White Paper

Understanding the impact and value of enterprise asset management

Make smarter decisions about your assets using the Internet of Things and artificial intelligence

Watson IoT™

IBM

Highlights

- Collect, consolidate and analyze essential information on virtually all types of assets.
- Turn insights into action by analyzing historical data alongside environmental conditions
- Improve operations through better asset availability, reliability and use
- Extend asset value through condition-based maintenance
- Extend the useful life of assets or equipment, improve return on investment and defer new purchases
- Unify processes for wide-ranging asset management functions across multiple sites.

Introduction

The Internet of Things (IoT) is fundamentally changing the way that organizations create value, compete and partner with other entities. By developing new opportunities for insight, relevance and competitive edge, IoT is transforming the way that consumers experience the world. Organizations are using IoT to boost operational performance, enhance customer experience, lead industry transformation, advance environmental sustainability and scale institutional expertise.

Across almost every asset-intensive industry (such as energy and utilities, oil and gas, manufacturing or transportation), organizations are challenged with how to maximize the value of assets throughout their lifecycle. In fact, in a recent survey of asset managers worldwide, more than 75 percent of respondents cited system reliability as the fundamental reason to invest in enterprise asset management.[1]

Today's asset-intensive organizations must constantly track, assess and manage the reliability of a wide range of physical, technological and human assets. These organizations must manage both inventory and production. They repair machinery, hire and schedule employees, deploy and manage IT infrastructure, maintain physical plants, and manage linear infrastructure or rolling assets. To further complicate matters, technology infrastructures are tremendously complex, typically running applications and data in silos that can limit the effectiveness of cross-organizational operations and efficiencies.

These organizations must deal with continually aging physical assets that require ongoing maintenance and repair, including power plants, railroad bridges, sewer systems, generators or electronic devices such as smart meters. Asset performance and the quality of the organization's products and services are impacted by the reliability of the asset or equipment. As a result, the increased need for asset maintenance and its management can have a direct impact on customer satisfaction. This dynamic applies to processes, as well. Production, maintenance or service processes age and erode, so end goods or service output might not meet the quality standards that were originally specified.

The most valuable asset is the management of human resources, and that comes with its own special set of challenges. Long-term employees, for example, are continually aging toward retirement, which can mean a loss of knowledge and skills, plus the expense of training new employees.

Despite these challenges, an organization's products or services must constantly evolve to meet customer demands. Multiple variables must be effectively managed. These include issues such as increased global commoditization and competition, compliance with industry and government regulations, green and sustainable operations, health and safety in the workplace, and higher costs of doing business. All of these factors contribute to the emergence of Industry 4.0, the current trend of automation in manufacturing technologies which merges physical systems, IoT and cloud computing.

With these challenges in mind, how can an organization control assets and remain profitable? Successful organizations build agility into their business model. The ability to adapt to change by improving operations can mean the difference between survival and extinction. Asset management, driven by valuable insights from IoT data, can have a significant impact. One critical step is to unify processes that manage wide-ranging functions across an organization's multiple sites.

When this framework is in place, organizations can optimize production and service systems within each site. As a result, organizations can wield greater control of the complex asset environments necessary for bottom-line results.

Clearly, enterprise asset management is critical to the health of an organization. When handled correctly, it can be the key to continued operations in times of reduced budgets. Asset management can also help extend the useful life of equipment, improve return on investment and defer new purchases.

IBM® Watson™ IoT helps organizations make smarter decisions about asset management by augmenting IoT data with powerful cognitive insights driven by artificial intelligence (AI). This brochure introduces IBM Maximo Enterprise Asset Management, which provides the capabilities for better managing physical infrastructure assets. This solution can be used to make better decisions around all aspects of asset management, and get the insights to deliver ongoing value for organizations.

