POWERPLAN™

CUTTING THROUGH THE CLUTTER

A Guide to Asset Management Systems

With clarity comes confidence.

The Alphabet Soup of Asset Management Systems

Asset management may not make mainstream media headlines or serve as titillating conversation at a cocktail party, but that doesn't mean it's not a top concern among asset-intensive industries, such as utilities, public sector and transportation organizations. The reason is simple: We all rely on major assets daily to perform effectively, safely and efficiently. If you're reading this, you know that the management of physical assets like pipelines, power plants, bridges and buildings is anything BUT simple. When you have thousands of assets spanning multiple cities, counties, provinces and even countries, the effort is increasingly complex. It involves monitoring and managing a multitude of processes, data, technologies and other variables across the globe. The larger the organization, the more complicated this becomes.

Unfortunately, what **does** make headlines are the consequences of asset failure—from sudden bridge collapses to costly power outages. Avoiding this risk of failure is more challenging than ever due to the erosion of aging infrastructure, coupled with tight operating margins, shrinking budgets and regulatory compliance.

The goal of asset management is to extract the maximum value of an asset over its lifetime. The technology, which aims to provide this holistic view, and for the purposes of this paper, is called Enterprise Asset Management (EAM).

EAM has delivered value to asset-intensive organizations by systematizing and automating key processes. As a result, we see new software vendors crop up almost every month while more mature software vendors stretch their existing solutions to accommodate industry needs and technological advances. Some of these asset-management solutions tout the Internet of Things (IoT) and Condition Based Maintenance (CBM), creating massive amounts of data that require significant horsepower to provide quick, analytical results. Others emphasize Machine Learning (ML) and Artificial Intelligence (AI) for Predictive Maintenance (PdM), key aspects of Asset Performance Management (APM) and Reliability Centered Maintenance (RCM). Then there are Decision Support (DS) tools for Capital Investment Planning (CIP or AIP), which are critical to help your organization optimize asset investments.

With all of these systems and solutions and software vendors, it's like opening a can of alphabet soup—even to someone who has been in the business of asset management for decades. No wonder organizations seeking to manage their assets in more efficient and systematic ways find it difficult to navigate the system landscape that surrounds their assets.

This guide is designed to help organizations understand and navigate this landscape. While it may not address all of your specific needs, it should help cut through the clutter so that you can identify the gaps and opportunities in your own systems to fill the gaps appropriately.
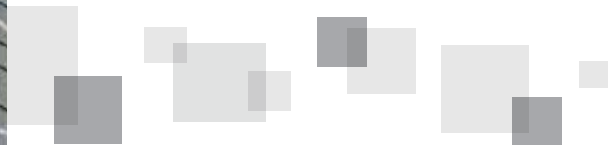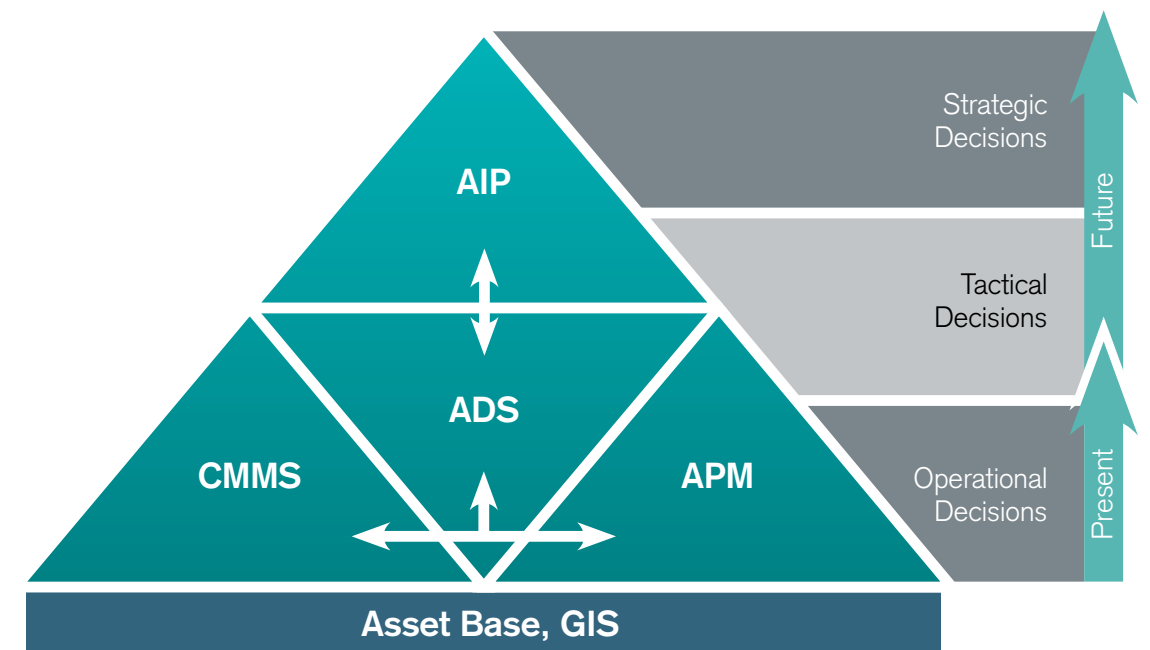
Clarifying Core Components: Identify the Gaps and Opportunities in Your Organization

