets, primarily aircraft. As Oracle's capabilities grow, it is increasing its software sales to smaller organizations in such industries as mining, petrochemicals, local government and small telecommunication and utilities companies.

Indus International: Indus offers two EAM products. The InSite EE EAM product has a Web-based user interface and the business logic of its previous EMPAC software offering. PassPort is strongly targeted at the utilities industry. The utilities focus gained considerable momentum with the announcement of Indus' acquisition of SCT's utilities systems and Wishbone. This gave Indus a more-complete offering, not just

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for utilities, but for outsourced service providers, which Indus calls Service Delivery Management (SDM). PassPort is also one of the two packages (with Mincom's Ellipse being the other) that is, in standard form, deliverable on IBM's Z series platform.

Mincom: Mincom continues to develop EAM functionality and technology, but it still has little presence in Europe outside the United Kingdom. Although it offers a suite (Ellipse), like SAP, PeopleSoft EnterpriseOne and Oracle, Mincom also packages the EAM modules to strategically market and sell them as best-of-breed offerings to some industries. The system is not suited to manufacturing environments; but for such asset-intensive industries as mining, utilities, defense and transportation, Ellipse can be implemented economically and reliably in conjunction with EAS suites from major horizontal EAS vendors.

Other products and vendors of interest include:

- Avantis.PRO from Invensys
- TabWare from AssetPoint
- Mainsaver Software
- Ramco Systems
- Synergen
- Ivara
- ADB Systems

7.0 Market Trends and Forecasts

The EAM market is forecast to grow at a more-normalized pace from 2003 through 2007, resulting in a five-year compound annual growth rate (CAGR) of 1.3 percent. Pure-play EAM software providers have persevered through lean years, despite increasingly stiff competitive pressures from ERP and EAS providers. Although opportunities are evident, license revenue continues to decrease.

With the minimal growth estimated to resume in 2004, Gartner forecasts healthier growth of 2.5 percent in 2005. The return to growth within the EAM market will be slow because the market is more saturated and mature than others. Selected market drivers include:

- Years of expansion have left many companies with fragmented and inconsistent software solutions. As costs to maintain the integration points and legacy systems become prohibitive, they will need to purchase new software.
- Underpenetrated (that is, emerging) regions and vertical industries that have not embraced the value propositions of EAM solutions are beginning to realize the need to adopt EAM functionality.
- Increased merger and acquisition (M&A) activities are a healthy trend that reduces the number of players, eventually allowing more consolidation in functionality, increasing corporate adoption and, eventually, expanding the market's playing field.

Market inhibitors include:

- Although the signs of a global economic recovery are evident, this is unlikely to fully rejuvenate the EAM market. Companies will be more cautious than in past years concerning new application purchases, with many opting to maintain established solution sets.

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- Buyer behavior will continue to be cautious and focused on the bottom line, resulting in a preference for obvious, external revenue-generating improvements (such as ERP and sales-oriented systems).
- As the economies of the world begin to realign, there are fewer providers chasing fewer available funds, and, although collaboration is increasingly attractive to many companies, few find themselves primed or willing to take advantage of established technologies.
- Increased M&A activities — although a driver for growth — will create fear, uncertainty and doubt for many companies that will defer decisions until the "dust settles." Therefore, M&A activity will actually be an inhibitor in the short term, but it will become a market driver in the long term.
- The EAM market is saturated and mature. Providers are no longer obtaining the highest prices on license sales, so they need to retrieve profitability from services and maintenance. Lower license fees and the re-architecting of the delivery of applications is forcing lower growth rates for providers.
- Emerging regions are unlikely to generate levels of application spending similar to North America or Europe. On average, the effect will be lower application license revenue, which will minimize growth (see Figure 11).

Enterprise Asset Management (EAM) License Revenue (\$ in millions)	2003	2004	2005	2006	2007	2008	Compound Annual Growth Rate 2004–2008
	\$349	\$364	\$381	\$403	\$426	\$448	
EAM Annual Growth	-3%	4%	5%	6%	6%	5%	

Source: Gartner Dataquest (June 2004)

Figure 11. EAM "Most Likely" Software License Revenue Size and Growth (2004 Through 2007)

Outsourcers and application service providers (ASPs) have been prominently active in the EAM field. Offerings have been emerging from all EAM vendors for their software products to be hosted or fully available via an ASP. Some of these vendors have been focused on this as a large part of their business. AssetPoint's TabWare has a large proportion of its customer base as hosted ASP clients because of a traditional focus on this opportunity. Similarly, Datastream has had significant take-up of ASP options. Indus launched its InSite product initially as an ASP-only offering (that is, Indus InSite EE is now a traditional licensed software offering after limited take-up of InSite as an ASP). Overall, the market is not likely to have significant ASP take-up outside of vendors that are deliberately and specifically targeting the opportunities in ASP. Based on Gartner's reviews of clients of the software vendors being tracked, there seems to be no more than 10 percent to 15 percent of companies engaging in an ASP option. Although there is likely to be some growth, it will not be a significant part of the market in the near future. By year-end 2007, less than 20 percent of EAM application hosting will be via ASP or other outsourcing techniques (0.6 probability).

