

Magic Quadrant for Energy and Utilities Enterprise Asset Management Software

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VIEW SUMMARY

For energy and utility (including oil and gas) companies searching for EAM software solutions for plant and equipment maintenance, we analyze "best of breed" point solutions and ERP-suite-based software products that support asset management strategies.

Market Definition/Description

This document was revised on 6 October 2014. The document you are viewing is the corrected version. For more information, see the [Corrections page](#) on gartner.com.

Energy and utility companies evaluate and procure enterprise asset management (EAM) products to resolve physical asset care requirements — that is, they provide maintenance support for fixed plants (such as power generation plants, water plants, refineries and offshore rigs), for linear distributed assets (such as power lines and pipelines), and/or for fleet assets (such as service equipment, transformers, pumping stations and wind generator towers). (*Note: The term "energy and utilities" as used in this document includes oil and gas [upstream, midstream and downstream], power generation [fossil, nuclear, hydroelectric and renewables], electricity transmission and distribution, gas transmission and distribution, and water/wastewater.*)

An EAM solution includes planning and scheduling, work order creation, maintenance history, and inventory and procurement, as well as equipment, component and asset tracking for assemblies of equipment. In some instances, the functionality is extended by the addition of basic financial management modules, such as accounts payable, cost recording in ledgers, and HR functions such as a maintenance skills database.

Technically, the EAM applications are designed to scale to larger numbers of users (typically, more than 100 concurrent users) and run on multiple sites from a single central database, thereby catering to whole-of-business requirements, rather than departmental or site requirements. They should also be increasingly able to support cloud and hosted deployments, the use of mobile technology, and analytics.

Magic Quadrant

Figure 1. Magic Quadrant for Energy and Utilities Enterprise Asset Management Software



EVIDENCE

This analysis was the result of a formal survey of the vendors listed, the customer references provided, and extensive and continuous engagement with the vendors' customers through client inquiry during the year.

EVALUATION CRITERIA DEFINITIONS

Ability to Execute

Product/Service: Core goods and services offered by the vendor for the defined market. This includes current product/service capabilities, quality, feature sets, and skills and so on, whether offered natively or through OEM agreements/partnerships as defined in the market definition and detailed in the subcriteria.

Overall Viability: Viability includes an assessment of the overall organization's financial health, the financial and practical success of the business unit, and the likelihood that the individual business unit will continue investing in the product, will continue offering the product and will advance the state of the art within the organization's portfolio of products.

Sales Execution/Pricing: The vendor's capabilities in all presales activities and the structure that supports them. This includes deal management, pricing and negotiation, presales support, and the overall effectiveness of the sales channel.

Market Responsiveness/Record: Ability to respond, change direction, be flexible and achieve competitive success as opportunities develop, competitors act, customer needs evolve and market dynamics change. This criterion also considers the vendor's history of responsiveness.

Marketing Execution: The clarity, quality, creativity and efficacy of programs designed to deliver the organization's message to influence the market, promote the brand and business, increase awareness of the products, and establish a positive identification with the product/brand and organization in the minds of buyers. This "mind share" can be driven by a combination of publicity, promotional initiatives, thought leadership, word of mouth and sales activities.

Customer Experience: Relationships, products and services/programs that enable clients to be successful with the products evaluated. Specifically, this includes the ways customers receive technical support or account support. This can also include ancillary tools, customer support programs (and the quality thereof), availability of user groups, service-level agreements and so on.

Operations: The ability of the organization to meet its goals and commitments. Factors include the quality of the organizational structure, including skills, experiences, programs, systems and other vehicles that enable the organization to operate effectively and efficiently on an ongoing basis.