Understanding core system components can help you and your team decide what is appropriate for your organization's needs, depending on functional requirements, by persona or role, or by the organization's primary focus.

For example, a supervisor within the Operations group needs a system to record his crew's work activities from the field. They need information about both planned work, and reactive activities due to failures or service requests. They need an operational system that provides access to asset inventory, work orders, and inspections for the assets on which they are working. Typically, these needs are fulfilled by a Computerized Maintenance Management System (CMMS).

In contrast, a capital planner will need to communicate future needs and activities, and determine necessary investment to the management team. To do this, they need an understanding of predicted asset condition, required activities, and related costs. This information may come from different, integrated solutions. Typically, these needs are fulfilled by a combined solution for both Asset Decision Support (ADS) and Asset Investment Planning (AIP).

As you reconsider which technology solutions your organization may need or if there are any gaps, you will also want to level-set on EAM solutions and terminology.

The first step is to clarify the terminology since a lot of the current confusion comes from the term Enterprise Asset Management itself. It evokes an image of an end-to-end, all-encompassing system for assets – which is true in this context, except it will be several systems and not just one. Secondly, what functionality is provided by each category?

- **Asset Decision Support (ADS) –**
  Asset Life Cycle Analysis
  Leverages data from GIS, CMMS, Condition Assessment and APM databases. ADS helps organizations determine the optimal asset investments for the organization over a period of the asset lifecycle. This modeling tool can use asset strategies to forecast optimal events and track condition, age, risk, level of service and other measures that are important to the organization and its strategic objectives, outwards of 100 years.

- **Asset Investment Planning (AIP) –**
  Investment Planning for CAPEX and OPEX
  AIP helps organizations determine the right investments for the organization's long- and short-term plans, based on their corporate values, objectives, and constraints. AIP can leverage decision support outcomes or be used independently to help planners formulate varied investment scenarios while optimizing against varied constraints, and solving for key objectives like mitigating risk or sustaining optimal levels of service.

- **Asset Performance Management (APM) –**
  Real-time performance monitoring
  Encompasses the capabilities of data capture, integration, visualization and analytics tied together for the explicit purpose of improving the reliability and availability of physical assets. APM includes the concepts of condition monitoring, predictive forecasting and reliability-centered maintenance (RCM). Overall, APM supports safe, reliable, and efficient operation of equipment and infrastructure, and monitors asset health.

- **Computerized Maintenance Management Systems (CMMS) –**
  Asset data tracking, work management, inspections and analytics
  Manages the maintenance of an organization's physical assets throughout each asset's lifecycle. CMMS software applications include features such as asset register, life-cycle management, reactive and preventive maintenance scheduling, warranty management, integrated mobile wireless handheld options and portal-based software interface.

- **Geographic Information Systems (GIS) –**
  Asset data location tracking
  Captures and tracks location-based data, which is usually coupled with attributes about each asset. This data allows assets to be mapped, analyzed, and rendered all in a spatial context.

