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Transforming Your Approach to Utility Asset Lifecycle Management

Oracle Utilities
Oracle Construction and Engineering

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Introduction

Utilities, like other asset-intensive organizations, require substantial capital investments in infrastructure, equipment, and technology. These assets are crucial for providing essential services, including electricity, water, and gas. Managing the assets effectively and efficiently is critical for maintaining profitability and the reliable, affordable service that customers expect.

Despite the critical role that assets play for utilities, many opportunities still abound for driving increased control, performance, and efficiency in asset management to levels that utilities **already** reach in customer engagement and network management.

Asset management approaches have evolved incrementally with different people, processes, and technologies accountable for various processes and each stage in its lifecycle. This disconnected approach results in a lack of visibility, siloed information, and missed value at every stage.

Countless teams across a utility make decisions about its projects and assets. In the planning process alone, corporate and load planning, project management, regulatory, legal, accounting, and procurement teams are involved.

Too often, the teams that span an asset's lifecycle operate in silos and rely on technology that isn't integrated. This lack of integration limits their visibility into synchronized, complete data, making real-time collaboration difficult. As a result, it becomes harder to make proactive, data-driven decisions that reduce costs and align with organizational strategy.

> **A misstep in managing a capital project can lead to cost overruns, project delays that affect service, missed regulatory deadlines, and even safety risks for workers and customers. For example, an Ohio gas utility was fined $400,000 over an unmarked gas line that caused a house fire when severed by an excavating company installing a water line.[1]**
>
> **Missteps in operating and maintaining assets can result in costly repairs, lower asset lifespans, an increased potential for failure, customer dissatisfaction, and even massive regulatory fines and lawsuits. After all three treatment pumps at a UK wastewater treatment facility failed because of a debris buildup, untreated sewage was discharged within half a mile of shore for two days, and the utility was fined GBP160,000.[2]**

Because these types of challenges persist in asset management, the International Organization for Standardization (ISO) produced ISO 55000, a series of international standards that outline a framework for organizations to effectively manage assets over the complete asset management lifecycle.

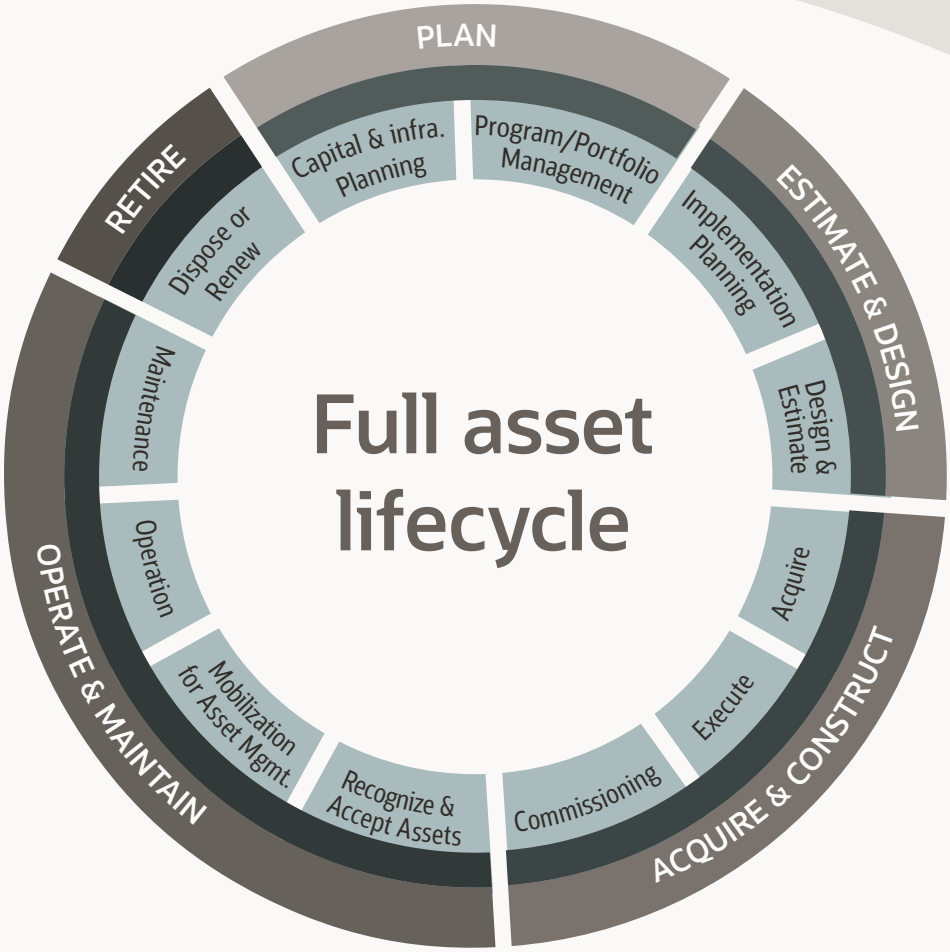
Oracle's asset management solutions span the entire project and asset lifecycle—from capital planning to operations and maintenance—in line with ISO 55000 recommendations. This comprehensive approach lets us deliver unique insights into optimizing lifecycle processes. In this ebook, we explore how utilities can develop and leverage their people, processes, technology, and data—regardless of their project and asset lifecycle management maturity.

