

October 4, 2010

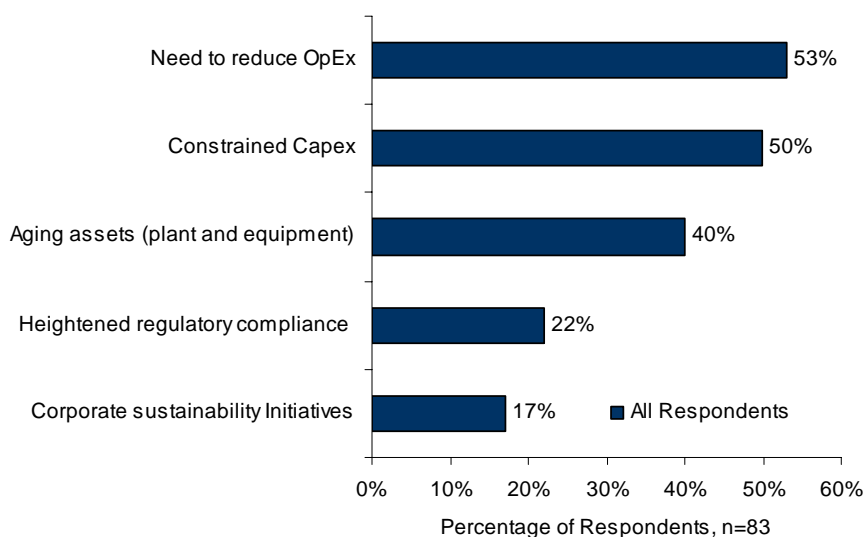
Project management practices for asset maintenance: A Guide for Power, Energy & Process Industries

One of the critical challenges faced by companies in the power, energy & process industries, including oil & gas, utilities, petrochemicals and metals & mining, is to effectively manage all assets in a predictive manner. These assets are worth billions of dollars and companies in this sector are struggling to manage effectively in the midst of tight capital and operational budgets. Whether bringing new assets on line or upgrading and maintaining existing assets, projects play a critical role. Managing these projects to completion on time and within budget can have a tremendous impact on asset utilization and reliability throughout the lifecycle of the asset, and help to sustain profitability even through the most troubled economy.

Managing Aging Assets under Reduced Budgets

While there is a prevalent feeling in the marketplace that the economic recovery is underway (see sidebar on next page), the majority of companies are still impacted by the effects of the downturn. The top pressure driving these companies to optimize asset management projects is the need to reduce operational expenditures (OPEX) and constrain capital expenditures (CAPEX).

Figure 1: "Top Two" Business Drivers



Source: Aberdeen Group, October 2010

Sector Insight

Aberdeen's Sector Insights provide strategic perspective and analysis of primary research results by industry, market segment, or geography

Sector Definition

Survey respondents represented 83 companies from power, energy & process industries including the following:

- ✓ Oil & Gas
- ✓ Utilities
- ✓ Chemical Processing
- ✓ Metals and Metal Processing
- ✓ Mining & Minerals
- ✓ Pulp & Paper
- ✓ Other Asset Intensive Industries

The third driver, aging assets (40%), highlights an important trend in the industry. The need to defer or eliminate capital spending over the past two years has prevented many companies from making significant investments in new assets and this has exacerbated the pressure of aging infrastructures and assets. Capital budget constraints have compelled executives to get more value from their existing asset base without any major investments, often extending the life and the age of the plant, facility or equipment. .

Increased regulations and general concerns about employee, plant and environmental safety bring further complexities to asset intensive industries. The risk of non-compliance, possibly resulting in fines, or even worse, environmental disasters, and in some cases the loss of life, is a very real and ever-present threat. A growing awareness of the need for sustainability - of both the environment and the business - is an added concern. And maintenance plays a pivotal role.

The projects initiated to respond to these issues in a proactive manner are critical in addressing these market pressures. Let us look into how the Leaders in asset intensive industries deliver projects on time and under budget, while reducing downtime for both routine and complex maintenance.

Maturity Framework

Aberdeen used four key performance criteria to distinguish the Leaders and Followers in managing projects in asset intensive organizations. The primary goal is to deliver projects on-time and on-budget. Therefore these two factors play heavily in Aberdeen's determination of top performance. In addition, in order to understand the effectiveness of the maintenance organization, we also factor in scheduled downtime for complex and routine (daily) work. By combining these two perspectives, we identify the Leaders in managing projects to deliver asset reliability.