8.0 The Future of EAM

During the next three to five years, there will be further developments in several areas:

- Mobility for workforce
- RFID in inventory
- BI reporting and analytics
- Portals for asset workers

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- Real-time asset monitoring
- Outsourced maintenance management

Mobile solutions continue to gain interest as a way of saving significant labor costs and putting detailed information in the field. Many of the EAM vendors mentioned previously already have some form of partnership with specialist providers to be able to support this feature. Three prominent mobile solutions vendors are providing the industry with complementary EAM support: Syclo, Telispark (recently acquired by Infowave Software) and Bluedot.

In addition, RFID technology derived from the retail and distribution market is starting to interest companies in the EAM space based on its ability to track expensive and high-turnover parts. Ultimately, the next generation of RFID will integrate intelligence in active RFID devices to monitor, report and even adjust performance in critical assets, as well as work management.

Many vendors now offer integrated BI so that the performance of assets, workgroups and maintenance strategies can be visibly assessed by segments of the organization. In most cases, this functionality is embedded in the EAM offering and is native to the vendor or used with original equipment manufacturers (OEMs). Where it isn't, partnerships are being formed with BI vendors, such as Crystal Decisions, Cognos or Business Objects. (Refer to the following section for a more-detailed analysis of this market segment.)

The advent of portals means that companies can combine a view of all relevant subsystems and data in one screen. Most of the suite vendors (such as Oracle, PeopleSoft or SAP) are offering this. As it develops further, there will be an increase in the deployment of supporting technologies (such as that offered by NRX Global) that encompasses the visual support from a number of different subapplications and the conversion of data to make them accessible.

Expensive or remote assets can be monitored by established supervisory control and data acquisition (SCADA) and PLM devices or emerging onboard telemetry.

Outsourced maintenance is on the rise, which brings new demands for the owners, maintainers and operators of assets. This is probably the most-significant variation in EAM functionality, and later sections of this report are devoted to that aspect of the changing business.

In the longer term, IT asset management will merge with EAM as equipment becomes increasingly computer-controlled. This will trigger the interesting possibility of a merged product set with merger requirements. Of the current vendors, MRO Software (with its acquisition of MainControl) is the most committed to this possibility. However, SAP and PeopleSoft (via EnterpriseOne) have taken tentative steps in the area of integrated, whole asset views.

8.1 BI and Analytics in Asset-Intensive Applications

Strategic Planning Assumption: By 2012, asset-intensive businesses leveraging remote monitoring of assets will need to handle 30 times more data than in 2002, which translates into a CAGR of 40 percent (0.7 probability).

Gartner defines analytics as the technology area that applies mathematical transformations to data and previous insights — about all kinds of processes — to produce new insights. Such insights can be analytical or predictive and may support decisions, as well as automation.

Analytics will become more important as additional data becomes available. The major drivers behind this trend will be:

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- New interactive platforms for end-users, customers and supplier interaction (for example, e-business, online industry marketplaces and a wide variety of mobile devices)
- The rise of much more data from sensors — from RFID chips, SCADA, equipment health monitoring, geographic information systems (GIS) and other positioning systems
- Overall improvement in data quality (for example, issues, receipts, stock-level transactions, work order history, maintenance tasks and frequencies, equipment records, suppliers' pricing records and transactional data)

At its most dramatic, analytics can reduce the risk of catastrophic failure by analyzing equipment performance and better managing preventative maintenance and inventory. With improved maintenance programs and inventory management, companies can avoid breakdowns, while reducing stock outs, which ensures keeping critical equipment in service. This, in turn, increases production and also has the potential to reduce fleet size in some operations by needing less reserve equipment to achieve the same overall capability. Although these tactics can be undertaken without analytics, using them frees up people resources by making the analytics process easier and assigning people to the most-critical jobs.