Defining asset management

In January 2014, the International Organization for Standardization (ISO) released the ISO 55000 series of standards. The ISO aimed to unite organizations worldwide behind a common framework for asset management. As the successor to the PAS 55 industry standard, ISO 55000 is the result of a three-year collaboration of hundreds of people from 28 countries. And in a recent survey, 90 percent of asset managers were already aware of the ISO 55000 release.[2]

According to ISO 55000, an asset is a "thing, item or entity that has actual or potential value." Therefore, the primary objective of an effective asset management program is to ensure that assets maximize value to all stakeholders in the value chain, throughout the asset's lifecycle.

There are different levels at which critical or strategic assets can be identified and managed. These levels range from discrete assets to more complex functional asset systems, networks, sites or portfolios. Asset management focuses on all types of assets, varying from critical or strategic physical assets, to human assets.

Physical assets, which are part of an organization's infrastructure, are positioned in the following four classes:

- Plant and production (occurring, for example, in industries such as oil, gas, chemicals, mining, manufacturing, pharmaceuticals, food, electronics and power generation)
- Infrastructure (including railways, highways, telecommunications, water and wastewater, and electric and gas distribution networks)
- Transportation (for military, airlines, trucking, shipping, rail and other uses)
- Real estate and facilities (for example, in offices, schools and hospitals)

The human asset perspective provides a broad view of personnel motivation, expertise or skills, roles and responsibilities, succession strategies, and insight into leadership teams within the organization.

Maximo Enterprise Asset Management provides an integrated approach to managing these discrete or complex assets. The product helps organizations overcome challenges rooted in their aging infrastructures or human assets, and in their siloed or disconnected systems. By breaking down multiple silos of non-standard, non-integrated systems, an integrated approach can help align operations with overall business objectives.

Such an integrated method can also support long- and short-term planning, such as controlling inventory and outside service providers, to better meet demands. EAM can enable preventive and condition-based asset maintenance. And it can help vendor management by supporting a full range of contracts and full support for managing service agreements.

Managing assets in the modern era

There are many reasons for the increased demand for better asset management. When organizations raise the importance, risk, quantity or cost of their corporate, critical or capital assets, they often see a corresponding rise in management's interest to maintain control and visibility of these assets.

What's more, in this new era of mobile, cloud and analytics technologies, there are more opportunities than ever to collect, consolidate and analyze information about assets to help fine-tune performance.

In addition, governments, regulatory bodies, shareholders and other key stakeholders have pressured organizations in public and private sectors to be able to locate and track asset whereabouts and lease obligations. The higher the risk or opportunity cost in not knowing where an asset is located, the greater the incentive for management to implement an asset tracking system. Enterprise asset management can provide real-time insight and visibility into virtually all physical assets, and across the maintenance, repair and overall supply chain.

Foundational capabilities of asset management are integral to managing an organization's smarter infrastructure. Such skills include tracking, monitoring and managing information around asset reliability, asset usage and performance.

With Maximo Enterprise Asset Management, asset-intensive organizations can find these core capabilities within a range of industry-specific solutions. The following diagram depicts how mobility and analytics extend the functions of each category. It shows the integration points with enterprise resource planning (ERP), geographic information system (GIS), and supervisory control and data acquisition (SCADA) systems that help maximize value across assets.

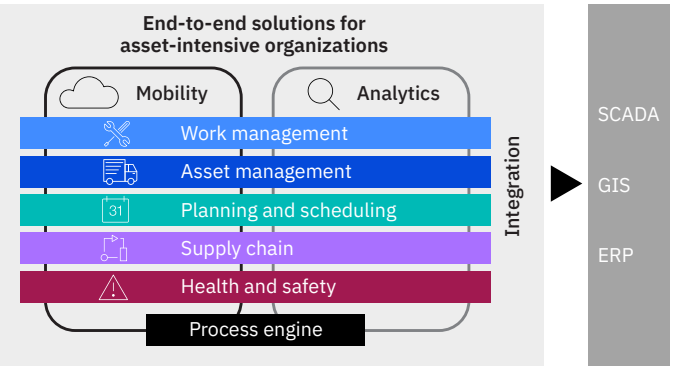

Figure A: Today's asset-intensive organizations need a robust set of enterprise capabilities backed by the latest mobile technologies and big data ananlytics

