

Four key considerations for adopting an asset investment planning strategy



Most asset-intensive organizations are looking to optimize their asset investments to meet their service level agreements (SLAs), make the most of their capital spending dollars, and minimize the business risks that result from asset failure. Ideally, these organizations would also prefer to lengthen their planning horizon to smooth out capital expenditures over periods that extend 25 years or more and avoid periodic spending spikes. Asset investment planning (AIP) software applications allow organizations to make data-driven decisions about their asset investment strategies so they can meet service level objectives, reduce risk, and minimize the need for wide variations in capital spending over time.

This white paper details the benefits organizations can achieve by developing a formalized asset investment plan, the four key factors they must evaluate and operationalize to build that plan (namely asset condition, asset criticality, business risk if the asset fails, and level of service required), as well as the expected outputs. These include reports that enable organizations to more easily determine what budget they need to set, what repairs, refurbishments, or new assets to invest in, and when exactly they need to spend that budget to achieve various potential scenarios.

Gartner expects that by 2022, 50% of utilities will shift from traditional planning tools to AIP software to help them optimize the investments on their mission critical assets.

Why many asset-intensive organizations turn to AIP

Capital investment decisions, to rethink or replace critical assets, have long relied on historical practices, rules of thumb, and manufacturers' recommendations put into Microsoft Excel spreadsheets. That process is increasingly ineffective: too expensive, too slow, and it often leads to the wrong answer.¹

Increasingly, asset-intensive organizations are looking to asset investment planning (AIP) to determine where to spend their limited capital to ensure their assets deliver the highest level of service over the short and long term. An asset investment plan enables organizations to optimally balance costs, risks, and performance improvements of competing asset interventions, such as maintenance, refurbishment, or replacement, providing data-driven answers to these fundamental questions:

- How big a budget do you need?
- What should you spend it on?
- When should you spend it?

Gartner expects that by 2022, 50% of utilities will shift from traditional planning tools to AIP software to help them optimize the investments on their mission critical assets. In its report "Optimize Utility Capital Expenditures With Asset Investment Planning Solutions," analyst Nicole Foust explains that "interactions with our clients show that they are evolving from replacing to 'rethinking' their entire asset base.[...] Regulators are becoming more sophisticated, moving to performance—or outcome-based systems that require more-granular metrics."¹

“An asset investment plan (AIP) is a data-driven capital plan that allows asset-intensive organizations to prioritize their capital budget in an efficient and justifiable manner.”

Jon Mortenson

Executive Director Sales Architecture, Hexagon PPM

By developing a well thought out asset investment plan, organizations can:

- **More effectively define and meet service level objectives.**
AIP operationalizes ISO 55000 best practices to enable organizations to assess the impact of their asset decisions on the service level they deliver now and in the future.
- **Lengthen the planning horizon for capital investments.**
AIP enables asset-driven organizations to evaluate their need for investments in maintenance, refurbishment, or replacement for all their assets across timeframes ranging from one to 25-plus years so they can smooth capital expenditures over time.
- **More effectively evaluate business risks** with regards to areas such as safety, environmental impacts, service impacts, and costs.
- **Future proof investments.** AIP enables asset driven-organizations to keep pace with evolving regulatory requirements and market conditions and factor these changes into their investment planning.

AIP challenges

Yet today, many organizations are challenged to define and quantify the individual factors that enable data-driven asset capital investment decisions—namely asset condition, asset criticality, and the business risk of failure. They are also unable to tie those factors together into an asset investment plan that supports service level goals, policies, and strategies. An AIP solution enables organizations to fill these gaps.