Asset-focused analytics enable organizations to maintain operational capabilities and service levels by optimizing inventory, which, in turn, could reduce the cost of inventory by 15 percent to 40 percent. By automating the inventory management process and grouping inventory into manageable categories, organizations realize additional savings by eliminating manual activities, which are lengthy and prone to error; taking advantage of vendor held stock; holding only critical spares on-site; and disposing of obsolete and excess stock. In doing this, inventory managers can optimize their stock levels and find a balance between inventory investments and service levels.

In the realm of procurement, the analytical assessment of supplier performance can lead to tactical decisions on the sourcing of materials and services. This can result in reduced procurement administrative costs. Procurement professionals can rate suppliers' performance objectively and analyze pricing agreements.

Asset-intensive analytics enable maintenance managers to more-readily address the underlying reasons that equipment fails. By assessing maintenance-task frequencies and identifying equipment that is being over- or under-maintained, they can adjust maintenance strategies and improve asset health, while reducing their preventative maintenance backlog.

Sustainable operational efficiency had previously been difficult to attain due to a lack of time, tools and the ability to implement system changes quickly. Analytical tools tuned for asset-intensive organizations provide a mechanism to continuously improve inventory, procurement and maintenance programs.

The operations of asset-intensive companies are not all about reliability for increased production and minimized costs. Safety is part of every company's obligation, and there are also increasing oversights for environmental requirements.

U.S. Occupational Safety and Health Administration (OSHA) and statutory compliance requirements can be monitored and reported through analytics. Similarly, environmental measures can be included so that appropriate tuning of activity and improvements can be measured and acted on through analytics.

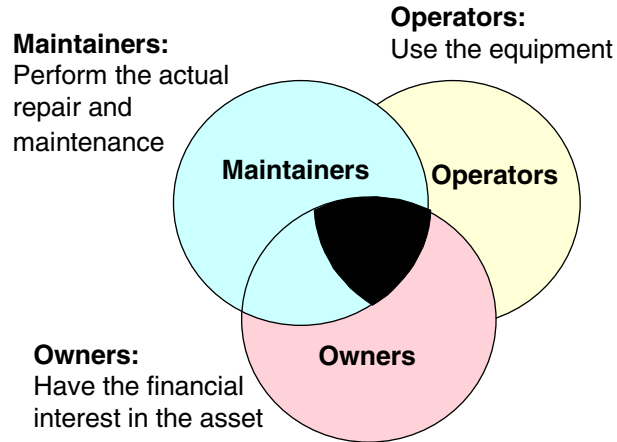
8.2 Outsourced Maintenance: Interested Parties Relating to an Asset

As business strategies evolve, functional requirements among the "constituents" involved in an asset diverge. For most of the time during the evolution of asset management, the company that owned the

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asset also operated and cared for it — or at least had the "hands-on" responsibility. In some cases, the manufacturer or the service provider performs the maintenance; however, in the field service model, a third-party agent acts as a provider. This is usually deployed with a "CRM-like" visibility and understanding of the customer but no visibility of the asset. Similarly, the owner of the asset would be at arm's length until year-end or end-of-quarter reporting. Three distant groups are emerging:

- Owners
- Operators
- Maintainers (see Figure 12)



Source: Gartner Research

Figure 12. Three Constituents of Asset Care

In many divergent industries, from public utilities to aircraft to oilfields, these separations emerge. The owners require detailed financial monitoring of asset value and return. As with many financial reporting strategies, this is inclined toward real-time reporting, as well as valuation at disposal. The operators require equipment monitoring, production capability projections, availability details and asset viability. The maintainers require data from usage and condition, but focus on planning, scheduling and managing human and parts resources to carry out repairs and preventative maintenance.

8.3 Outsourced Maintenance: Software Features

Applying the concept of outsourced maintenance services to the application software market, the intersection of established systems become the theoretical "ideal" for outsourced maintenance service providers (see Figure 13).