Data is the common thread across the lifecycle

Knowing the cost of designing, constructing, operating, renovating, and maintaining assets. Determining their health. Getting lower TCO from them. Through it all, there's a clear, common thread: data. Data tells the asset's life story—its origin, how it was built, where it has traveled, what it has accomplished, and who has maintained it. That life story offers lessons in how to improve performance, life expectancy, and reliability across an entire project and asset portfolio.

Of course, asset data sources evolve over time. Performance metrics, weather data, and upstream or downstream data points that were once unavailable are increasingly valuable to utilities—especially when paired with advanced analytics tools.

Asset optimization depends on fast, accurate, and comprehensive access to relevant data across the organization. A single platform for collecting, managing, and sharing information at every stage of the project and asset lifecycle is essential. Without a unified, trusted source that provides governance while quickly making data accessible to the right systems and people, a utility's portfolio can't achieve its full potential.



What if you had a connected platform—designed and built for performance and access to every stage of the project and asset lifecycle—that's flexible enough to increase efficiency, minimize risks, and optimize asset health?

From...	To...
Siloed systems causing data lag and incomplete information	Timely, enterprisewide access to processes, communications, and reporting for supporting your operations
Manual data entry for multiple systems	Online, connected information and data-driven decision-making in real time
Critical data that's errant, missing, or hidden	Transparency and integration to unify data
Multiple process management models (depending on division or geography)	A uniform process management model applying best practices
Weak internal controls and vulnerability to fraud	Culture and infrastructure with strong controls, governance, and discipline
One IT plan for the setup of each new project	A plug-and-play best practice model based on the latest lessons learned
A big administrative burden for the upkeep of data and reporting and little time for analysis	More time for analysis and decision-making

Maturity continuum

What does full utility project and asset lifecycle management look like, and how mature is your current approach?

From ideation to retirement, every asset follows a cyclical path marked by distinct, connected lifecycle stages: plan, estimate and design, acquire and construct, operate and maintain, and retire, dispose, or renew.

Within each of these lifecycle stages, we've identified three ascending maturity levels achievable through technology.

Level 1: Best practices	Level 2: Advanced capabilities	Level 3: Next-generation project and asset performance
Basic steps that all utilities must take, and capabilities most utility technology providers offer, within each stage of the capital project or asset lifecycle. These steps include automating processes and creating digital records.	Leading utilities implement them, using tools and technology offered by only a few providers, to take your project and asset lifecycle management beyond a legacy approach. They include the ability to integrate processes and systems for unified data and more comprehensive insights.	Connected processes and systems and unified data to fuel predictive analytics and let artificial intelligence take utility asset lifecycle management to the next level of performance, reliability, and efficiency.