Core capabilities of enterprise asset management include:

- *Work management*: Asset-intensive organizations need to be able to centrally manage planned and unplanned work activities, from initial request through completion and recording of actuals. Mobile workers need to accomplish more in the field, from reading meters, to capturing electronic signatures, to using bar code and RFID capabilities for asset tracking and management. The right combination of features can streamline work processes for increased productivity.
- *Asset management*: An effective enterprise asset management solution must manage and optimize the use of all assets to achieve greater asset availability, reliability and performance. The result is the ability to extend the asset's life because assets are better maintained. The ability to gather and analyze data about asset operations allows an organization to move from corrective maintenance (repairs made after a problem occurs) to preventive maintenance (scheduled repairs based on experience). The last step is a move to predictive maintenance (repairs made because data for a particular asset indicates that a failure is imminent).
- *Planning and scheduling*: Planners and schedulers are at the heart of optimized work processes. To lower maintenance costs and improve resource usage, personnel need to be able to graphically view all work orders and preventive maintenance schedules on a Gantt chart. Intuitive navigation through work orders can help dispatchers manage task and work dependencies. Crews dispatched for special jobs in remote locations have an acute need for the proper skills, tools and documentation, which is an expensive strategy used in the most critical situations. In addition, the ability to locate and track field resources on a public map can help improve workforce management and help increase the efficiencies of emergency work.
- *Supply chain management*: As traditional business assets become more technology-enabled, operations and IT functions are increasingly converging in today's fast-paced business and technology environments. As a result, one way to effectively manage operational applications is to consolidate them. Organizations that seek to better manage their supply chains must:
  - Find support that is able to manage a wide variety of asset types and maintenance information.
  - Establish a single technology system to manage virtually all asset types and information (for example, production, linear, facilities, transportation and infrastructure) including calibration support and use of mobile capabilities.
  - Have an integrated asset management solution that enables optimal return on assets, complies with regulations and helps minimize risk.
  - Be able to develop smarter processes and provide users with an innovative, fully integrated supply chain management system designed for assetintensive industries.
- *Health and safety:* The primary objectives of health, safety and environment initiatives are to reduce overall risk, to comply with appropriate regulations, and to create a safe and efficient operating environment in which assets are used. Achieving these objectives are as much about standardizing health, safety and environmental practices as integrating these practices with day-to-day operations management.

An intuitive user experience is critical for supporting these capabilities for enterprise asset management. With easy navigation and features, organizations can streamline work processes for increased productivity and reduce the need for user training. The ability to geographically visualize the location of work and assets on a map can also help organizations increase workforce efficiency and the quality of customer service.

"Our ability to gather and manage asset, fault and condition data to minimize network problems has become the cornerstone of our ability to deliver a consistently high-quality passenger experience."

Neil Roberts, director of ICT, Yarra Trams, Australia

Mobility

The widespread adoption of mobile technologies and the rise of bring-your-own-device programs are driving rapid change in enterprise IT. That's why it's more important than ever for enterprise asset management solutions to support the latest mobile capabilities. Today's engineers, field technicians and other business staff are now using smart mobile devices to get their work done. These workers need to complete their projects within an optimized, IT-approved environment. By taking advantage of device-specific capabilities such as photos and voice-to-text features, mobile solutions allow technicians to capture the right information at the right time.

Figure B: A comprehensive enterprise asset management solution provides increased visibility, control and automation.

Analytics

The amount of data within an organization, and around asset management processes, has exploded within the past 10 years. As organizations mature in how they manage assets, this data is invaluable in helping them uncover opportunities to improve process efficiencies and increase their return on assets. Management teams need to be able to run extended and enhanced analytics so that they can gain the right insights to make smarter decisions and operational improvements.