Table 1: Top Performers in Power, Energy & Process Industries

Definition of Maturity Class	Mean Class Performance
Leaders: Top 30% of aggregate performance scorers	<ul style="list-style-type: none"> ▪ 87% of projects delivered within budget ▪ 79% of projects delivered on time or early ▪ 13% reduction in scheduled downtime for complex work ▪ 18% reduction in scheduled downtime for routine work
Followers: Remaining 70% of aggregate performance scorers	<ul style="list-style-type: none"> ▪ 62% of projects delivered within budget ▪ 56% of projects delivered on time or early ▪ 6% increase in scheduled downtime for complex work ▪ 2% increase in scheduled downtime for routine work

Source: Aberdeen Group, October 2010

Are we in recovery?

The latest quarterly Aberdeen Business Review (Q3 2010) collected survey responses from over 1650 companies, on business goals, strategies and challenges, as well as insights into the impact of the recent economic downturn. Sixty five percent (65%) of survey participants indicated that they believed the economic recovery had begun but only 7% of all respondents feel the recovery will be either steady or rapid. That leaves 82% believing the speed of recovery will range from "slow but steady" to "taking decades to recover." The remaining 11% feel this is the new economy.

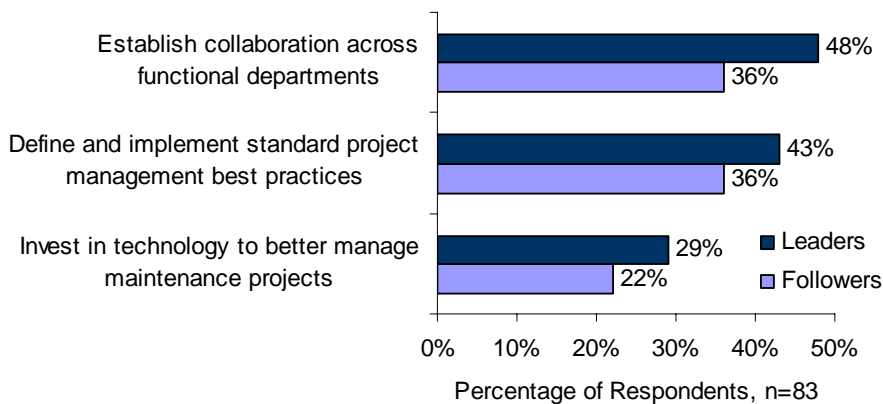
The results of the study revealed that the Leaders are able to deliver 23% more projects on time and 25% more projects within budget. In addition, the performance difference in scheduled downtime highlights a critical differentiator among both these categories. Leaders have been able to reduce schedule downtime for daily and complex work by 17% and 12% respectively year over year. In this environment, a 1% decrease in total downtime can result in millions of additional revenue and reduce operating expenses. In comparison, the Followers have **increased** scheduled downtime for both daily and complex work, 1% and 5% respectively.

What do these Leaders do differently in order to achieve such differentiated performance?

Top Strategies

First we look at the overall strategic actions. The results of the research found three strategies differentiate the top performers.

Figure 2: "Top Two" Strategic Actions



Source: Aberdeen Group, October 2010

Collaboration and standardization are closely aligned and often found to work in tandem in leading companies. Asset management is not the job of a single group or department in an organization. Different functional groups such as project planning, engineering, maintenance, safety, production, financial auditing and reporting must be involved in order to deliver projects on time and on budget. This requires a collaborative effort across these different functions and departments and is even more critical in projects of extended duration and complexity, which involve outside service providers in the lifecycle of the project

The definition and implementation of standard project management best practices enable this collaboration. By defining, documenting, and implementing standardized best practices (i.e. those practices that have produced successful results), variability, risk, and unpredictability in schedules and cost are either reduced or eliminated. This becomes increasingly important for longer, complex projects which may potentially

involve dynamically changing or remote project teams. It also fosters better communication and reduces delays in bringing new project team members (possibly from different locations or departments) on board mid-project.