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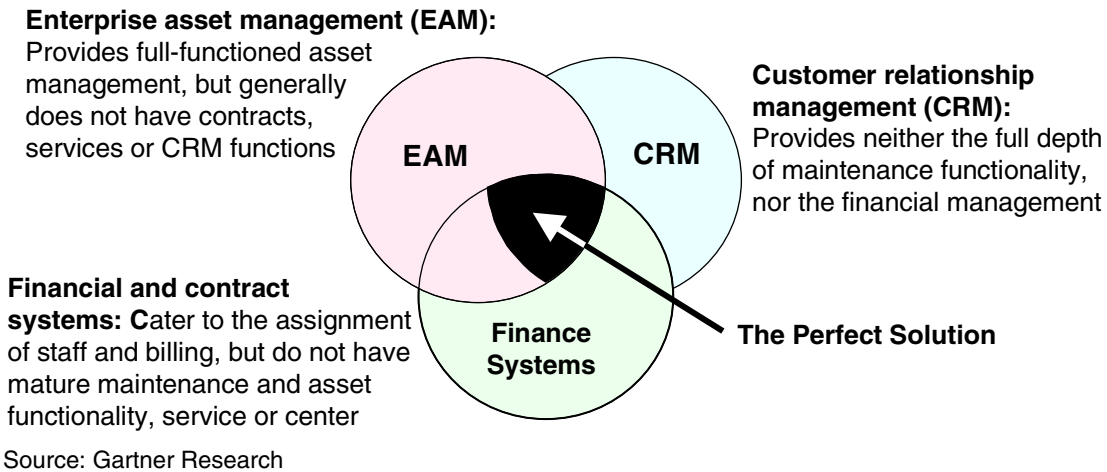


Figure 13. Outsourced Maintenance Services

These outsourced services include finance functionality to assess, project asset value and support costs; CRM functionality to engage with clients in a selling or call center environment; and traditional EAM system functionality. The result is a system that can provide as much detailed accounting and customer view as has been the case on the assets. Overlaying all of this is greatly enhanced contract management to ensure that service conditions are met.

An examination of this model through the lens of the different constituents reveals demand for variations of the system to support the needs of owners, operators and maintainers. The first signs of this are systems for manufacturers dealing with complex life cycle support needs through the course of offering maintained support and performance contracts for their customers. Companies providing outsourcing for the technical support of complex equipment require technology solutions that support the business model and provide a platform for delivery to their customers. The movement toward collaborative ERP has been driven, in part, by the business trend toward outsourcing. This, in itself, comes about through the compelling business advantages of using partners for the execution and expansion of noncore businesses. Initially, much of this activity has been in the area of subcontracted manufacturing and, later, in the supply chain; however, it is now moving increasingly to facilities, plant and equipment maintenance.

The functions of such a complex asset maintenance outsourcing company combine services and skills provisioning with asset monitoring and maintenance, as well as elements of CRM. This is different from earlier business models in that outsourced maintenance has been on an "overhaul" basis, whereby the asset was "rebuilt" because of a lack of intimate asset knowledge to refine the repair tasks. In other cases, it has been a field-service process, wherein jobs were allocated on an "as required" or timed service basis. The missing aspect of the relationship was that an in-house asset management strategy has a high level of asset intimacy to monitor the performance and degradation of the asset. This enables predictive, preventative and reliability-centered maintenance strategies. Collaborative EAM/CRM provides this intimacy to the outsourcer.

C-commerce and the Internet-enabled interconnection of companies are now supporting remote asset monitoring and proactive maintenance services. This is reflected in increased interest in outsourced maintenance providers as an industry. Initially, this was in the high-value, high-criticality aircraft maintenance industry because the highly technical equipment requires massive infrastructure and deep skills to maintain. Internally, these can be costly; however, a consolidation that an outsourcer constructs provides critical mass and lower overall costs.

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There is increased software vendor activity commensurate with this industry focus. An example is the cooperative engagements between General Electric Engine Services and IFS. These engagements combine industrial service expertise with a software technology that can support an outsourced asset-monitoring and service business model. In addition, the collaboration is extending right to the plant floor, with monitoring systems providing information feeds to the plant operators, as well as back along the chain to the equipment builders, who are increasingly acting as maintenance providers. Alliances between ABB and IFS, MRO Software and SAIC, and Siemens and Ivara bear this out. This remote monitoring of assets further enables outsourced maintenance services by freeing up the service provider from being physically present at the site.

This technology has not yet matured to the point of fully supporting all the needs of outsourced maintenance services (such as customer acquisition, retention and sales). Systems currently installed by outsourced maintenance services are compromised by being drawn from one of three groupings. EAM systems provide full-functioned asset management, as typified by the AssetPoint TabWare product, which is focused on facilities managers and maintenance outsourcers. These do not have fully developed contracts, services and CRM functions. Service industry oriented ERP packages (for example, PeopleSoft or Lawson Software) do not have mature maintenance and asset functionality. CRM suites (from Siebel Systems or Onyx Software, for example) provide neither the full depth of maintenance functionality, nor the financial management that outsourced maintenance services providers require.