Four components of an asset investment plan

Creating an asset investment plan that delivers the right level of service at the right level of risk and the right level of expenditure requires organizations to define and quantify the following inputs:

1. Asset condition
2. Asset criticality
3. Business risk if the asset fails
4. Level of service required

1. Asset condition

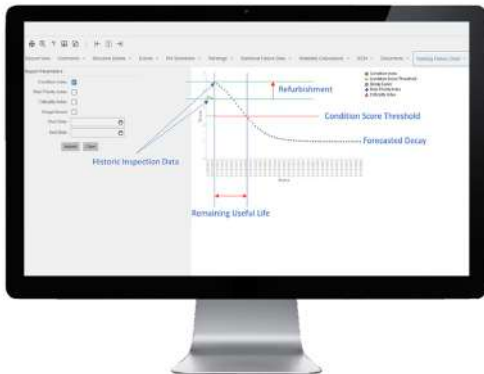
Enterprises in industries such as transportation and energy often require large numbers of physical assets to meet their objectives. One key factor these organizations must consider in their asset investment plan is the condition of these assets and their effective remaining life—particularly for expensive and critical assets.

When the organization buys a new asset, that asset is in excellent condition. Over time, its condition deteriorates until it reaches a minimum acceptable condition, at which point the asset must be repaired or replaced.

Assessing asset condition typically involves periodic inspections. Once the organization has evaluated asset condition, it can determine how much useful life the asset has left. Assets rarely deteriorate in a straight line. Their rate of deterioration can be plotted as a decay curve, which is specific to the individual asset. For some assets, deterioration is like a car's depreciation, occurring primarily upfront and then slowing down. Other assets might remain in good condition for a long time and then reach a tipping point after which they deteriorate quickly. Note that in cases where an organization doesn't have the budget to test each individual asset of a particular type, it might choose to physically test a representative subset and then use a standard asset decay curve to predict the likely condition of the rest of the asset class.

Knowing where the asset is on the decay curve helps organizations decide what interventions are necessary to extend its useful life. They might perform extra preventative maintenance to ensure the asset achieves its expected useful life; refurbish it to extend its useful life and thereby push out capital expenditure for a replacement; or decide it's time to invest in a replacement.

An AIP solution enables organizations to plot out that decay curve for each asset so it can visualize deterioration over the asset's lifetime to understand its condition in five, ten, fifteen, or twenty years' time. The right AIP solution can also establish where intervention points lie and evaluate different maintenance strategies for those interventions.



The rate of asset deterioration can be plotted as a decay curve that shows the asset's remaining effective life. Here we see how refurbishing can extend the asset's effective remaining life.

2. Asset criticality

Asset criticality is the impact the failure of a particular asset will have on an organization's ability to realize its business strategy, policies, and objectives. An asset criticality assessment as part of asset investment planning guides the prioritization of asset investments.

Determining asset criticality requires organizations to develop a consistent methodology for defining relationships between different factors for different assets. Only the organization can define what that relationship should look like for its assets.

An AIP solution will allow an organization to take the methodology it uses to define and score criticality and operationalize that so the organization can more quickly and easily score criticality for all of its asset types. It's important to understand that asset criticality can vary as business objectives change. For example, most of the time, an airline's most important objective is to keep as many planes up in the air as possible to maximize revenue. But during the COVID-19 pandemic, when far fewer planes are flying, an airline's maintenance strategy might change to prioritize keeping grounded planes from deteriorating from lack of use.

3. Tolerance for risk of asset failure

No business is without risks. While some organizations may attempt to mitigate risks entirely, most realize that they can't do business without some risk. Organizations must define their tolerance for the consequences of an asset failing so they can make investments accordingly.

Failure of an asset can have a wide range of consequences for an organization, including:

- **Safety**
Could the asset burn, explode, or crash?
- **Physical challenges**
Could the asset create a nuisance due to noise, vibrations, or smells? Is it subject to downtime and disruption of service?
- **Finances**
Could the asset be subject to increased costs due to reactive/crisis planning or deferred maintenance? Could resale value be impacted? Could it operate inefficiently? Could the organization miss opportunities for leveraging economies of scale?
- **Legal**
Risks can include potential fines and penalties due to non-compliance conditions, potential accidents and injuries, increased insurance deductibles due to failure to mitigate, jeopardizing of warranties due to failure to meet duty of care, litigation, and more.