Leaders are also more likely to combine standardized best practices with enterprise level technology to effectively address these projects and market pressures. When dealing with the management of thousands of assets across a wide geography or a small number of very large assets, investment in technology to equip employees with visibility into critical asset and project related data can be critical in achieving top performance. Providing this visibility to appropriate employees from the plant floor level to the executive suite will enable timely and intelligent decision making.

We find the more standardized the processes and the more technology is applied at the enterprise level, the better the performance in keeping projects on time and under budget. The Leaders are able to support collaboration across these key groups and enable the seamless flow of information to ensure that information gets communicated in a timely and effective fashion.

Challenges in Managing Asset Related Projects

These industries face numerous challenges in responding to these pressures and executing strategies. Survey respondents from these industries were asked to rate the following challenges on a scale of 1 to 5 where 5 was "very challenging" and 1 was "not a significant challenge."

Table 2: Relative Difficulty of Challenges Faced

Challenge Faced	All
Project plans and resource scheduling are not aligned	3.6
Large volume of interdependent activities, simultaneous operations and uncertainties	3.5
Inability to understand portfolio trade-offs/visualize 'what-if' scenarios	3.5
Lack of standards/formal processes make it difficult for planners & managers to move from one project to the next	3.5
Inefficient and/or manual project management processes	3.4
Lack of available skilled resources needed for projects	3.4
Lack of real-time visibility into project costs and schedules	3.3
Complexity of planning and delivery schedules	3.3
Difficulty in sharing data across distributed (remote) project teams	3.3
Difficulty in sharing data across multiple external parties (joint ventures, subcontractors)	3.3
Multiple versions of data/No single source of the truth	3.2
Increased variability of costs (materials, equipment, labor) throughout the project	3.2
Multiple international locations and compliance with government/regulatory directives	2.6

Source: Aberdeen Group, October 2010

Table 2 shows us two things:

- Leaders are somewhat less challenged, but share similar perspectives in terms of relative difficulty
- No single challenge appears to be a "show-stopper." The sheer number of challenges is the problem.

An investigation of the business capabilities of Leaders versus Followers helps explain the performance differences between the two groups but also shows that even the Leaders could benefit from improvement.

Business Capabilities

While establishing a strategy for collaboration, project management standards and technology implementation are critical steps, achieving the results shown in Table 1 is heavily dependent on the business capabilities achieved by asset intensive companies in the execution of these strategies (Table 3).

Table 3: Business Capabilities

	Leaders	Followers
Process	Project Management best practices are defined and documented	
	35%	20%
	Standardized risk management processes established to reduce project risk	
Organization	35%	16%
	Established cross-functional team to foster collaboration	
	40%	35%
Knowledge Management	Objectives of corporate performance and maintenance management are aligned	
	37%	33%
	Real time visibility into all project milestone and schedule status	
	30%	20%
	All project information is captured in a central repository	
Performance	40%	31%
	One true master schedule can be maintained even when resources are distributed	
	30%	22%
	Global Key Performance indicators can be managed from any site	
	20%	10%

Source: Aberdeen Group, October 2010

Process

One of the dominant strategic actions adopted by the Leaders is to define and implement standard project management best practices. Indeed we also saw that the **lack** of standards and formal processes make it difficult for planners and managers to move from one project to the next. While Leaders are 75% more likely to define and document best practices, those that do are still in the minority (35%), making this a priority for all.

Another key capability that differentiates the Leaders is risk management. Risk management deals with four critical stages. First it is important to develop processes to assess the top project risks. Once these risks are documented, it is then necessary to quantify risks based on the probability and impact of these risks on the project's goals. The third area of focus should be to prioritize these risks to the appropriate decision makers. The final stage is to have contingency and mitigation plans in place if an adverse event occurs. These four capabilities provide companies with a predictive risk management plan to reduce the impact of an adverse event. Leaders are more than two times as likely as Followers to have a standardized risk management process in place to reduce overall project risks.

Organization

Completing projects on time and within budget requires effective communication and collaboration across functional groups. Ensuring that production and maintenance teams are working hand in hand to optimize asset availability and utilization can be a key challenge. Leaders again are more likely to establish cross functional teams across the enterprise to create a culture of collaboration. In these industries, it is also crucial to enable collaboration across the extended network of contractors and suppliers that are a key to the project's success.