Plan—where a new asset begins

When planning for a new asset's increased capacity and capabilities, a consistent and data-driven evaluation process is needed. Is it more beneficial to expand, retrofit, or build a new asset? You must consider the risks, the projected return on investment, and the alignment with long-term organizational goals and regulatory mandates throughout every decision cycle. Effective capital planning and project planning are crucial for selecting projects that will deliver the greatest value for your investment and meet the needs of your customers. Further, a rigorous preplanning process will reduce the volume of project proposals and increase their quality, speed up the selection process, and increase the percentage of projects approved.

Level 1: Best practices	Level 2: Advanced capabilities	Level 3: Next-generation project and asset performance
• Consistent decision criteria • Data-driven decisions • Organizational goal alignment • Obligation to serve	• Unified data environment • Governance processes • Predictive, what-if scenarios • Reporting and dashboards	• Prescriptive recommendations • Digital twin incorporation • Multifactor optimization • AI/machine learning
Key benefits		
Consistent ability to easily track and measure alignment to enterprise goals across projects and assets	Increased budget and allocation accuracy, visibility, and optimization	• Process automation • Vast improvement in the reliability and affordability of service delivery
Key focus		
The focus is on process automation and standardization across the organization, supporting data-driven decisions, employing objective criteria, and aligning to organizational goals.	This level includes collaboration (a unified data environment), predictions (what-if scenarios), enforced governance (no spreadsheet manipulation), and visualizations (reporting).	This level includes prescriptive, real-time automation across processes and systems; decisions informed by data for asset health and risk; and real-time alerts—from sensors, the Internet of Things (IoT) devices, and other sources—based on the criteria you set. Multifactor optimization helps enterprises set and achieve asset goals that closely align with organizational objectives (for example, maximizing capacity and reducing transportation costs within allocated budgets).

Estimate and design—taking the guesswork out of guesswork

At the beginning of the estimate and design stage, conceptualization and feasibility studies bring more meat to the bones of the idea you've moved through the planning stage. Typically, by this point, you've narrowed your focus to two or three different approaches to be explored in more detail with the aid of detailed engineering studies. Understanding potential conflicts and constructability challenges at this stage reduces risk and overall asset costs.

Level 1: Best practices	Level 2: Advanced capabilities	Level 3: Next-generation project and asset performance
• Standard processes • Defined goals and scope • Documented schedule • Clear basis of estimate • Gated approval process • Change and risk management • Document control system	• Integrated data environment • Advanced work packaging • Contingency disposition reporting • Startup planning and constructability	• 4D and 5D project modeling • Autonomous small rovers, robotics, and drones, all integrated into the technology ecosystem • Proactive, AI-driven recommendations fueled by unified data from documents, drawings, and images
Key benefits		
Availability of past and current data and consistent processes for increased project definition and budget accuracy	Earlier, more inclusive planning, optimization, and delay prevention	Prescriptive, data-driven, proactive recommendations to optimize outcomes and prevent unfavorable cost and schedule outcomes (risk)
Key focus		
There's consistency in processes, improvement project to project, more accurate scope definition, and improved schedule and budget accuracy. Lessons learned aren't effectively leveraged to mitigate the risk of unfavorable outcomes (hung workflows, reviews, and so forth); traceability and auditability at the process and system levels inform decisions and actions.	Integration enters the picture. Stakeholders see the same thing at the same time across processes, systems, and projects. The data (via analytics) is more valuable. Advanced capabilities, including rules of credit-based progress measurement, advanced work packaging (AWP), and earned value management (EVM), are introduced. Risk and contingency are managed across the portfolio, with risk trigger dates becoming an automated stimulus for timely contingency reallocation. Clash detection and startup planning earlier in the project help lead to better field performance and on-time, on-budget delivery.	The level 2 predictive capabilities are elevated to allow prescriptive capabilities. Connecting cost, schedule, and model data (4D or 5D) unifies information, fueling AI. The partnership between people and technology allows AI to optimize efficiency and improve project outcomes and service levels.