An AIP solution can help an organization rank the consequences of asset failure by operationalizing the ISO 35000 standard, which breaks down bands of acceptable risks and remediations that can be taken to minimize those risks.

The solution should also account for [black swan events](#) that no one could have predicted. For example, many characterized the global financial crisis of 2008 as a black swan event. An AIP solution that accounts for black swan events prompts the organization to predict the worst consequences that could happen to the business and put together a plan for how to deal with that.

4. Level of service required

Level of service can be defined as the parameters, or combination of parameters, that reflect social, political, environmental, or economic outcomes that an organization intends to deliver to its customers and other stakeholders using its assets. For example, an electric company could promise to deliver a random hour of power each day or a reliable supply of power 24x7x365. A transportation company might state that its trains will run 95% of the time. Once the organization has identified its service goals, it can define strategies for how to achieve these desired outcomes using its assets, objectives for realizing these strategies, and a set of KPIs to measure progress toward those objectives.

The ISO 55000 standard specifies how assets will be managed and operated at an agreed upon service level while optimizing total cost of ownership at an appropriate level of risk. An AIP solution should allow the organization to implement the ISO 55000 standard by operationalizing the organization's policies, strategies and objectives, tie those to KPIs and then link that to level of service requirements.

RCM Details	
RCM Level:	FMECA
Risk Level:	Desirable
Failure Probability %:	40.00
Black Swan:	<input type="checkbox"/>
Risk Priority Number:	9
Risk Priority Index:	Acceptable
Risk Consequence Cost:	1,000.00 CAD
Black Swan Cost:	CAD

This screen shows how an AIP can help an organization rate risk levels and the acceptability of those risks for their organization.

The AIP solution thereby enables the organization to measure its performance against its level of service goals so it can maintain clear alignment between asset investments and policies, strategies, and objectives so it can meet service level requirements.

AIP outcomes

With all these inputs—asset condition, asset criticality, risk tolerance, and level of service—defined and quantified in the AIP, organizations can create reports that lay out scenarios that describe the consequence of taking one action or another.

For example, a transit agency has buses and trains that it uses to deliver a defined level of service 24x7x365. The asset investment plan will tell the company how much it'll need to invest to achieve that level of service (LOS) goal.

Organizations can also create scenarios that show them how they'll need to invest to meet LOS goals over time. For example, an organization may need to spend \$1 billion next year, \$200 billion in three years, and \$100 billion in five years. Having this information enables the organization to adjust its expenditure patterns to smooth out annual budgets to make them more consistent over time.

A holistic solution

Much of the information for the key inputs for the asset investment plan come from the asset registry in the enterprise asset management (EAM) system, which tells organizations what assets the organization has, the work management system that manages maintenance operations, and the asset performance management (APM) system that monitors asset condition and reliability.

The right AIP solution should include asset investment planning as part of those other solutions so organizations don't need to continually replicate information from one system to another. All the necessary data necessary for planning should be available from a single system.



20 year capital allocation
How AIP helps organizations smooth capital investments over time.

How AIP fits into APM

With the right AIP solution, asset-intensive organizations can now accurately evaluate asset condition, asset criticality, business risk if an asset fails, and level of service required. After taking these factors into consideration, organizations can holistically determine which assets to invest in, as well as how much to invest over the short and long term to reduce risks and meet service level objectives.

¹Gartner report, Optimize Utility Capital Expenditures with Asset Investment Planning Solutions, 22 January 2019, Refreshed 1 June 2020



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Our technologies are shaping production and people-related ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

Hexagon's PPM division empowers its clients to transform unstructured information into a smart digital asset to visualize, build, and manage structures and facilities of all complexities, ensuring safe and efficient operation throughout the entire lifecycle.

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