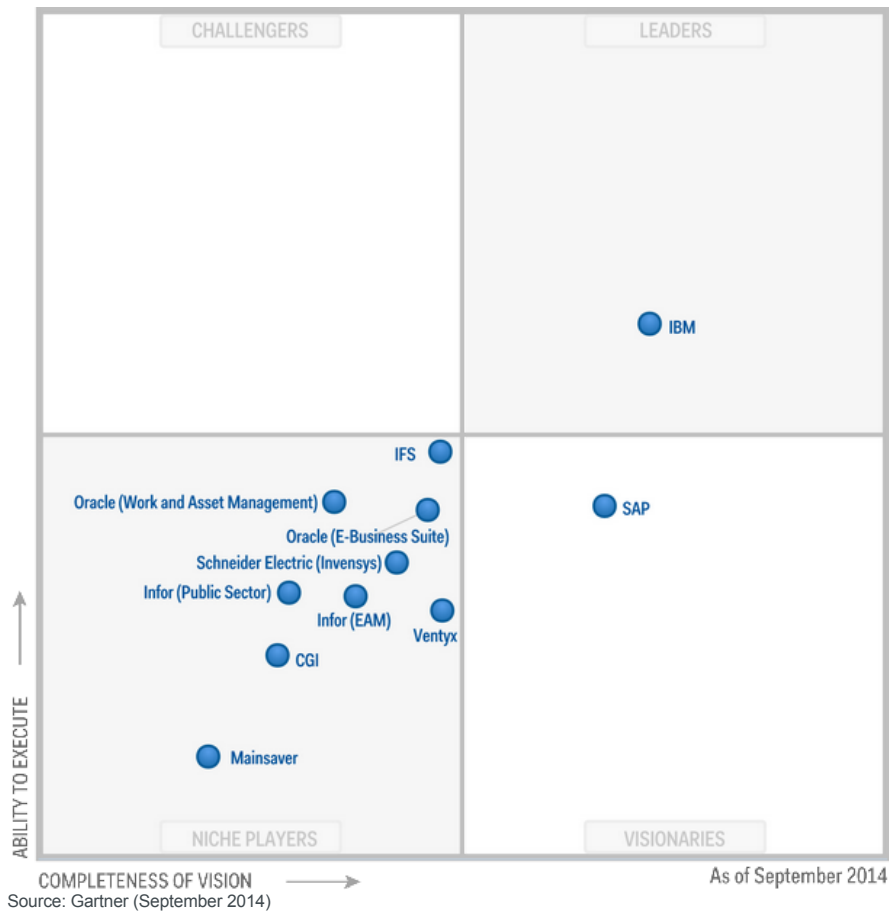
Completeness of Vision

Market Understanding: Ability of the vendor to understand buyers' wants and needs and to translate those into products and services. Vendors that show the highest degree of vision listen to and understand buyers' wants and needs, and can shape or enhance those with their added vision.

Marketing Strategy: A clear, differentiated set of messages consistently communicated throughout the organization and externalized through the website, advertising, customer programs and positioning statements.

Sales Strategy: The strategy for selling products that uses the appropriate network of direct and indirect sales, marketing, service, and communication affiliates that extend the scope and depth of market reach, skills, expertise, technologies, services and the customer base.

Offering (Product) Strategy: The vendor's approach to product development and delivery that emphasizes



differentiation, functionality, methodology and feature sets as they map to current and future requirements.

Business Model: The soundness and logic of the vendor's underlying business proposition.

Vertical/Industry Strategy: The vendor's strategy to direct resources, skills and offerings to meet the specific needs of individual market segments, including vertical markets.

Innovation: Direct, related, complementary and synergistic layouts of resources, expertise or capital for investment, consolidation, defensive or pre-emptive purposes.

Geographic Strategy: The vendor's strategy to direct resources, skills and offerings to meet the specific needs of geographies outside the "home" or native geography, either directly or through partners, channels and subsidiaries as appropriate for that geography and market.

Vendor Strengths and Cautions

CGI

CGI is an approximately \$10 billion global business process services and system integration firm with headquarters in Montreal, Quebec, Canada. CGI entered the EAM market through the acquisition of Logica in 2013. Logica's EAM product, the Asset & Resource Management (ARM) Suite, is the result of combining functionality from prior products, the Work Management Information System (WMIS) and STORMS (Severn Trent Operational Resource Management System). ARM is more oriented toward work management than asset management.

Strengths

ARM is particularly well-suited for work-management-centric requirements typically found in transmission and distribution environments.

The product is scalable and suitable for large transmission and distribution utilities.

It has a strong presence in natural gas distribution environments, in addition to its core electrical transmission and distribution business.

It offers integrated asset investment planning (AIP) through its partnership with Seams.

Cautions

CGI has no deployments in power generation or in oil and gas.

ARM has not been adapted for global delivery, and installation resources are not available.

There are limited service provider options (mainly CGI).

The product doesn't have integrated inventory/materials management functionality.

References report lengthy and costly upgrades, although in some cases this reflects a client's preference to skip upgrades.