Acquire and construct—from concept to concrete

Project design, by necessity, often proceeds iteratively, with financial commitments coming in tranches as the design progresses. To optimize the schedule, the estimate and design stage and the acquire and construct stage of any capital project, particularly a large one, will often overlap. And the more data you can access—and the better it is—the more optimal the decisions and actions will be.

Level 1: Best practices	Level 2: Advanced capabilities	Level 3: Next-generation project and asset performance
• Disciplined bidding • Safety metrics • Cost management • Material tracking • Progress tracking • Risk identification • Level 3 CPM scheduling	• Collaborative bidding • Portfolio-level management • Role-based data access • Auditable deliverable tracking • Deterministic risk management • Integrated cost and schedule management	• Sensors • Drones, autonomous devices • AI/machine learning • Augmented reality • Probabilistic risk management • Rules of credit-based progress measurement
Key benefits		
Visibility and control to help meet milestones and keep cost, schedule, and safety on track	Forward-looking alerts and information to take proactive action across projects	Expanded and unified data to fuel AI-driven predictive insights for timely and informed decisions and actions that drive the next generation of efficiency and service levels
Key focus		
You have process automation and solution-level reporting. It's difficult to track the impact of change in one process to the outcome of another, apply risks or learnings from project to project, or make high-level decisions based on connected data.	You're integrating processes and systems, looking across the portfolio of projects, enforcing governance and security at all appropriate levels, and learning from project to project. Integrated cost and schedule management allows real-time deliverable status and project progress tracking for gaining early alerts of potential future delays. Standardized systems support more complete risk identification and analysis, including likely estimate at completion and schedule performance for timely contingency release. Integrated capital planning and project management let you optimally reallocate that contingency based on consistently applied criteria.	You have complete technology utilization, including advanced data capture (IoT, drones, sensors, cameras, and so forth). Significantly higher reported progress accuracy and defensibility have been attributable to rules of credit-based progress measurement. Unified data improves AI capabilities, driving prescriptive guidance for better project outcomes and preventing delays, overruns, and suboptimal decisions.

Operate and maintain—maximize asset value

This is where the asset realizes its value. Once the asset demonstrates it's operating as designed, it's turned over to utility operations, along with its startup and calibration records, original equipment manufacturer (OEM) manuals, spare parts list, maintenance requirements, and more.

Level 1: Best practices	Level 2: Advanced capabilities	Level 3: Next-generation project and asset performance
• Access to project data, including design, OEM, and warranty data • Exact physical location of the asset • Record of asset-level investment history • Comprehension of asset health, allowing for risk-based investments • Defined preventive and corrective maintenance plans • Ongoing improvement of asset management strategies	• Central source of truth • Project-asset tool integration • What-if scenario planning • Weighted investment scoring • Condition-based maintenance • Performance management • Real-time data visualization and asset insights	• Autonomous decision support • Digital twin and IoT integration • AI-powered diagnostics • Integrated operational risk management • Sustainability-aware operations
Key benefits		
A strong foundation for asset strategy and data management	The ability to predict and prevent problems, resulting in an extended asset life and reduced costs for operation and maintenance	Time and resources saved by embracing autonomous decision support tools backed by AI
Key focus		
Asset operations leaders can't maximize asset value without deploying at least the standard benchmarks for modern utility asset management. Accurate and understandable asset data lets utilities base spending on asset condition and the potential impact of failure. These best practices let utilities deploy a proactive—rather than a reactive—strategy for asset management.	A centralized, single source of truth provides asset location, position, status, criticality, and more. Utilities can analyze scenarios by changing resource, financial, or operational perspectives, which results in a more effective decision-making process for operating, warranting, and replacing assets. Additionally, condition-based maintenance at this stage lets utilities reframe the maintenance strategy to more accurately reflect the asset's current and projected health.	Autonomous decision support tools backed by AI and machine learning will change the way utilities maintain assets. Using these tools, as the system collects and analyzes asset health data, it will flag emerging issues, pivot to condition-based preventive maintenance, and initiate the relevant work responses.

