



WHITE PAPER

Improve Deployment of Large Capital Projects with a Purpose-Built Solution

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IN THIS WHITE PAPER

This white paper looks at the approaches that oil and gas companies are taking to improve the management and implementation of large capital project management (LCPM) initiatives. Findings are based on a survey of 100 oil and gas professionals across all sectors and geographies to evaluate the approaches organizations are taking and the areas of greatest opportunity. Of particular interest is the value of having a purpose-built content management system at the core of an LCPM initiative to manage critical documents and data of all types, integrate with other requisite systems, and establish links for communications. What is especially important about this dedicated approach is that it provides a company with a platform to rapidly deploy an LCPM initiative to reduce costs while limiting the risk of technology failure.

SITUATION OVERVIEW

Operational excellence is more important than ever today. Large projects like pipelines, refineries, and offshore platforms are the most prominent and tend to be very data intensive and complex, with significant documents and information to be shared and managed. Large capital projects require a scalable solution to provide immediate communications and extended collaboration between large teams of people, including partners, clients, and suppliers. These megaprojects are deployed best when a purpose-built LCPM solution is leveraged to efficiently and effectively organize and manage data and documents of all types and also coordinate numerous workflows and systems to ensure projects are delivered on time and on budget, ultimately achieving high performance and reduced costs.

Large Capital Projects Needed to Meet Growing Energy Demand

Large capital project spending in the oil and gas industry will continue to increase in the long run. According to the 2014 *World Energy Investment Outlook*, the International Energy Agency (IEA) estimates cumulative investments in the global oil and gas industry to be approximately \$22.4 trillion for 2014-2035, which equates to a little over \$1 trillion a year of capital investment. Investments are currently broken down to about 77% upstream, 13% midstream, and 10% downstream over the next 21 years (2014-2035). The IEA estimates \$48 trillion in investment will be needed by 2035 to meet world demand for energy, a 25% increase per year from what is currently invested.

Large Capital Projects Are Risky

A recent E&Y report on 365 oil and gas companies' capital projects, *SpotLight on Oil and Gas Megaprojects*, revealed that 73% of oil and gas companies' large capital projects fell behind schedule, 64% came in over budget, and an average of 59% exceeded the original budget plan. According to Axel Preiss, E&Y's Global Oil and Gas Advisory Leader, "While the report looks at current industry performance, longer-term industry outlooks suggest that project delivery success is actually decreasing, especially in certain segments of the industry, such as deepwater, where complexity and risk are considerably higher. Poor execution can potentially result in the project being economically uncompetitive and negatively impacting an organization's overall financial results."

Impact of the Drop in Oil Prices

Lower oil prices will have varying effects across the oil and gas sector. The decline in oil prices may be a headwind for some crude oil and gas companies, but other companies, such as natural gas pipeline companies, will be largely unaffected. Gathering and processing pipeline companies could see some pressure as this group takes on more price risk because of the exposure of some contracts. Refined products pipeline companies may benefit from lower prices as demands for liquid products will increase if prices remain low for oil. Downstream companies will probably profit most from lower oil prices. Refineries benefit as people tend to travel more given lower fuel prices. As for investment in large capital projects, pipeline and refining projects are expected to remain unaffected, while lower oil prices slow the growth in large capital projects in upstream, but there will likely continue to be overall growth.

In particular, during times of lower oil prices and limited free cash flow for capital investment, it is important for oil and gas companies to take steps to better manage large capital projects on time and on budget. Improved capital project management will realize greater efficiencies and reduce the risk of overrun, resulting in reduced costs and positively impacting the bottom line.

Changing Role of IT

At the same time that large capital projects are growing in cost and complexity, there is a revolution occurring in information technology (IT). 3rd Platform technologies – cloud, mobility, Big Data and analytics, and social business – are coming together to become the innovative platform of the future for new application development, improved performance, and extended functionality provided by an amalgam of integrated technologies and real-time information.

Oil and gas companies are also looking to these innovative technologies and approaches to become more automated, agile, and productive while reducing costs. A number of companies are moving to develop new applications leveraging cloud technologies (see Figure 1). According to IDC's *Vertical IT and Communications Survey* conducted in summer 2014, 10% of oil and gas companies now have Big Data and analytics in production either in business units or enterprisewide. What's more, 38.4% of oil and gas companies are considering, piloting, or implementing Big Data and analytics. Over 20% of oil and gas companies have mobile device or applications initiatives in progress. The complex ecosystem of players in large capital projects – engineers, designers, contractors, oilfield services companies, owners, and joint venture partners – makes these projects ripe for the introduction of 3rd Platform technologies where documents can be shared in a secure cloud and accessed via mobile devices as needed.