Another key organizational capability involves the alignment of maintenance goals with corporate performance goals. Since the maintenance department is usually viewed as a cost center in an organization, it is the responsibility of this team to make sure that the objectives of their own group are tightly aligned with corporate objectives related to cost, profitability and revenue. One of the ways to do this is to define common metrics across both. Helping corporate executives understand the financial, environmental, and brand impact of the various projects undertaken by the maintenance organization can go a long way in bringing about alignment and proving the value of maintenance in meeting strategic corporate goals.

Knowledge Management

Making effective project management decisions requires organizations to equip their employees with the right data at the right time in the right form. The Leaders differentiate themselves by more effectively leveraging the data they collect and turning the data into actionable intelligence.

The Leaders differentiate themselves by providing 50% better visibility in real-time into the status of milestones delivery. Yet still the majority of even

"We have established a central corporate "Operations Excellence" program which includes Integrated Planning and Capital Project Management Systems. Improvements have been documented through these programs, and have been quantified by increased production and decreased downtime due mainly to collaborative communications across functional groups. Still have much room for improvement. Challenges are getting all the stakeholders around the same table to see the overall picture. Once management commitment is established to do this, improvements happen."

~ Staff, Asset Management
Department
Large Oil & Gas Company

our Leaders (70%) lack this level of transparency. Providing this information to employees in a real-time fashion can be critical in reducing unscheduled delays and improving project performance. Where this improved visibility is provided, decision-makers are better equipped to proactively manage possible exceptions, thereby containing schedule and budget overruns. This added visibility also provides greater insight into the causes of poor performance. By being better informed and more proactive the negative impact of these events can be minimized.

Another key capability is the ability to access all this information easily and in a timely fashion. If your organization stores project information in different siloed based systems, getting to this information can be difficult and time consuming. Adding to the complexity is the quality and consistency of data collected in different systems. The leaders are addressing this challenge by establishing two critical capabilities. First, Leaders are more likely than Followers to store project information in a centralized database. This better enables these Leaders to establish and maintain one true master schedule even when resources are distributed. Establishing such a capability will ensure that information such as project schedules, milestones, resources, and performance are measured and collected consistently across the organization.

Both these capabilities will enable employees, including project managers, financial executives and operational leaders, to access the right information in the right form at the right time to make intelligent decisions. Such a capability will also enable smooth collaboration across functional teams, a key strategy established by the Leaders.

Performance Management

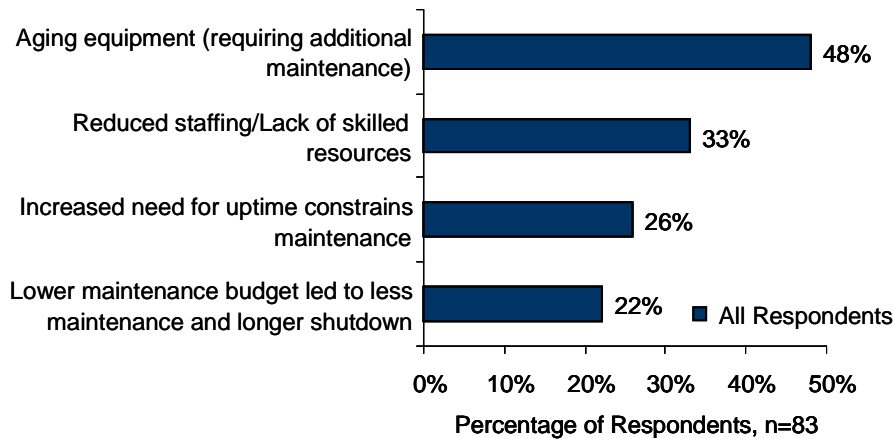
In these industries, the goal of the maintenance project is to improve asset reliability and performance, and this correlates to less non-productive down time. Project performance is a key factor in delivering on those goals. As a result of better project performance, Leaders have been able to reduce the duration of shutdown of equipment for complex and routine work.

On the other hand, Followers have experienced a 6% increase in the duration of shutdown during complex maintenance projects. Budgetary constraints appear to be one of the root causes for this phenomenon (Figure 3). Limited budgets prevent companies from investing in the upgrade or replacement of equipment and aging equipment is harder to maintain.

"Asset management is part of the overall portfolio of work that we do. Additionally, there is clear visibility to the total spend and this gives us an opportunity to evaluate new projects while mindful of current asset work."