IBM

IBM is an approximately \$100 billion global technology and consulting corporation with headquarters in Armonk, New York. Its Maximo Asset Management product is positioned in the Cloud & Smarter Infrastructure group (formerly Tivoli) within IBM. It is also working with other IBM divisions such as the Cloud Services division (for its Maximo SaaS offering) and its Business Analytics division's SPSS (for predictive maintenance). Maximo is deployed in a broad cross-section of energy and utility subsectors around the globe.

Strengths

Maximo is a highly scalable product that is suitable for very large enterprises.

IBM has a mature and extensive global community of EAM support resources and partners, minimizing implementation risks and support shortfalls.

The product provides a broad range of functionality to support all energy and utilities subsectors.

References rate the product and the value received highly.

Maximo offers several industry solutions with enhanced functionality (such as environmental, health and safety [EH&S] in its Maximo for Oil and Gas solution), as well as extensive product partnerships.

Cautions

References, customers and prospects report that costs to deploy and maintain are at the high end of the EAM market.

Industry solutions are extra cost add-ons.

Customers report significant hardware requirements to run applications.

Mobile strategy has been evolving over the past several years, with the current offering largely unproven in production.

IFS

IFS is an approximately \$400 million global enterprise application software vendor based in Linköping, Sweden. It sells ERP, enterprise service management (ESM) and EAM systems, including delivering the EAM module as a point solution. IFS sells its products to a wide range of industries but focuses on asset-intensive businesses with significant maintenance and construction requirements. It has expanded sales in new geographies; however, its utility industry presence in North America is still very limited.

Strengths

The IFS Applications product can be deployed in most energy and utilities subsectors.

IFS's references report above-average satisfaction with both the product and service levels.

IFS Applications can be — and is often — deployed as a complete ERP solution, including financials.

IFS has a mature mobile strategy, and the product has construction functionality.

IFS is able to offer an in-house reliability-centered maintenance (RCM) module to extend functionality.

Cautions

IFS still has few energy and utilities customers in North America.

Its European customer base is heavily weighted toward the Nordic countries and Poland.

It has a limited presence in oil and gas (predominantly service companies).

There are limited service provider options, though this is improving over time.

Infor (EAM)

Infor is an approximately \$3 billion global enterprise application software vendor based in New York. Infor's EAM product (formerly known as Datastream 7i) had been focused mainly on manufacturing. Infor has increased its EAM product focus and closed new business with utility companies, mainly municipal utilities.

Strengths

The product has a strong presence in the water and wastewater subsector.

It has one of the highest user satisfaction ratings among its peers.

Infor EAM is relatively easy and cost-effective to upgrade and maintain.

The product is highly configurable.

Cautions

Its energy and utilities deployments are concentrated among smaller, municipal customers (not unlike Infor's separate Public Sector product described below).

It has a limited presence in oil and gas.

References report limited or no adoption of Infor mobile solutions.

Infor development efforts are diluted by having two products that target the same water/wastewater market.

Infor (Public Sector)

Infor is an approximately \$3 billion global enterprise applications software vendor based in New York. Infor Public Sector (originally acquired from Hansen) is focused on client type (the public sector, particularly water authorities) rather than functional process. This means it can deliver a broader government business solution, but overlaps in some EAM functionality with its sibling product, Infor EAM.

Strengths

Public Sector is part of the broader Infor suite of public-sector functionality, including customer service and HR applications.

It has a significant presence in the water and wastewater industries in North America, Australia and New Zealand.

It has above-average customer ratings for service and value received.

Cautions

It is not suitable for EAM deployments other than public-sector utilities.

It does not have a significant presence outside of North America, Australia and New Zealand.

Infor development efforts are diluted by having two products that target the same water/wastewater market.

Mainsaver

Mainsaver is relatively small, independent, stand-alone EAM software vendor based in San Diego. It is privately held by investors who purchased the Mainsaver product from Titan in 2002. Mainsaver is designed specifically for fixed-plant environments such as power generation. It is primarily focused on North American power markets, but has a growing partnership network outside the continent.

Strengths

Mainsaver's references rate its service levels highly.

The product is inexpensive, easy and quick to deploy and upgrade.

It has been widely deployed by independent power producers, including both conventional and renewables.

Cautions

The product is primarily installed at small stand-alone power generation facilities, not enterprise deployments.