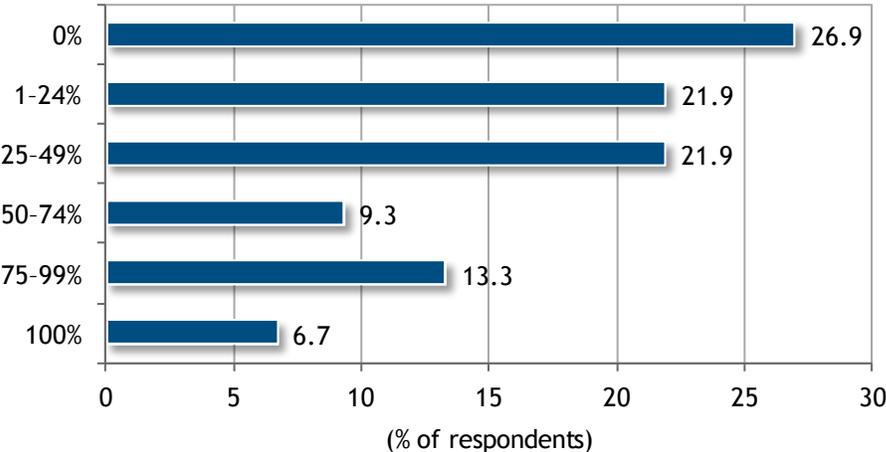
A successful large capital management project is executed ahead of time and at a lower cost than planned. To achieve this goal, oil and gas companies must focus on improving communications and productivity of all relevant resources combined. This implies that planning and execution must be aligned with technology, processes, and people, and an easy-to-use, integrated solution is required to efficiently manage the project. The good news is that 3rd Platform technologies can bring companies closer to these objectives.

It is important to select software vendors that realize the potential benefits of implementing large capital projects in the cloud and the importance of 3rd Platform technologies. The cloud promises many potential benefits, such as faster deployment, scalability, disaster recovery, cost avoidance and savings, and universal access. This is important because the long-term model for all oil and gas companies should be to enable digital transformation of the IT organization into a 3rd Platform IT organization, extending across the business for agility and resilience.

FIGURE 1

Adoption of Cloud in the Oil and Gas Industry

Q. Out of the new applications and infrastructure projects you plan to launch in 2014, what percentage will be via the cloud?



Base = respondents whose knowledge covers IT
 Notes:
 This survey is managed by IDC's Quantitative Research Group.
 Multiple responses were allowed.
 Data is weighted by employment by industry and business size.
 Source: IDC's *Vertical IT and Communications Survey*, May 2014

FINDINGS

IDC Energy Insights conducted a global survey of 100 oil and gas professionals across upstream, midstream, and downstream, representing major oil companies, national oil companies, and independents, to evaluate the approaches organizations are taking to improve the management and implementation of LCPM initiatives and the areas of greatest opportunity. Findings are presented in the sections that follow.