The optimal solution for these industries will be hybrid systems combining service, CRM and EAM functionality. Such solutions will enable outsourced maintenance services vendors to track customer behavior, expectations and service requirements while they track assets through their entire life cycle. By tracking the assets through their life cycles and monitoring wear characteristics, the outsourced maintenance services will be able to offer a better level of service to the customer, while minimizing the over-servicing of the assets, which would prove costly. An advanced system to support outsourced maintenance services strategies would combine CRM principals — and the software found in CRM systems — with RCM techniques. This will enable the calculation of failure projections and, therefore, financially optimized replacement schedules. This can be used to optimize asset support charging levels. By optimizing service levels, customers will see value from the minimized risk of outages, and outsourced maintenance services will see value by minimizing the costs to achieve that level of risk mitigation.

Outsourced maintenance service providers need to look at the complexity of their customers' relationships and their assets under care. If the customer relationships are complex, CRM systems will offer sufficient functionality. If the assets are complex or large-scale, but the customer base is stable or small, some established EAM and asset-intensive ERP suites would be sufficient.

The growth of outsourced maintenance providers will generate an interest in systems tuned to their needs. The competitive advantage for outsourced maintenance services for companies will come from having an integrated system cater to all aspects of this market. This is an opportunity for growth for EAM vendors. The market requirement of outsourced maintenance providers has been recognized in specific software offerings from Astea International, and the beginnings of the strategy are available in SAP and PeopleSoft EnterpriseOne.

Customers looking for outsourced maintenance should also be aware of the differences between complex asset support and looking after simpler assets in the field. Field service is an established discipline, which deals more with customer-centric views than asset-centric views, and the assets are treated as a "black box" in the field. Gartner forecasts growth in both these areas, as well as an overlap. The resulting systems that support outsourced maintenance management and field service of complex assets at maximum service levels at minimum costs will need to combine elements of EAM, field service and ERP

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to form a full service resource planning (SRP) system. This will be marketed in modified form to three sets of buyers:

- Internal maintenance operations (the traditional EAM market)
- Manufacturers and their agents (the homogeneous equipment environment)
- Service contractors (the heterogeneous equipment environment)

9.0 Conclusion

Because support for maintenance disciplines is absent in older-generation ERP products, enterprises will need to upgrade to newer releases or alternative solutions. Consequently, Gartner makes the following observations and recommendations to software vendors in the EAM market.

- The economic downturn has forced companies to justify their software initiatives and establish tighter budgetary constraints that elongate sales cycles for smaller, less-profitable projects. Therefore, software vendors must be prepared to offer easily integrated point solutions that provide continuing compatibility with the ERP systems to which they are interfaced.
- There is a general feeling of reluctance due to prior experiences in software application purchases not meeting the expectations of users. This is, in part, due to a lack of upfront planning and measurement to effectively calculate ROI but also to project overruns. Vendors need to proactively assist potential clients in ROI modeling.
- The EAM market is saturated. The challenge for established vendors is integration and depth of functionality in specific, targeted industries. The market potential for new entrants will grow as businesses pursue newer integration technologies and deeper vertical experience that will migrate toward niche vendors. Vendors need to focus on pre-packaged vertical solutions and reduce companies' customization requirements. This includes industry-specific terminology, screens and business processes.
- EAM software vendors should continue to focus on integration to their ERP/EAS brethren. Seamless integration is clearly the best option, reducing work and effort on the user's part for connecting these highly prioritized requirements.

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Appendix A: Acronym Key

ABC	activity-based costing
ALM	asset life cycle management
APAC	Asia/Pacific
ASP	application service provider
B2B	business-to-business
BI	business intelligence
BOM	bill of materials
CAGR	compound annual growth rate
CFR	Code of Federal Regulation
CMMS	computerized maintenance management system
CPM	corporate performance management
CRM	customer relationship management
EAM	enterprise asset management
EAS	enterprise application software
ERP	enterprise resource planning
FMS	financial management system
GIS	geographic information systems
HRMS	human resource management system
IFS	Industrial and Financial Systems
JDE	J.D. Edwards
M&A	merger and acquisition
MRO	maintenance, repair and operations
MRP	materials requirement planning
MRP II	manufacturing resource planning
OEM	original equipment manufacturer
OSHA	Occupational Safety and Health Administration
PCS	plant control system
PLM	product life cycle management
RCM	reliability-centered maintenance

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RFID	radio frequency identification
ROA	return on assets
ROI	return on investment
SCADA	supervisory control and data acquisition
SCM	supply chain management
SCP	supply chain planning
SDM	Service Delivery Management
SRM	supplier relationship management
SRP	service resource planning