Mainsaver has limited presence outside of North America.

The product has limited presence in oil and gas, transmission and distribution.

Mainsaver's references rate its technology and product below its peers.

Oracle (E-Business Suite)

Oracle is an approximately \$38.3 billion global technology company with headquarters in Redwood Shores, California. Oracle's E-Business Suite (EBS) is a complete ERP suite solution designed for a broad cross section of industries. The first version of the EBS Enterprise Asset Management (eAM) module was developed a dozen years ago for a manufacturing customer and has more recently been deployed at a variety of energy and utilities companies.

Strengths

The eAM product is preintegrated to the Oracle EBS suite of enterprise applications, including financials, procurement and HR.

Oracle has an extensive global presence minimizing implementation and support risks.

It has an increasing customer base in upstream and midstream oil and gas.

Cautions

Oracle's reference customers rate its product, services and value received below its peers.

Most of its energy and utilities EAM customers have been using the product for less than five years.

Oracle EBS is targeted at many industries and has limited energy- and utility-specific functionality.

Oracle EBS eAM is not designed for integration with enterprise applications from other major ERP vendors.

Oracle (Work and Asset Management)

Oracle is an approximately \$38.3 billion global technology company with headquarters in Redwood Shores, California. Oracle's Work and Asset Management (WAM) is an EAM product brought in through the acquisition of SPL WorldGroup (which had acquired the Synergen product) in 2006. WAM is part of a broader set of utility industry functionality such as customer information management (CIS) and outage management systems (OMSs) that is delivered to mainly public-sector utilities.

Strengths

Oracle's references rate its service levels, user satisfaction and overall value near the top of its peers.

The product is particularly well-suited for deployment to support a range of municipal services, including electrical distribution and water/wastewater.

WAM is part of the broader Oracle Utilities product suite, including utility-centric customer service applications.

Cautions

The product is not widely deployed in large, multifaceted utilities.

It is North American-centric, with limited presence in the rest of the world.

The product has no presence in oil and gas and limited presence in generation.

SAP

SAP is an approximately \$22 billion global enterprise application software vendor based in Walldorf, Germany. SAP Business Suite is a complete ERP suite designed for a cross section of industries. Its EAM module (formerly called the PM module) is used by a broad spectrum of, mostly large energy and utilities companies. Its EAM customers are located in every major region of the world.

Strengths

SAP EAM is preintegrated to the SAP suite of enterprise applications, including financials, procurement and HR.

SAP has a mature and extensive global community of EAM support resources and partners minimizing implementation risks and support shortfalls.

Business Suite is highly scalable and suitable for large enterprises across the full spectrum of energy and utilities subsectors, especially oil and gas.

SAP has made significant investments in innovation relevant to EAM, including mobile and analytics.

Cautions

SAP EAM is not designed for integration with enterprise applications from other major ERP vendors.

References and customers report costs to deploy and maintain the product are at the high end of the EAM market.

References and customers consistently rate usability of the product as poor (although SAP's investments in simplified user experience [for example, SAP Fiori UX] show promise in addressing

this perennial issue).

Schneider Electric (Invensys)

Schneider Electric is an approximately \$31 billion electrical distribution and industrial automation company with headquarters in Paris. Schneider Electric's Avantis EAM product has a long history in the EAM market, having come to Schneider through its recent acquisition of Invensys. Although Avantis is found in a large cross section of industries, approximately half of its revenue comes from a diverse set of energy and utilities subsectors. It's too early to assess the impact of Schneider's acquisition on Avantis' future.

Strengths

Avantis is a broadly used best-of-breed EAM solution suitable for most energy and utilities subsectors.

Its references rate its service levels near the top of its peers.

Schneider is primarily an OT provider, and has invested in OT integration with Avantis to support condition-based maintenance.

Cautions

Avantis has a diverse customer base and hence doesn't focus on energy and utilities industry functionality.

The product is not suitable for large, multifaceted energy and utility enterprise deployments.

Its references rate its technology near the bottom of its peers.

It is one of the few business IT applications in the Schneider portfolio.

Ventyx

Ventyx is a wholly owned subsidiary of ABB, an approximately \$55 billion power and industrial automation company based in Zurich, Switzerland. Ventyx was acquired by ABB in 2010 but operates independently of the parent company with its own offices around the globe. Ventyx's Asset Suite product has been focused almost exclusively on the EAM market for utilities. Asset Suite is primarily deployed at large utilities in North America, with some deployments in Europe and some recent success in the Asia/Pacific region.