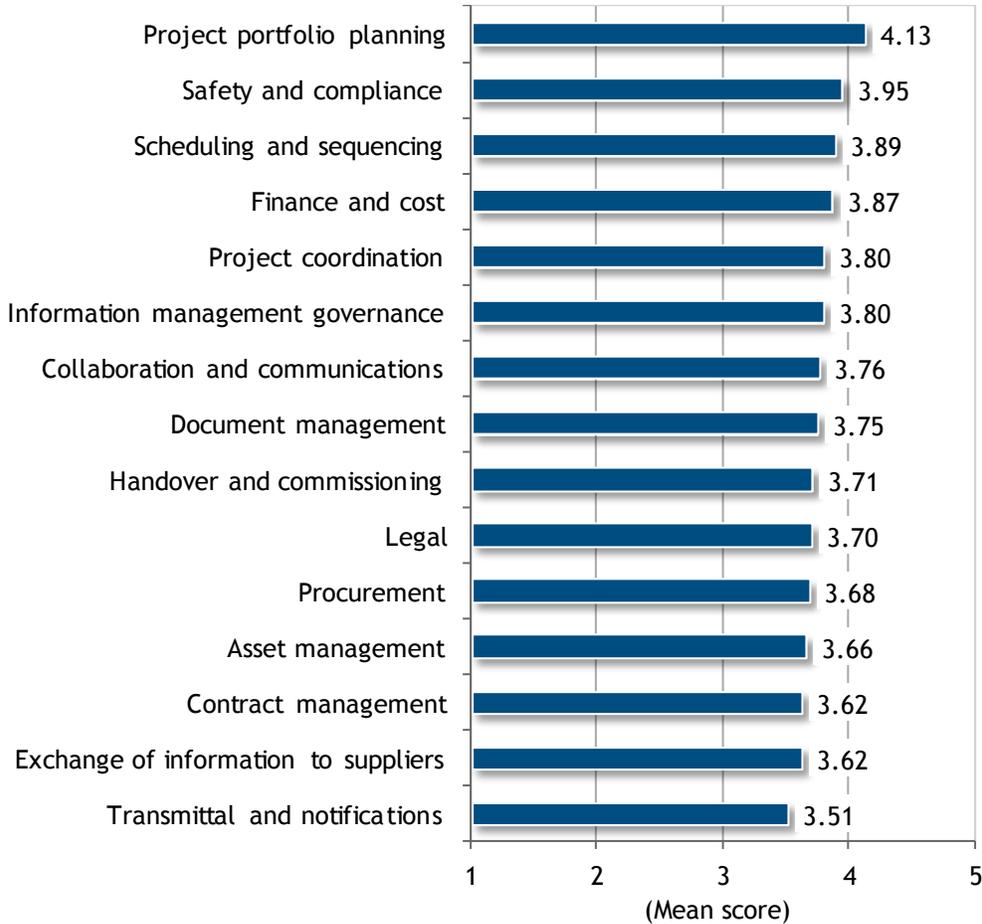
Planning Is Critical to Successful Large Capital Projects

Project portfolio planning is the top function where IT can make a difference in capital project management, according to the LCPM survey, and is reported as the most critical aspect of managing a successful LCPM initiative (see Figure 2). This implies that IT can help by executing the plan in a tightly integrated information systems environment consisting of purpose-built content management, easy-to-use workflows, communications, collaboration, and other complementary systems designed to successfully reduce the risk of project overruns. Oil and gas companies need to integrate planning with execution more tightly to ensure reliability to limit downtime and realize greater production. A good LCPM solution will offer insight into work processes to visualize the status of that process in the queue. Figure 2 also makes obvious the critical need for safety and compliance, scheduling and sequencing, and other relevant functionality for consideration when architecting a best-in-class LCPM solution.

FIGURE 2

Critical Elements to Manage Large Capital Projects

Q. How critical do you perceive each of the following to managing large capital projects?



Base = all respondents

Notes:

This survey is managed by IDC's Quantitative Research Group.

Data is not weighted.

The responses were measured on a scale of 1-5, where 1 = "low" and 5 = "extremely critical."

Source: IDC Energy Insights' *LCPM Study*, October 2014

Successful Planning and Execution Requires a Centralized View

As depicted in Figure 3, oil and gas companies report that visibility and centralization are the two most important elements of a comprehensive and fully integrated approach to planning and execution of an LCPM initiative. These combined capabilities provide an oil and gas company with a common focal point and a central exchange for project information and quality control and much more. This is best achieved by central visibility to all processes in the queue and their status to understand the progress and performance achieved. Dashboards can also be provided to analyze problematic areas.