In particular, analytics must be supported by true optimization models to automate the key planning, scheduling, and work management processes for capacity planning, resource management and work scheduling. The correct solution makes these capabilities available through easy-to-use executive dashboards.

Sadly, the health of asset data is an often overlooked failure. Without completed fields, or validated data, analysis is not possible. Analysis of the health of data fields in critical areas such as asset registries, item inventory and work completion is essential to supporting reliable analytical reports.

Gaining asset management benefits with visibility, control and automation

To manage the full asset lifecycle and better address business imperatives, asset-intensive organizations require integrated visibility, control and automation across their business and technology assets. This approach can help organizations better achieve their objectives and maximize the value from all assets supporting the operation.

This increased visibility of all assets across the enterprise allows organizations to respond faster and make better decisions. Visibility provides an enterprise-wide view of asset details and processes from across the organization, including visibility into asset service processes across the enterprise supply chain.

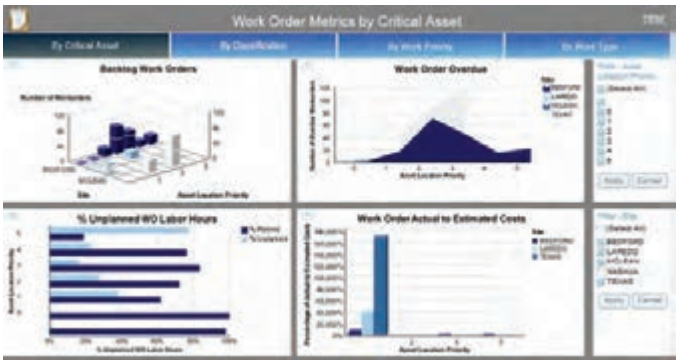

Figure C: Integrated analytics within IBM Maximo enables organizations to proactively improve business processes, such as work-order management, based on key performance indicators.

With better control of their assets and asset-related data,organizations can:

– Better manage and secure their investments
– Increase governance and reduce operational risk
– Extend asset life, reduce inventory costs and control
– Mitigate compliance issues and risk
– Improve health, safety, and security

In addition ,increased automation enables organizations to:

- Build agility and flexibility into their operations
- Improve asset use with proactive asset management and consolidation of their systems
- Enhance operational capabilities by automating workflow, reporting through key performance indicators and dashboards and improving inventory data reliability

To manage the full asset lifecycle and address these business imperatives, asset-intensive organizations can derive great value by implementing the EAM solution.

Adding value through improved enterprise asset management

Increased asset availability and reliability provide a basis for improving service delivery and growing revenue from the same asset base. As organizations tune their supply chains to meet specific supply levels, their asset or equipment uptime and availability must align to these demand schedules.

According to an A. T. Kearney survey in *Industry Week*, 558 companies that currently use computerized maintenance management systems exhibited an average of:

- 28.3 percent increase in the productivity of maintenance
- 20.1 percent reduction in equipment downtime
- 19.4 percent savings in the cost of materials
- 17.8 percent decrease in inventory maintenance and repair
- 14.5 months of payback time.[3]

Asset management has a direct impact on profitability, since it affects the quality of the product or service produced or delivered. It can justify the price and ultimately determine profitability. The quantity of goods produced or services delivered directly contributes to the top-line revenue for organizations in virtually any industry. An organization's revenue can be affected whether that good is a hard asset, such as an engine component, or a service delivered to a customer.

Asset management also has a logical impact on operational costs. Efficiencies realized by effectively managing labor, inventory and other support services directly impact the bottom line by helping to control costs. More timely and precise user intervention can improve productivity, reduce materials use and decrease the cost of doing business.