Strengths

Asset Suite has a strong presence in nuclear power generation.

It is a highly scalable solution suitable for large, multifaceted enterprise deployments.

Ventyx investments and partnerships in asset health technologies are utility-specific and target both generation, and transmission and distribution.

Cautions

Asset Suite is one of the highest-cost EAM solutions to deploy and maintain.

It has very limited presence outside of power generation, transmission and distribution.

Its references rate both the product and service levels below average.

Vendors Added and Dropped

We review and adjust our inclusion criteria for Magic Quadrants and MarketScopes as markets change. As a result of these adjustments, the mix of vendors in any Magic Quadrant or MarketScope may change over time. A vendor's appearance in a Magic Quadrant or MarketScope one year and not the next does not necessarily indicate that we have changed our opinion of that vendor. It may be a reflection of a change in the market and, therefore, changed evaluation criteria, or of a change of focus by that vendor.

Added

This is a new Magic Quadrant that represents the merging of two previous Magic Quadrants: those for power generation EAM software, and for delivery utility enterprise asset management. No vendors have been added from those two Magic Quadrants.

Dropped

Ventyx Ellipse, which had appeared in both retired Magic Quadrants, was not included in this Magic Quadrant evaluation due to minimal new sales in the utilities sector. It does continue to have a significant customer base in utilities, but is more focused and successful in the mining industry.

Inclusion and Exclusion Criteria

For this Magic Quadrant, we are evaluating only the top EAM products worldwide. Software products must address the majority of functional capabilities listed above. They should have demonstrable track records in power generation, delivery utilities, and/or oil and gas; they should have generated license and/or subscription fee revenue of at least \$3 million during the past 12 months; and they should cover multiple geographies.

Evaluation Criteria

Ability to Execute

Gartner analysts evaluate providers on the quality and efficacy of the processes, systems, methods or procedures that enable IT provider performance to be competitive, efficient and effective, and to positively impact revenue, retention and reputation. Ultimately, providers are judged on their ability and success in capitalizing on their vision.

Product/Service: Core goods and services offered by the vendor that compete in/serve the defined market. This includes current product/service capabilities, quality, feature sets, skills, and so on, whether offered natively or through OEM agreements/partnerships as defined in the market

definition and detailed in the subcriteria.

Overall Viability: An assessment of the overall organization's financial health, the financial and practical success of the business unit and the likelihood of the individual business unit to continue to invest in the product, continue offering the product, and to advance the state of the art within the organization's portfolio of products.

Sales Execution/Pricing: The vendor's capabilities in all presales activities and the structure that supports them. This includes deal management, pricing and negotiation, presales support and the overall effectiveness of the sales channel.

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Marketing Execution: The clarity, quality, creativity and efficacy of programs designed to deliver the organization's message in order to influence the market, promote the brand and business, increase awareness of the products, and establish a positive identification with the product/brand and organization in the minds of buyers. This "mind share" can be driven by a combination of publicity, promotions, thought leadership, word-of-mouth and sales activities.

Customer Experience: Relationships, products and services/programs that enable clients to be successful with the products evaluated. Specifically, this includes the ways customers receive technical support or account support. This can also include ancillary tools, customer support programs (and the quality thereof), availability of user groups, service-level agreements, and so on.

Operations: The ability of the organization to meet its goals and commitments. Factors include the quality of the organizational structure, including skills, experiences, programs, systems and other vehicles that enable the organization to operate effectively and efficiently on an ongoing basis.

Table 1. Ability to Execute Evaluation Criteria

Evaluation Criteria	Weighting
Product or Service	High
Overall Viability	Medium
Sales Execution/Pricing	Medium
Market Responsiveness/Record	High
Marketing Execution	Low
Customer Experience	High
Operations	Low

Source: Gartner (September 2014)

Completeness of Vision

Gartner analysts evaluate providers on their ability to convincingly articulate logical statements about current and future market direction, innovation, customer needs, and competitive forces and how well they map to the Gartner position. Ultimately, providers are rated on their understanding of how market forces can be exploited to create opportunity for the provider.