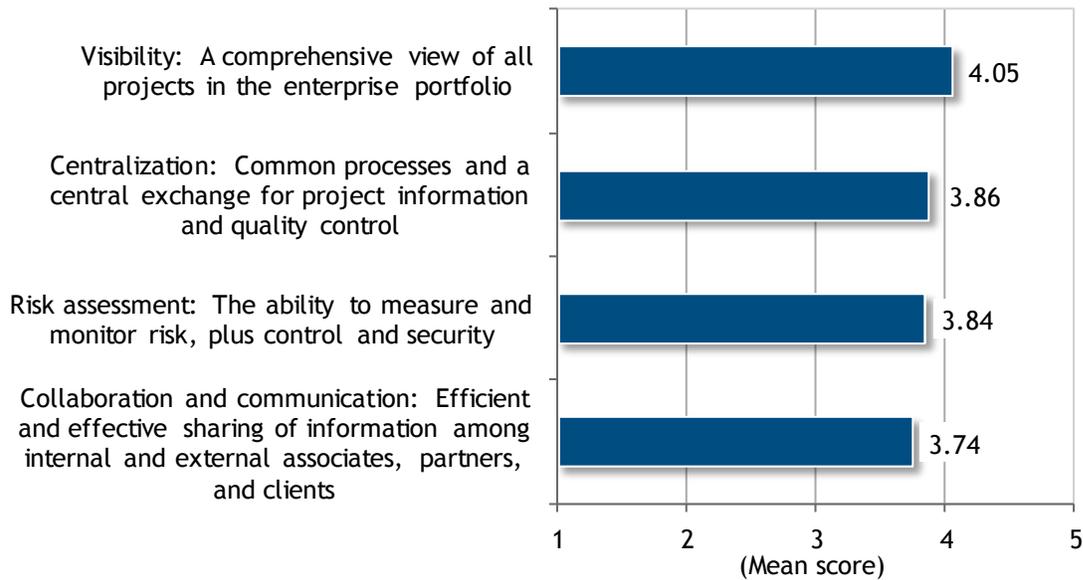
This approach helps organizations understand, plan for, and monitor and manage all the activities and technologies from a high level with drill-down capabilities into the underlying data. IT can help enable project portfolio management by providing:

- Visibility to all projects with links into applications, data, and processes for monitoring, managing, and controlling all processes in the queue
- A fully integrated approach to all systems and workflows
- Insight into the status of processes and workflows in the queue to ensure timely execution and synchronization with planning
- An easy-to-use interface
- The ability to locate data and documents in all projects
- Access to data for intelligence and modeling and simulation capabilities

FIGURE 3

Elements of an Integrated Approach to Planning and Execution of an LCPM Initiative

Q. To realize a comprehensive and fully integrated approach to planning and execution of capital project management in your company, please rate the importance of the following elements.



Base = all respondents

Notes:

This survey is managed by IDC's Quantitative Research Group.

Data is not weighted.

The responses were measured on a scale of 1-5, where 1 = "not important" and 5 = "extremely important."

Source: IDC Energy Insights' *LCPM Study*, October 2014

Most Large Capital Projects Are Not Managed Consistently

Oil and gas companies appear to understand that a purpose-built solutions approach brings structure and organization to the deployment process and also minimizes the risk of failure because the process is repeatable and the nuances of the applications are known. There is value in leveraging the years of experience of a known solution and how it should behave.

However, most large capital projects are not managed with common processes or a central exchange for project information and quality control. According to the LCPM survey, respondents reported that 76.2% of large capital projects are managed on an ad hoc or project-by-project basis. The effect is that best practices in streamlining and cost reduction are not employed across the organization.

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A Complex Ecosystem Requires Communication and Collaboration

As companies enter into new locations, especially in remote areas around the world, communications become even more critical, especially collaboration and communication with the engineering, procurement, and construction (EPC) provider's team, which plays a major role in LCPM development and deployment.

Oil and gas companies face the challenge of different success criteria as they deal in new locations and geographies. Each country has its own unique requirements for business and compliance standards. An innovative system is needed to quickly develop and customize solutions to meet these challenges. Even contracts are becoming more complicated and comprehensive as companies and their partners and vendors are driven to capture and negotiate greater detail and clarity about their agreements. Communications and collaboration are vital to engage management and subject matter experts to make the right decisions at the right time.

Content Management Is Critical to Collaboration

A reliable platform to share information, critical documents, and content throughout the ecosystem is essential for good collaboration with multidisciplinary asset team members to jointly discuss issues and find resolutions to critical issues. This means that critical documents are delivered on time along with transmittals, notifications, and other information that impacts the project.

Many variances exist in the oil and gas industry that drive the need for managing data of all types. In some cases, a company may need to pull operational information along with maps, images, and scientific data, geological structure and test data, and other kinds of data for a holistic view about a well, a facility, or, perhaps, a refinery to forecast intelligence about what works and what doesn't. Tracking and managing such detailed information require a robust content management functionality to quickly pull all data related to a critical problem or opportunity into an environment for team collaboration.