- **Project Portfolio Management (PPM) –**
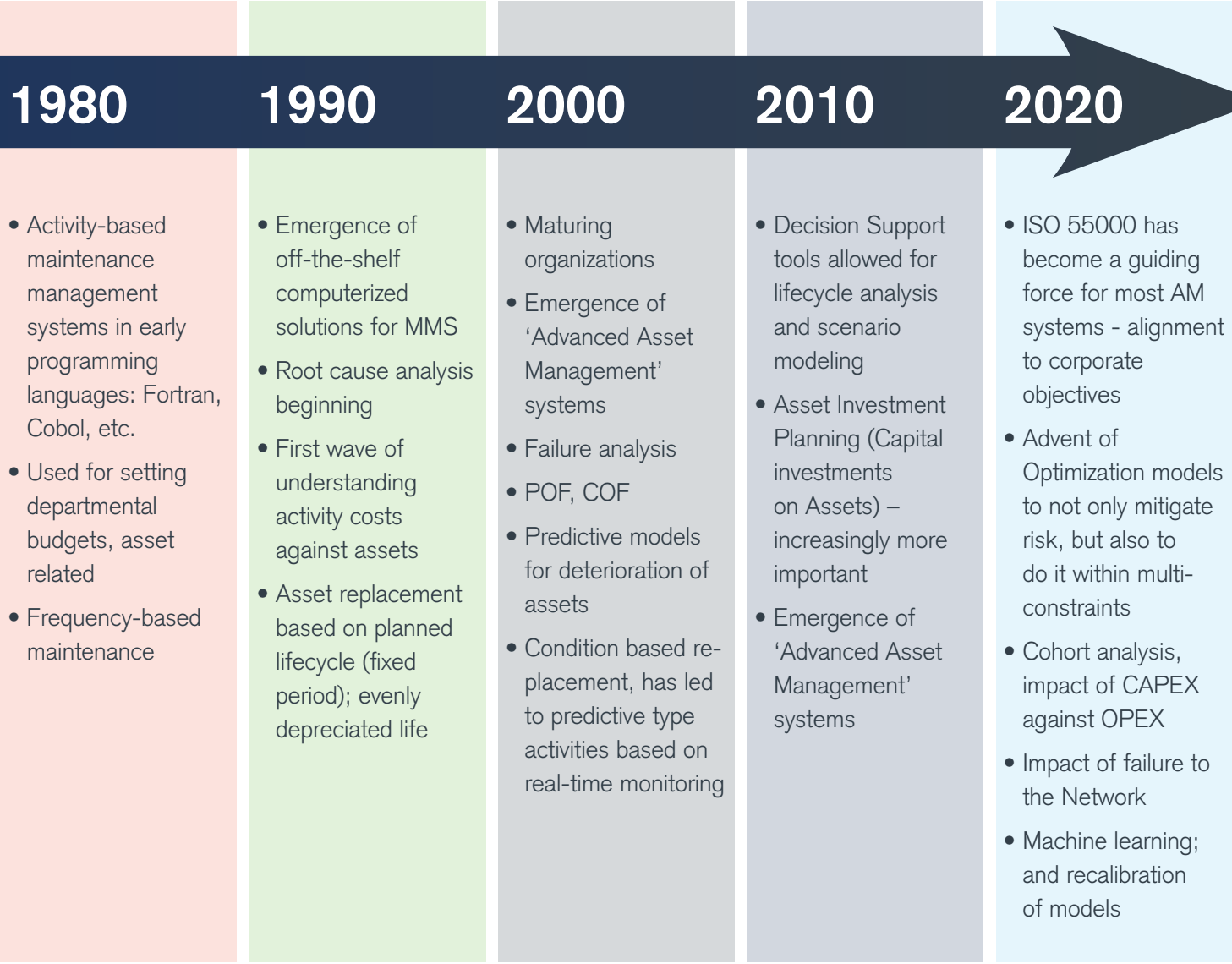 *Reactive and planned maintenance*
  Enables corporate and business users to organize a series of projects into a single portfolio that will provide reports based on the various project objectives, costs, resources, risks and other pertinent associations. This approach examines the risk-reward of each project, the available funds, the likelihood of a project's duration, and the expected outcomes.

The Evolution of Asset Management Systems

The evolution of technology has played an important role in maintaining or managing assets over the past 40 years, with increasingly more sophisticated and complex components, taking giant leaps forward in progressively shorter intervals.

The advancement from basic, activity-based maintenance management systems to the sophistication of machine learning and prescriptive models has led us to today's number of solutions and systems.