Market Understanding: The ability of the vendor to understand buyers' needs and translate these needs into products and services. Vendors that show the highest degree of vision listen to and understand buyers' wants and needs, and can shape or enhance those wants with their added vision.

Marketing Strategy: A clear, differentiated set of messages consistently communicated throughout the organization, and externalized through the website, advertising, customer programs and positioning statements.

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Offering (Product) Strategy: A vendor's approach to product development and delivery that emphasizes differentiation, functionality, methodology and feature set as they map to current and future requirements.

Business Model: The soundness and logic of a vendor's underlying business proposition.

Vertical/Industry Strategy: The vendor's strategy to direct resources, skills and offerings to meet the specific needs of individual market segments, including verticals.

Innovation: Direct, related, complementary and synergistic layouts of resources, expertise or capital for investment, consolidation, defensive or pre-emptive purposes.

Geographic Strategy: The vendor's strategy to direct resources, skills and offerings to meet the specific needs of geographies outside the "home" or native geography, either directly or through partners, channels and subsidiaries, as appropriate for that geography and market.

Table 2. Completeness of Vision Evaluation Criteria

Evaluation Criteria	Weighting
Market Understanding	High
Marketing Strategy	Medium
Sales Strategy	Medium

Offering (Product) Strategy	High
Business Model	Medium
Vertical/Industry Strategy	Medium
Innovation	High
Geographic Strategy	Medium

Source: Gartner (September 2014)

Quadrant Descriptions

Leaders

Leaders in this market have a global presence, a large installed base in energy and utilities companies of all kinds, strong viability, and a combination of rich features, including functionality, interfaces with different ERP applications, and a capable and global implementation partner community. They should also be leaders in customer experience. IBM, with its Maximo Asset Management product, is the only Leader in the energy and utilities EAM space. It remains the vendor that will be on most energy and utilities companies' shortlists of EAM applications for evaluation.

Challengers

Challengers in this market show good execution and suitability as a stand-alone EAM application for all energy and utilities subsectors, but may fall short in areas such as innovation, industry strategy or geographic strategy. Like Leaders, they will score high in customer experience and product satisfaction. There are no Challengers this year.

Visionaries

Visionaries in this market offer a broad set of EAM functionality and understand where to invest, but have fallen short in some areas of execution such as customer experience. A Visionary understands where the industry is going and has a strategy for delivering solutions to meet those needs. SAP's large presence as an ERP provider to asset-intensive industries such as oil, gas and utilities has driven extensive investments in EAM, including mobility (through its acquisition of Syclo) and partnerships, such as with Meridium for asset performance management. These investments and others put SAP in the Visionaries quadrant of this market. However, the tight coupling of its EAM functionality with its ERP suite limits SAP's suitability for those companies already using it as their ERP system of record or with an appetite for making SAP their ERP system of record.

Niche Players

Vendors in this market are classified as Niche Players because of one or more factors:

- A niche focus on one or two energy and utilities subsectors
- A lack of innovation in areas of importance to energy and utilities companies
- Limited global presence
- Inability to assess long-term viability because of nontransparent or poor financial performance

The Niche Players in this Magic Quadrant fall into five major categories:

- Those that primarily serve the power sector — both generation and transmission (Ventyx)
- Those that primarily serve companies with merchant or stand-alone power generation operations (Mainsaver)
- Those that primarily serve energy transmission and distribution markets, including gas transmission (CGI)
- Those that primarily serve municipal utilities (Infor Public Sector and Oracle WAM)
- Those that are broad-based EAM suites that fall short in areas specific to energy and utilities such as subsector functionality, industry-specific innovation, geographic footprint, or customer experience (IFS, Infor EAM, Oracle E-Business Suite, and Schneider Electric)

A Niche Player should be considered for inclusion on a shortlist when the specific project requirements match the vendor's specific strengths (see the Strengths and Cautions sections for each vendor).

Context

This Magic Quadrant represents a merging of two previous Magic Quadrants: those for power generation enterprise asset management software, and for delivery utility enterprise asset management. It also encompasses oil and gas industry requirements. Companies using this Magic Quadrant to evaluate vendors for an EAM project shortlist should consider the variations in requirements that reflect their own particular operational needs. By definition, Leaders in this Magic Quadrant are suitable for almost every energy and utilities project. Challengers, Visionaries and Niche Players, in contrast, should only be considered when the requirements match the vendor's specific capabilities, experience or regional focus.