According to IDC's *Vertical IT and Communications Survey*, content management is one of the key systems involved in successfully implementing large capital project management initiatives. In fact, content management ranked extremely critical for major oil companies and NOCs. Because of its importance to running day-to-day operations, content management is another software application that some software vendors have already made available on the cloud for management of data of all types across the enterprise.

In Figure 4, 65.2% of oil and gas respondents believe that content management software is an important investment priority for oil and gas companies. Oil and gas companies require a reliable framework and a repository that can handle high-performance data management functionality and intense integration and interactive workflow requirements. The next transformation for content management is being the engine for managing and coordinating all other applications and processes involved in large capital projects.

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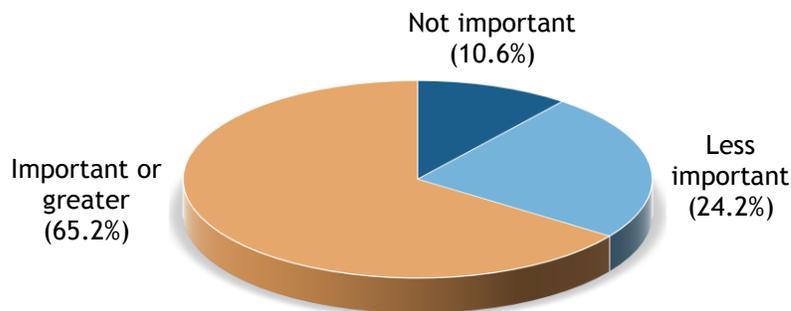
What this means to an oil and gas company is that content management vendors are helping companies transform their traditional IT environment into a high-performance platform for innovation and rapid large project management execution. Content management is ideally suited to be the focal point for bringing planning and information systems together to provide all the required functionality for successful executing and managing an intense LCPM implementation.

Content management is ideally suited to be the focal point for bringing planning and information systems together.

FIGURE 4

Priority of Content Management Software Solution

Q. Please indicate the priority level of your investment for the content management software solution areas.



Base = respondents whose knowledge covers software

Notes:

This survey is managed by IDC's Quantitative Research Group.

Data is not weighted.

The responses were measured on a scale of 1-5, where 1 = "not important" and 5 = "extremely important."

Source: IDC's *Vertical IT and Communications Survey*, May 2014

Who Makes Decisions?

Funding an LCPM initiative is almost always a team decision, and approval by the CFO will be required, although sometimes approval from the CEO and the COO is also required, especially for megaprojects that require intense investments. EPC providers have strategic roles in LCPM initiatives, which differ by industry and organization. It is important to understand that EPC providers are treated differently by company, so there are no set expectations, and relationships appear to be flexible and different for each opportunity.

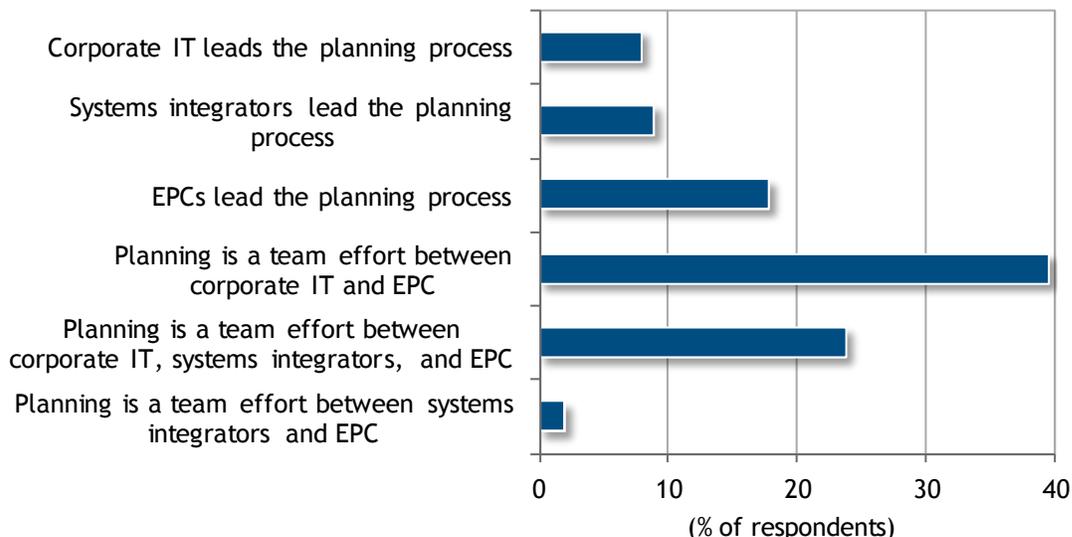
For example, EPC providers usually lead the entire planning to execution role for major oil and gas companies. As seen in Figure 5, planning is typically a team effort between corporate IT, EPC, and, many times, systems integrators (SIs). The delivery of an LCPM solution is predominantly a team effort between