1980	1990	2000	2010	2020
• Activity-based maintenance management systems in early programming languages: Fortran, Cobol, etc. • Used for setting departmental budgets, asset related • Frequency-based maintenance	• Emergence of off-the-shelf computerized solutions for MMS • Root cause analysis beginning • First wave of understanding activity costs against assets • Asset replacement based on planned lifecycle (fixed period); evenly depreciated life	• Maturing organizations • Emergence of 'Advanced Asset Management' systems • Failure analysis • POF, COF • Predictive models for deterioration of assets • Condition based re-placement, has led to predictive type activities based on real-time monitoring	• Decision Support tools allowed for lifecycle analysis and scenario modeling • Asset Investment Planning (Capital investments on Assets) – increasingly more important • Emergence of 'Advanced Asset Management' systems	• ISO 55000 has become a guiding force for most AM systems - alignment to corporate objectives • Advent of Optimization models to not only mitigate risk, but also to do it within multi-constraints • Cohort analysis, impact of CAPEX against OPEX • Impact of failure to the Network • Machine learning; and recalibration of models

> "We realized the growing need to have a systematic asset management system that was defendable to both regulators and stakeholders, and also fit the future organization objective for an ISO 55001 line compliant asset management system."
>
> **– Asset Strategy Engineer – Evoenergy**

A Look Back to Move Forward

Reactive:
Decades ago, organizations simply reacted to asset issues and failures, developed plans based on a manufacturer's recommended activities (if that), and conducted some basic pre-planned activity to try to better schedule resources and hopefully, prevent failures. From there, organizations moved into a more preventative (planned) regime of work: they learned which assets they owned, where they were, and what condition they were in—the basic foundational elements of asset management.

Predictive:
Then came the predictive approach. As organizations developed a deeper understanding of their assets, including their health, how they behave and perform, they were able to predict when a key event was likely to happen. We understand the full lifecycle of our assets so we can apply deterioration models, intervention strategies, and risk mitigation activities.
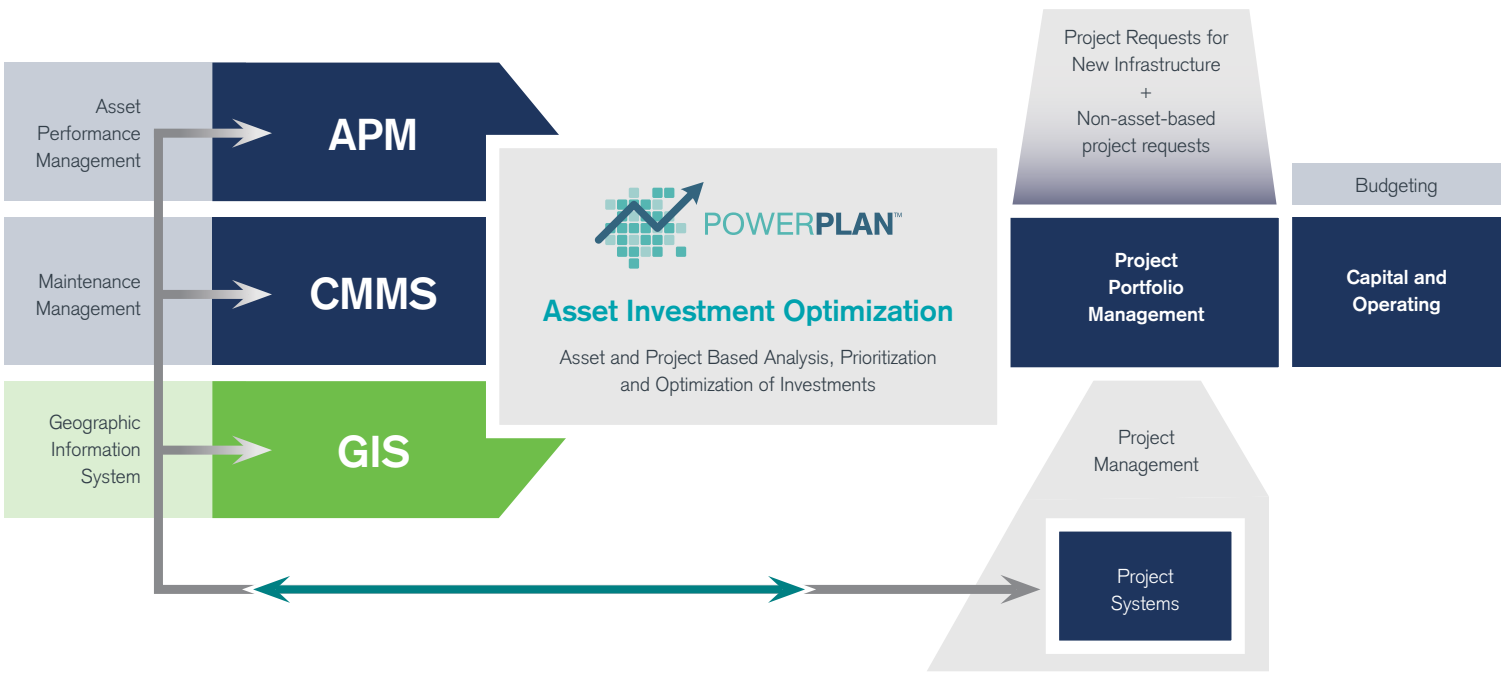
Prescriptive:
A prescriptive approach can help you manage the future by understanding when to undertake a particular activity on an asset over its lifecycle to maximize its performance, its life, and its overall value, including the ability to determine where and when to invest capital over extended time horizons. Yet, most organizations struggle with how all these components fit together into a fully functioning, dynamic system.