A significant challenge for organizations today is to effectively balance the lowest operational cost with the utilization loads of their asset portfolios. As a result, organizations commonly overstock equipment and fleets to make sure that they always have the assets they need. Other organizations stockpile spares to shorten repair times by eliminating delays caused by an inefficient supply chain. Each of these insurance policies come with high premiums associated with constant upkeep, refurbishment and financial carrying costs that rarely cease.

These strategies can increase, rather than decrease costs.However, using EAM helps control or eliminate overstocking and stockpiling, and can also help reduce the organization's fixed capital investment and contribute to positive bottom-line results.

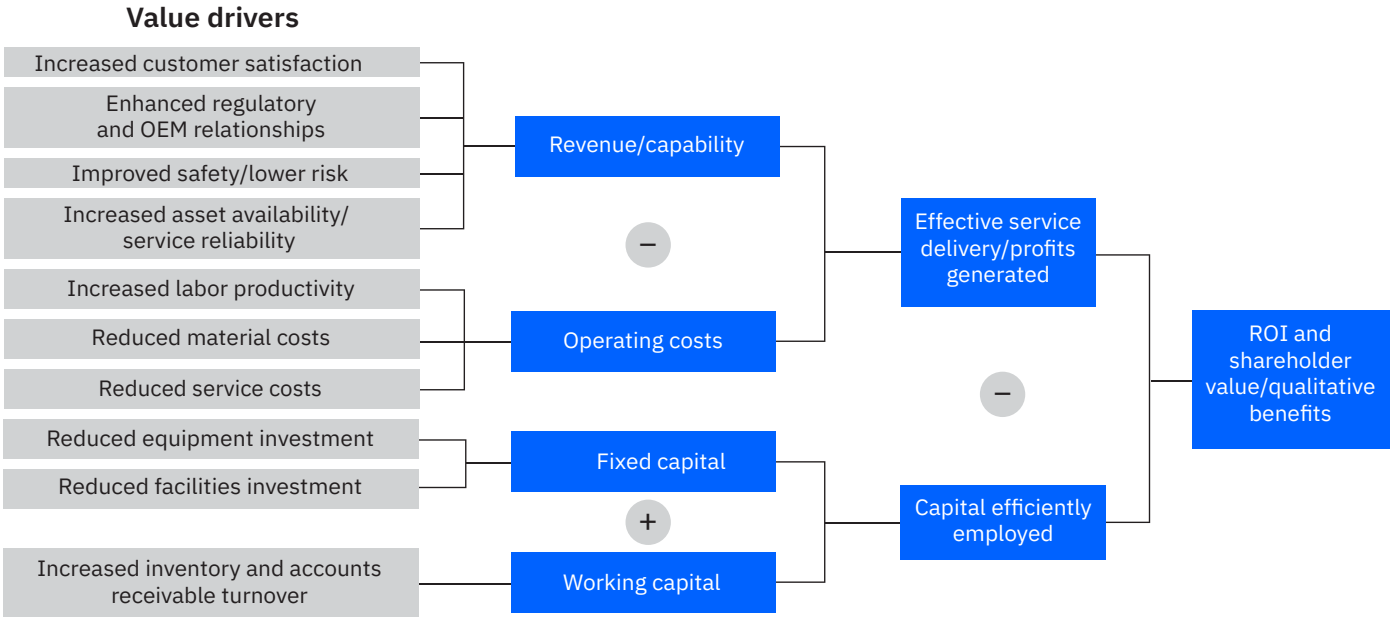

Figure D: Certain value drivers contribute directly to ROI and shareholder value.

"With IBM Maximo, we can determine the optimal approaches to maintenance — enabling us to deliver the highest levels of asset availability without driving up operational costs.

Richard Barber, maintenance systems section head,
Drax Power Station, UK

Choosing a solution that can increase revenues and decrease costs

With IBM Maximo, organizations are betterable to meet today's business, operational and technology challenges, and efficiently address the lifecycle of resources.