corporate IT and EPC. Finally, maintenance is split fairly evenly between SIs and a team effort of corporate IT and EPC. All sectors reported heavy involvement with EPC. Most companies regard EPC as nonstrategic, even though companies rely heavily on EPC for planning and/or execution.

FIGURE 5

Identifying the Lead Role for Planning an LCPM Initiative

Q. How do you view the role(s) of planning an LCPM initiative?



Base = all respondents

Notes:

This survey is managed by IDC's Quantitative Research Group.

Data is not weighted.

Use caution when interpreting small sample sizes.

Source: IDC Energy Insights' *LCPM Study*, October 2014

Realizing a Successful LCPM Initiative Implementation

The consensus of the oil and gas respondents in the LCPM survey was that the most important indicators of a successful LCPM initiative include higher performance and speed than originally planned (by a wide margin), followed by lower costs. According to an October 20, 2014, study from Accenture, high performance in unconventional operations has indicated that a company can realize a reduction in LCPM execution cycle time as much as 40% by optimizing performance to realize faster time of implementation, which is a good metric benchmark to monitor.

Companies reported that project portfolio planning is the most critical element for implementing a successful LCPM initiative, and most companies believe they perform this function fairly well. All 100 respondents reported that there is room for improvement

The most important indicators of a successful LCPM initiative include higher performance and speed than originally planned (by a wide margin), followed by lower costs.

in every category. Respondents also reported that some of the activities they don't perform well include communications and collaboration and contract management, all of which can be improved with a good LCPM software solution. The poorest areas of performance include communication and collaboration and contract management, all of which can be improved with a good LCPM software solution.

The majority of oil and gas companies reported the most important aspects of handover and commissioning are the ease of use and transmission of the quality of information. From an IT perspective, major oil and gas companies saw maintenance as an area where IT can make an improvement with regard to LCPM, and NOCs selected operations as the area where IT can make the most difference. It is important to understand nuances like these for each industry category to customize solutions for each. Planning, design, and coordination have the most impact on projects not coming in on time, according to survey respondents.

Oil and gas companies also ranked their organizations low in their ability to effectively share information and communicate with partners. Clearly documented plans and roles of each party and extended collaboration are important for successful LCPM initiatives. While oil and gas companies believe they can handle clearly documented plans and roles fairly well, there is room for improvement. Communication with external parties is lacking with respect to security, synchronized processes and workflows, and extended collaboration. All of these areas of improvement can be addressed with a solid LCPM solution.

Purpose-Built Content Management at the "Core" of LCPM Initiatives

To successfully execute large capital projects, companies must have one focal point for managing and sharing important project information that also links all major activities and systems into one trusted source. For LCPM, systems with these qualities are best addressed by a purpose-built content management solution that has robust functionality and a good framework for integration, communication, and collaboration. The content management solution must be easy to use, scalable, and capable of controlling high-performance data processing, with robust management functionality of data of all types, records, and workflows between all requisite systems and parties concerned.