Retire, dispose, or renew—completing the circle

The decision to retire, dispose of, or renew an asset isn't the end of a linear path for an organization. Asset retirement decisions feed back into additional planning, with new project execution and cost accounting to be undertaken. On a small scale, a distribution transformer or water meter can't simply be disposed of—it must also be replaced. That's true on a large scale, too. As a utility retires a coal-fired generation plant, for example, it must replace that generation capability and voltage support in an alternative way. New projects have their genesis in this final stage of an asset's lifecycle, and their cost implications must be visible and accounted for properly. Incorporating an asset investment planning process helps utilities develop effective strategies for optimal asset replacement. This helps with the timing and prioritization of investments, the balancing of risk exposure, and the decision-making for short- and long-term asset investment strategies.

Level 1: Best practices	Level 2: Advanced capabilities	Level 3: Next-generation project and asset performance
• Beyond date-based actions with asset data • Analytics-driven decisions • Predictive analytics drive a preventive, right-work-at-the-right-time approach	• Full-life asset health data • Indirect asset health inference	• AI/machine learning decision support • Network model data for weather and environmental patterns • Network equipment usage data • Autonomous decision-making
Key benefits		
Asset condition and risk tie directly into the asset maintenance strategy	Easy identification of the best approach to a repair/replace or dispose/renew decision	The best approach to repair/replace decisions identified by using AI and machine learning
Key focus		
Utilities should be incorporating more than just a date-based approach when deciding to dispose of or renew an asset. Leveraging asset data and predictive analytics lets utilities deploy a preventive, right-work-at-the-right-time approach.	Retirement and replacement decisions involve more than just running an asset to failure. An asset's history should guide a repair/replace or dispose/renew decision. For example, monitoring an asset's energy consumption—and identifying a steady increase—can reveal rising operating expenses and inform a more effective repair or replace decision.	Embedded decision support tools, including AI-based insights, will play a big role. Based on an asset's health score, history, and planned replacement schedules, an asset management system can identify the optimal repair or replace decision and present tailored suggestions and scenarios to support decision-making.

Are you ready to move beyond best practices?

Here are four questions to ask when evaluating your approach to asset lifecycle management:

Question 1

Is our ERP system by itself unable to cope with the growing complexity, data, and processes involved in managing the entire lifecycle of our utility assets?

Question 2

Does my utility's approach to asset lifecycle management cover every stage—from initial planning to retirement—with best-of-breed, integrated technology? Or are we piecing together disparate systems that don't easily speak to one another?

Question 3

Do my technology partners possess enterprise-level expertise in ERP and industry-specific expertise in construction, engineering, and utility operations—along with the cloud infrastructure, middleware, and analytics needed to break down legacy silos in utility asset lifecycle management?

Question 4

Does my utility's approach to asset lifecycle management—and that of our technology partners—provide the foundation needed for predictive analytics and AI, or are we at risk of being left behind?

Adopt an enterprisewide approach

End to end, Oracle is the only technology partner that can help you answer all four questions with a resounding "yes!"

Exceeding user expectations starts with empowering utilities with reliable tools to operate efficiently, support their teams, and achieve their goals.

Adopting an integrated, enterprisewide approach to asset lifecycle management, with asset data flowing across every lifecycle stage, can eliminate legacy challenges.

We understand that integrated systems, connected processes, and unified data are crucial for project and asset success and for realizing the full benefits of predictive analytics, including AI-driven insights. Our security-first approach and decades of experience securing data and applications help ensure that security is integrated from the ground up—not bolted on as an afterthought.

With our extensive experience in enterprise resource planning, construction and engineering, and utility operations—and a platform covering the entire project and asset lifecycle—we deliver best-in-class solutions to address your challenges.

Want to know more?

- Capital planning
- Payment management
- Project and portfolio controls and management
- Enterprise resource planning (ERP)
- Field service management
- Work and asset management

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1. "Ohio Gas Company Fined $400K for Gas Line Rupture that Caused Home Fire," Insurance Journal, March 5, 2019.
2. "UK utility Southern Water fined for major sewage pollution," WaterWorld, September 23, 2015.

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