The large number of vendors in the Niche Players quadrant is reflective of a market that, although it has been in existence since 1999, is still evolving and relatively fragmented. This is the case despite a considerable number of acquisitions, mergers and other forms of consolidation over the years. The fragmentation reflects a number of factors, including the relatively conservative nature of energy and utilities companies, a diverse and growing set of functional requirements, and the cost of replacing legacy systems. Most of the vendors in the Niche Players quadrant have a long history of providing EAM software to energy and utilities companies, and therefore may be appropriate for specific types of energy and utilities EAM deployments.

In this market sector, clients need to look at their overall application portfolios and plan how their EAM solutions will interact with other related components, such as failure detection, condition monitoring, operational information and shutdown/outage planning. As evidenced by our growth forecasts and the inquiries we receive on this topic, many energy and utilities companies are considering upgrading to, or reinvesting in, asset management software. New investments in EAM address issues with aging assets

(by better maintenance), the aging workforce (retention of knowledge in task and processes) and reliability (preventive and predictive maintenance), resulting in overall better return on assets and reduced unplanned downtime and outages.

Energy and utilities companies need to make key technology architectural decisions, such as choosing between an EAM point solution approach and an ERP suite solution, as part of their EAM selection processes. Based on the relative importance of asset reliability and availability to the overall success of the business, a company should select the vendor that best fits its application architecture, while offering the optimum mix of functionality for the company's portfolio of plant and equipment. Vendors vary in scalability and fit to purpose, and a solution that is appropriate for one client may lack key features needed by another client. Long-term vendor and product viability are factors in most customer evaluations, and potential buyers should examine current profitability, as well as a long-term commitment to EAM and their industry.

Although the scope of this Magic Quadrant is global, some vendors focus on specific geographies and may be small globally but significant regionally, so do not choose vendors based on size alone. Because the Magic Quadrant process is, by necessity, an averaging of vendor offerings and performance, we always recommend consulting the authors to get specific advice on your needs, location and industry subsector, such as oil and gas, power generation (nuclear, renewable or hydroelectric), transmission and distribution, or water/wastewater.

Market Overview

EAM packages that are focused on the needs of energy and utilities companies primarily have material and maintenance management functionalities (or at least the vendor packages and sells them in that format) that are scalable to multiple sites and cater to advanced maintenance management functions. (An older, more limited term that is sometimes used is "computerized maintenance management system [CMMS] packages," which include material and maintenance functionalities, but are simpler in scope and are focused on single-site deployments. Those may still be used by large enterprises if a site-by-site or departmental solution is required.)

For energy and utility companies with complex fixed-plant requirements, the functionality provided must be capable of managing hierarchical plant structures; condition and performance monitoring (driven by operational technology [OT] integration); preventive maintenance; outage/shutdown planning for refurbishments; increasingly, a "fleet" capability not just for vehicles but also for fleets of assets, such as an oilfield or a wind farm; and the tracking and managing of all OT devices and systems. This is reflected in the requirements listed here, which will be satisfied by the best software products in this category:

- Detailed asset registry, combined with internal and external parts and support descriptions
- Long-term maintenance, project and work schedules
- Support for complex inventory relationships for indirect maintenance, repair and operations (MRO) that are associated with forecasting planned and unplanned work on installed assets
- Supply chain capability for indirect goods, with demand planning linked to maintenance and repair schedules
- Probability-based, "just in case" MRO-focused inventory and procurement, rather than "just in time" or material-requirements-planning based
- Human capital management capabilities to match skills, training and availability with work requirements
- Statistical analyses of equipment performance and reliability
- Condition-based triggers for asset health and performance (OT integration)
- Serial number tracking and tracing for equipment and parts
- Financial support via detailed cost analysis
- Integration with whatever ERP (financial and HR) package is deployed
- Extensive warranty tracking to component levels and support for manufacturers' records requirements for equipment under warranty
- Shutdown project planning
- "Lock out/tag out" or "permit to work" functions
- Enablement of both connected and disconnected application usage for mobile workers

We are seeing the emergence of new requirements in some areas. Economic changes mean that energy and utility companies are seeking maximum returns on their assets, so operational asset optimization becomes more important. This, in turn, means further refining the relationship between operations and maintenance scheduling, so requirements are emerging to connect maintenance scheduling to production, delivery and profitability.

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