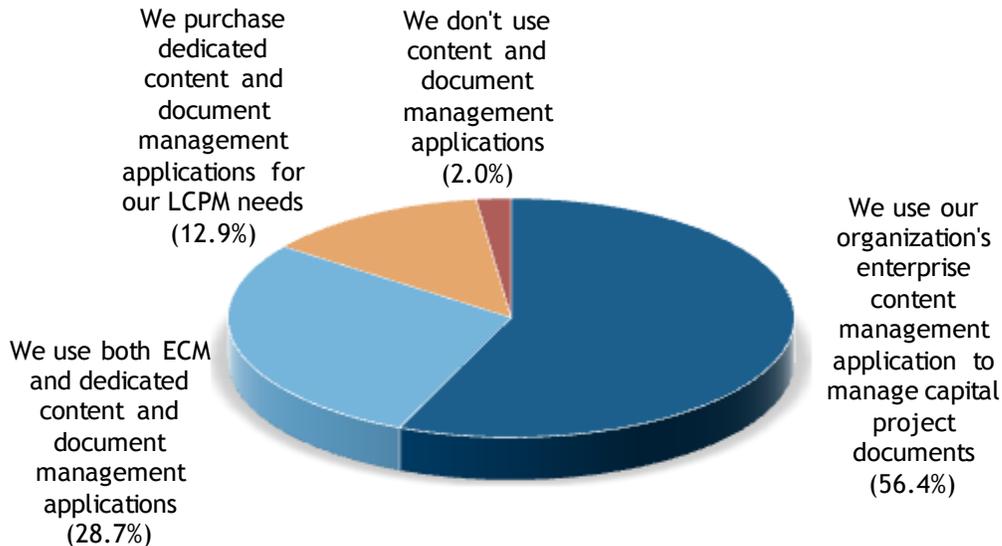
Many oil and gas companies have repositories, but many have issues locating documents, information, and records. This indicates that many companies do not control data, documents, and content as well as they think they do. A comprehensive content management system can help solve this problem. When respondents were asked about the top areas that they would recommend their company invest in to realize a successful LCPM implementation, the top 4 responses were risk management analytics, integration of LCPM, enterprise architecture, and an enterprise content management system dedicated specifically to LCPM and used as a central repository for managing data and documents of all types.

At the same time, it is important to note that only 13% of survey respondents reported that their companies have purpose-built LCPM software solution systems for managing information and records, another area for improvement (see Figure 6). It is more efficient and effective to develop a purpose-built LCPM software solution to integrate the necessary applications and infrastructure technologies with project planning to establish standards for performance to realize meaningful results. Because output is captured from a dedicated source, performance can be measured and managed without interruptions that otherwise would have occurred if the underlying source of information was shared with other systems and users.

FIGURE 6

Management of LCPM Content and Documents by Organizations

Q. Which of the following best reflects how your organization manages LCPM content and documents?



Base = all respondents

Notes:

This survey is managed by IDC's Quantitative Research Group.

Data is not weighted.

Use caution when interpreting small sample sizes.

Source: IDC Energy Insights' *LCPM Study*, October 2014

Plus Workflow

Preconfigured process templates are a game changer for rapid deployment of new LCPM initiatives. These templates basically automate processes and speed the time for execution and drive higher performance and lower costs. Another benefit of this approach is that having automated best practices for processes also satisfies SOX compliance process requirements, and ECM is at the core of drastically reducing the pains that limited process visibility brings to the agility of an organization.

All parties involved should have fast access to project content, participate in workflows, and receive approvals with electronic signatures and securely share content. Managing the process of creating, sending, and tracking transmittals can be a daunting task as tracking thousands of packages and responses manually is very time consuming and prone to mistakes and errors and incoming or returning transmittals need to be automatically filed and managed based on their classification. Transmittals should also be included in progress tracking reports to ensure that status and location can be quickly identified.

ESSENTIAL GUIDANCE

The impact of delivering an LCPM initiative on time and on budget is a benefit in itself, and significant costs can be realized if oil and gas companies can just meet their planned objectives in a timely and effective manner. IDC Energy Insights believes that a well-designed purpose-built solution for LCPM initiatives will help streamline processes and coordinate the necessary resources based on standards and repeatable workflows for optimal performance. What needs to be factored into the equation is that just a small 2-5% improvement in cycle time can have a tremendous impact on a \$2.5 billion project – \$50 million to \$125 million. This does not include the fact that the project will run more productively and that automating workflows offers an important secondary benefit of helping achieve SOX compliance process requirements.

A purpose-built LCPM solution offers many benefits, including mitigating the risk of overruns for oil and gas companies and EPC alike when managing a portfolio of projects or a single large capital project. With a purpose-built LCPM solution, LCPM initiatives become more repeatable over time as new preconfigured process templates are created and added, workers build relevant knowledge and skills, and the process becomes more intuitive with each new implementation. Oil and gas professionals appreciate the value of a purpose-built LCPM software solution because it is easier to establish standards for processes, applications, and infrastructure and integrate planning with information for improved workflows that can be automated. In essence, a dedicated LCPM solution allows for better optimization as benchmarks for performance can be set and monitored without interruptions from the outside.