This solution enables organizations to:

- –Manage aging infrastructures
  - – Identify equipment components and how they are connected to the asset assembly
  - – Implement and enforce standard processes for asset management
  - – Support real-time data collection, diagnostic and analysis tools to extend their usable life cycle. Improve overall maintenance best practices and meet increasingly complex health, safety and environmental requirements.
  - – Control operational risk by embedding risk management into everyday business processes
- – Control the brain drain among employees facing retirement
  - – Respond to global price pressure by enabling a reduced workforce to work more efficiently and cost-effectively
  - – Put into place proven workflows and enforced best practices that capture the knowledge and critical skills of long-time employees
- – Consolidate operational applications
  - – Standardize asset management best practices across virtually all asset types across the entire enterprise
  - – Support global operations by using captured intellectual experience of skilled workers in a format easily dispersed in a wide range of languages
- – Provide a lower cost of ownership by using one global enterprise application instance, consistent metrics, and best-in-class practices that are enforced with the same standard asset management solution at all of the organization's sites.
- – Enable asset-intensive organizations to optimize their maintenance and repair supply chain with management of materials and spare parts inventory that is fully integrated into the asset management solution
- – Use accessible, integrated capabilities for integration with other systems for enterprise resource planning, operational systems, manufacturing execution, financial management, reporting.

Implementing a solid enterprise asset management solution can directly contribute to the way organizations in asset-intensive industries increase revenues and decrease costs.

IBM Maximo Enterprise Asset Management

This solution offers the required visibility, control and automation of key information that an organization needs to achieve greater efficiency in asset management. This product manages virtually all asset types, from traditional physical assets to emerging smart assets, on a single technology platform.

IBM Maximo can support the maintenance of an organization's physical infrastructure and improve customer service, increase return on assets, enable greater compliance, improve asset performance and reduce risk. And it can accomplish these tasks in a shorter time period, while providing better visibility and control of all required information to better align with an organization's overall business goals.

IBM Maximo is designed to naturally align with asset management best practices across an organization or in an industry. It provides industry-leading capabilities and functionalities that allow capital, asset-intensive industries to leverage the benefits of an integrated enterprise asset management system to manage critical assets and facilities within the organization.

IBM Maximo unifies comprehensive asset lifecycle and maintenance management activities, providing insight into all enterprise assets, their conditions and work processes to achieve better planning and control, while leveraging the business function within an organization.

"We have better information on assets and maintenance activity, and more sophisticated tools and mechanisms for managing it all. The result is greater operational control and accountability, especially when it comes to planning and scheduling."

Ivan de Lorenzo, Outage Planning Manager, Cheniere Energy

Industry solutions

IBM Maximo captures decades of development work in partnership with the world's largest, most demanding customers who are leaders in complex industries. The result is world-class software options that address the special needs of industries:

- *Utilities:* Provides special capabilities for linear assets, configuration management and crew schedule or dispatching based on geospatial visual management tools. Suitable for transmission and distribution in water and wastewater, gas and electric power
- *Oil and gas, mining and metals*: Focuses on operational excellence by integrating safety, reliability, compliance and performance into work management. Reduces costs through standardization, collaboration and the adoption of better operational practices
- *Manufacturing:* Helps industries such as automotive, aerospace and defense, electronics or industrial products, food and beverage, or consumer products manage all their assets and maintenance activities. Uses concepts such as proper Lean Six Sigma terminology and complements product lifecycle management requirements.
- *Life sciences:* Helps monitor, track and manage equipment, facilities, mobile and IT-enabled assets. Integrates with IBM Maximo Calibration to manage tools, traceability and management of e-signature and gold standards. Documentation packages help meet complex compliance requirements from the FDA and to provide support in validation projects
- *Healthcare:* Helps manage the complex relationship between facilities and equipment readiness. Tracks and locates critical assets, monitors facility conditions, complies with reporting requirements and integrates with operational health information systems
- *Nuclear power:* Helps nuclear organizations manage work and asset management regulations through detailed state management, workflows, escalations and e-signature. Suitable for management of activities within stringent regulatory environments due to compliance, health, safety and security
- *Transportation:* Provides detailed asset configuration management, fuel management, drivers' logs and bay scheduling tools to help improve the availability and use of critical transportation assets in organizations operating rail, road and air traffic or logistics
- *Service providers:* Helps manage profitability and SLAs by linking customer service commitments with field teams delivering services. Related service management activities for multiple customers are managed in a single cloud- based deployed instance accessible by an Android or Apple device