~ Director, Asset Management
Oil & Gas Company

Figure 3: Reasons for Increased Duration of Shutdown*



* Question was asked ONLY of those who indicated duration had increased; Respondents selected the "top two" reasons

Source: Aberdeen Group, October 2010

Reductions in staff can be the result of cost cutting efforts or retirement, and the lack of skilled resources is often a corollary. Budgetary constraints may lead to difficulty in attracting and retaining talent. Regardless of whether skills and staffing are a problem or not, budgetary constraints or the need for increased throughput may simply lead to less maintenance, resulting in longer duration projects when maintenance is performed.

In fact findings show that in aggregate maintenance budgets were reduced over the past year by an average of 2% for both Leaders and Followers. However, while Leaders were able to achieve a corresponding reduction in maintenance costs of 4%, Followers' maintenance costs increased by 5%. Therefore it is not surprising that Leaders' average performance against budget exceeded that of Followers by 18%.

While Leaders are twice as likely to be able to manage global Key Performance Indicators (KPIs) from any location, this statistic alone is deceiving because only 20% of these top performers have this ability, leaving the vast majority of all companies surveyed unable to monitor and manage metrics universally. This brings us to the final chapter in analyzing the performance of these Leaders and Followers. Without the right tools to gain visibility, support collaboration and measure performance, even the Leaders will struggle.

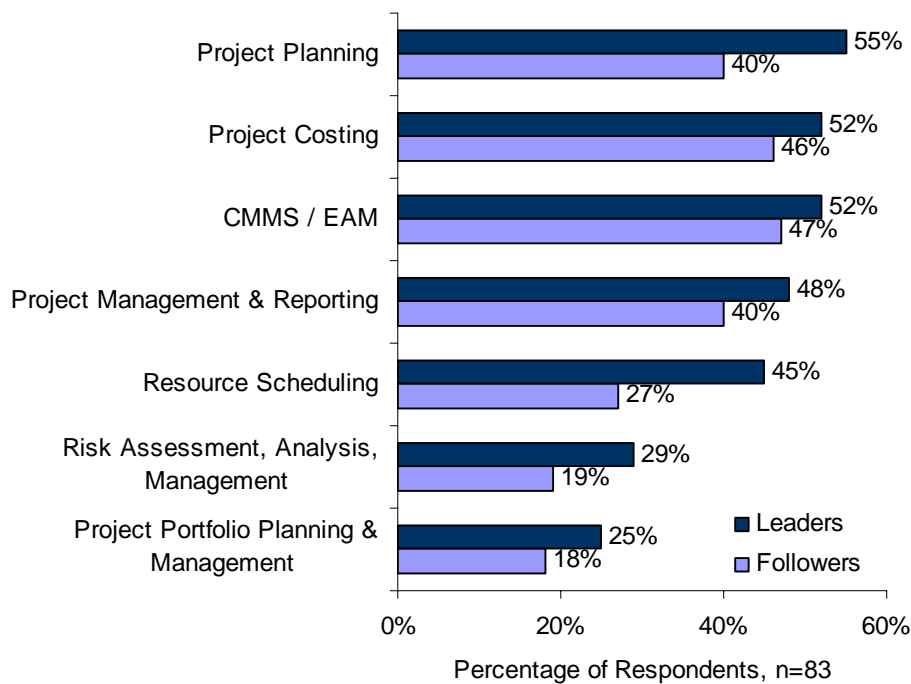
Technology

Investing in technology was shown as one of the strategies differentiating the Leaders in these industries. The technologies shown in Figure 5 highlight the key areas of investment for the Leaders. Each of these applications helps to automate, streamline and support the business capabilities shown in Table 3.

Performance against maintenance budget

- ✓ Leaders: 94%
- ✓ Followers: 80%

Figure 4: Technology Enablers



CMMS: Computerized Maintenance Management System

EAM: Enterprise Asset Management

Source: Aberdeen Group, October 2010

The adoption rates noted in Figure 4 reflect the use of enterprise level applications both for managing assets directly, as well as for managing the projects which are instrumental in maintaining their reliability and performance. While adoption rates do not indicate the implementation of enterprise level applications are pervasive, even among the Leaders, in each category, Leaders are significantly more likely to be using enterprise applications than Followers, who rely primarily on desktop tools, spreadsheets, and manual processes.