One key objective of asset management is to maintain control over the data streams that are used to increase your understanding of your organization's assets, along with the costs and risks throughout the entire lifecycle. A complete and fully functioning EAM system is dynamic, incorporating information and activities and plans from the past, present and future.

Looking Toward the Future

Choosing the system(s) that work best for your organization comes down to identifying a way to enable people, processes and systems to deliver the right information to the right people at the right time to make the best decisions. With this in mind, looking at asset management and data flow through a temporal lens provides additional clarity into how core components relate across time periods as well as with one other. While CMMS and APM span past and present activities, ADS and AIP specifically leverage the past and present to forecast the future. PowerPlan offers a complete solution for both ADS and AIP inside the Asset Investment Optimization Suite.

To fully leverage "prescriptive" asset management, it's important to see how an Asset Investment Optimization software solution pulls information from other sources to model future investment scenarios and expected results, but also pushes this outcome data back into those source solutions for transactional purposes.

So which components and solutions are right for your organization? The reality is that there is not a "one-size-fits-all" system for realizing the most value possible from an organization's assets. When making the decision of how to architect your own system, it's important to identify where your asset management culture and practice is currently, where you'd like it to go and how to gain the most visibility into the data you need to achieve your goals. Many times it's not an either/or but a true combination of solutions to provide the best system for your organization.

For example, one of the reasons the practice of asset investment planning emerged was because organizations needed a consistent and repeatable methodology for their asset investment decisions that aligned with their corporate objectives. In addition, organizations operating across multiple geographies and jurisdictions needed to be compliant with changing rules. Increased regulatory scrutiny requires a clearly documented and defendable audit trail, and globalization adds extra layers of complexity. On top of that, investors continually demand better returns in the private sector and citizens demand better levels of service in the public sector, while IT budgets and resources are limited and manual processes don't drive long-term, strategic investment planning.

As a result, organizations of all sizes need a single, integrated, highly detailed view of data and information from their financials and EAM solutions. By layering complex regulatory or governmental requirements with granular financial and operational data, EAM provides a single source of auditable information that can be accessed by stakeholders in every department.

> "We are now able to integrate all of our source asset management systems into one software package for long-term lifecycle management. The system saves time by allowing staff to access inventory, condition, lifecycle, and rehabilitation information from a single software system."
>
> **– Coordinator of Linear Asset Mgmt.**
> **Capital Works Dept., City of Burlington, Ontario**

With a system already learning from real-time events and automatically adjusting algorithms and models - why not also have it generate work orders in anticipation of asset failures, thereby pre-empting a potential catastrophic asset event? Systems like this are 'cognitive,' or have the ability to think. The technology behind this system is at the intersection of big data, analytics, machine learning, and artificial intelligence. Sounds like a future only found in science fiction, but to some degree, that future is already here.

Conclusion

Every organization is on an asset management journey, but at various points and paths along the way. It is important to identify where your organization is on that journey, create a vision for the future, and align your organization on the plan forward. The asset management landscape can be confusing, but with clear goals in mind you can realize the full value of your organization's assets.

PowerPlan's Asset Investment Optimization Suite includes Asset Decision Support and Asset Investment Planning solutions. To learn more, visit our [website.](#)

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**+1 678.223.2800
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