To help improve efficiencies across industries, this solution now supports effective asset management in the cloud. Clients get optional installation of a multi-tenant database that allows secure data separation for each customer or business unit, and offers the ability to expedite onboarding through templates. Internal departments can continue to run their own business processes, configurations and customizations alongside other business units within a single database without impacting each other.

Advanced capabilities

IBM Maximo delivers next-generation capabilities to enhance investments in enterprise asset management, including:

- *Built-in mobile access:* Using IBM Maximo Anywhere, users can access work and asset management capabilities through any device's browser. Maximo software capabilities are provided within the form factor of a phone or tablet, allowing direct access from virtually anywhere.
- *Built-in mapping and crew management:* Organizations can geographically manage crews and assign work with greater flexibility, by visualizing *service addresses* for both work and assets on a public map, as one example. The application designer provides support for Google, Bing and Esri maps.
- *Analytical insights:* It is easier to monitor the health of an organization and make smarter decisions. Specific *business intelligence packs* for enterprise asset management provide insights for improving asset failure management, work order management and inventory management.

In addition, this solutions can use the following key aspects of enterprise asset management to their advantage:

- *Asset maintenance management:* Optimized at the process level. Examples include reactive, preventive and planned maintenance combining materials and service management. Maximo asset and work management modules in generally address this requirement.
- *Asset risk management:* Optimized at the asset performance level. For example, asset reliability, service and performance management, IBM Maximo Calibration and key performance indicators and metrics, such as mean time to repair and mean time between failures, address such requirements
- *Infrastructure management:* Optimized at the service performance level. Examples include utilities and facilities management. Spatial and linear asset management, facilities and integration with intelligent building management systems address these requirements
- *Condition-based maintenance:* Many assets need more insight than preventive maintenance efforts can provide. Some assets seem to fail randomly. With IBM Maximo and IBM Maximo Asset Health Insights you can develop a customized approach that lets organizations capture knowledge about how asset health is assessed and then use these insights to manage teams to perform maintenance only when needed, reducing costs and unplanned downtime

Flexible deployment options

Available as an on-premises or software-as-a-service (SaaS) offering, Maximo Asset Management provides the rightcapabilities to meet organization's needs. Each model provides the collection, consolidation and analysis of virtually all types of assets, unifying processes for wide-ranging asset management functions across multiple sites.

There are many financial and operational benefits to adding SaaS to your EAM program, but most of them boil down to allowing organizations to focus on their core competencies and moving faster in their businesses.

This frees up capital that is currently spent worrying about IT management and delaying business decisions due to upgrades and limited resources.

In a recent IBM Institute for Business Value Study, leaders are focused on delivering the following three operational benefits from SaaS Investments:

- Enhancing technology agility (63 percent)
- Boosting employee satisfaction (57 percent)
- Improving business scalability (57 percent)

These business leaders also consider the cloud to be the where they can experiment with new technologies, integrations and data-driven partnerships to create new business value for their clients.

For more information, contact your IBM Business Partner:

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Footnotes

1. “Research Report on Asset Management Practices, Instruments and Challenges: 2014-2019,” Reliabilityweb.com, Accessed December 9, 2014. http://www.reliabilityweb.com/index.php/articles/asset_management_practices_investments_and_challenges_2014-201

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