Applications which assist in project planning, costing, scheduling, management and reporting are most commonly used by Leaders, with portfolio management bringing up the rear. This is actually not surprising as the level of need for applications that assist in prioritizing, selecting and then managing a portfolio of projects may vary depending on many factors, including company size and the complexity of the operation. Yet every company in asset intensive industries must deal with projects at some level.

Investing in Computerized Maintenance Management System (CMMS) / Enterprise Asset Management (EAM) solution is also found to be a differentiator for the Leaders. EAM solutions provide a relatively core set of functionality that closely aligns to how Leaders approach technology adoption around asset management. EAM solutions help companies manage critical information related to work orders, materials, spare parts, employee data, procurement, and maintenance schedules and provide employees with a single platform to access this information on a timely basis to make

"We are incorporating the use of CMMS / EAM with project planning for capital and O&M work to better capture costs back to assets. This will also help us to create new assets with detailed specification information and preventive/predictive maintenance tasks."

~ Reliability Engineer
Utilities Company

intelligent decisions. Adoption of EAM is important to increase visibility into complete asset lifecycle to improve decision making.

Leaders have invested less in risk management technologies, although they still lead the Followers in adoption. These applications are valuable in sifting through large volumes of data and identifying the potential financial and operational impact of identified risks. Where the risk involves not only non-compliance to regulatory requirements, but also hazardous implications that range from loss of reputation and brand equity to lost business and even to loss of life, risk management tools can help companies to prioritize work based on both the impact of the projects on organization financial goals as well as the potential dangers in not completing them or performing poorly.

Required Actions

We are currently in an uncertain economic period and even though there are signs of recovery, companies are still very cautious about their investments. The maintenance department has seen a direct impact by having their capital and operational budgets slashed. The key to profitability for power, energy and process organizations is simple: delivering projects and milestones on time and on budget. The adoption of all the capabilities discussed in the report is not very high. This presents an opportunity for Followers to quickly adopt some of the recommendations highlighted below to achieve competitive advantage. Some of the companies in the Leaders category also need to understand their shortcomings based on the analysis presented in the report and invest in appropriate business capabilities and technologies to fill in the gap. These organizations should look at the following recommendations to improve performance:

- **Establish collaboration across functional teams both within the enterprise and outside the enterprise, especially operations, and maintenance, engineering and project management teams:** Collaboration needs to be a strategy that is established from the top level. Managing projects requires a variety of teams working together on a common goal. Executives in the asset intensive organizations should establish policies to ensure that functional teams work closely together and exchange information in a seamless fashion.
- **Align operational performance with corporate performance:** To understand the impact of asset strategies on organizations financial goals it is critical to create business processes that align the goals of operational and corporate groups. This can be done by providing executives the visibility into the key operational metrics and helping them understand the financial impact of the projects undertaken by the maintenance organization.
- **Invest in project management solutions to provide real time visibility into project data:** With so many inter-connected moving parts, it is very difficult to effectively manage projects without the necessary tools to schedule resources, manage and

report against project delivery and control costs. Automating project planning, costing and reporting processes will enable employees to have real time visibility into these important stages of the project and will enable them to work collaboratively with other functional groups to deliver project on time and on budget.

- **Establish a risk management strategy to provide predictive insights:** Implement an enterprise risk framework to manage risk across the enterprise. This will help asset intensive organizations to have a structured process of identifying, quantifying and prioritizing risk and have procedures in place to mitigate the risks that have the most impact on the organizations success.
- **Invest in EAM solutions to improve maintenance processes and performance:** Optimized decision-making can only be achieved by providing critical asset data as actionable intelligence to key decision-makers, where actionable intelligence is defined as relevant and timely data presented in the proper context. Investing in an EAM solution will provide enhanced visibility and planning capabilities to maintenance and operations employees, and will allow them to more quickly move from reactive to predictive based maintenance processes. This will be a key in reducing scheduled downtime and costs.

For more information on this or other research topics, please visit www.aberdeen.com.

Related Research	
<i>Delivering Project Profitability On Time and Under Budget</i> ; January 2010 <i>Managing Risks in Asset Intensive Industries</i> ; March 2009	<i>Asset Performance Management: Aligning the goals of CFO & Maintenance Managers</i> ; November 2009 <i>Product Portfolio Management Gets its Due</i> ; April 2008
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