Executive support for the investment will be driven not by the mundane capital appropriation process but instead by getting visibility to the option value of having a purpose-built LCPM solution in place that will quickly and effectively deploy and manage large capital projects to improve performance, reduce costs, and limit risks. Innovation is another key factor to consider when making the final decision. Leading oil and gas companies are already transforming their IT departments to the 3rd Platform to realize the promising benefits of innovation and move to create an environment that can quickly integrate new technologies and processes and rapidly adapt to change.

The Approach

The recommended approach to developing an LCPM solution is to identify the required functionality for a successful LCPM implementation and also look deeper into the value of building a purpose-built solution that can add value to your efforts for better information and performance management and control. It is also critical to select a software vendor with deep oil and gas domain expertise and a strong track record with ECM technology in the oil and gas industry. These vendors understand the pitfalls, having gone down this path for years, as well as what is important and the keys to success.

Develop a well-thought-out enterprise architecture and a road map plan for implementation to capture your vision about where you are going and how you will get there. The final architecture for an LCPM initiative requires content management at the core of the solution to provide an integration framework to other applications, along with workflows to access, organize, store, and share data with the right parties as needed.

It is important in your architecture and your road map to identify and show what applications and infrastructure systems are involved, interactivity, and data workflows between systems and departments. Perform your due diligence to understand the software and service requirements and costs to be able to determine and set proper expectations. Finally, create an RFP based on your findings and requirements and submit only to qualified service companies for final selection.

As companies become more technically astute with LCPM initiatives, they will start building KPIs to monitor and manage performance. Various integration points will reveal helpful information about how well a process is being performed, and analytics will be a helpful tool for monitoring performance changes in LCPM deployment to establish best practices.

Table 1 is a snapshot of the various functions to be considered when developing an LCPM solution. It is important to consider all these functions when dealing with vendors for your final selection.

TABLE 1

Large Capital Project Management Breakdown of Components

Function	Key Capabilities
Integration	<ul style="list-style-type: none"> ▪ Integration with key project management software applications ▪ Drawing management 2D/3D solutions
GUI	<ul style="list-style-type: none"> ▪ An easy-to-use interface
Content Management	<ul style="list-style-type: none"> ▪ Document management ▪ Scanning for document digitization ▪ Version control ▪ Records management
Workflows	<ul style="list-style-type: none"> ▪ Predefined for rapid deployment ▪ Business process management ▪ Workflows and transmittals for acceptance ▪ Handovers ▪ Audit trails for compliance
Security and permissions	<ul style="list-style-type: none"> ▪ The ability to provide and restrict access to users within and outside of organizations
Communications and collaboration	<ul style="list-style-type: none"> ▪ Between all departments, team members, management, partners, and the extended team
Construction and commissioning	<ul style="list-style-type: none"> ▪ Planning, designing, and engineering 2D/3D CAD
Procurement	<ul style="list-style-type: none"> ▪ Agreements, contracts, and RFP management
Operations and maintenance	<ul style="list-style-type: none"> ▪ Automated transmittal support

Source: IDC Energy Insights, 2015

Software and Services Considerations

The service vendor of choice will have deep domain knowledge and skills and will also have a successful track record deploying LCPM initiatives specifically to oil and gas companies. It is important to work with a vendor that understands the industry, including the workflows, metrics, and even the language, which is unique to the industry. Evaluate service vendors for their level of competency, but talk with references, especially if the project is extremely large. In addition, also factor in your decision about the service firm's location, size of company, number of large project leaders with relevant experience, and overall expertise.

An internal architecture should be established as a blueprint for how IT will map technology to the business requirements and is a helpful guide to compare how each vendor's LCPM software solution products will interoperate together and identify which vendors generate the best expected results. It is incumbent upon oil and gas companies to research the various LCPM software solutions in the market and develop a requirements checklist that best meets company needs. One advantage of selecting a software vendor that offers a purpose-built LCPM solution is that interoperability within the vendor's own applications will eliminate problems within a client's environment. In addition, it is also important for a vendor to provide a good integration strategy and tools to integrate the vendor's software applications with other required systems and applications.

For software vendor selection, technical capabilities, power, scalability, and speed are not enough. Careful consideration must be given to functionality, integration capabilities, scalability, and the commitment of the software vendor to evolving its applications to the 3rd Platform to prepare for the future. Examine the software vendor's knowledge of and commitment to evolving software applications to the 3rd Platform. Based on IDC surveys, oil and gas companies are serious about investing in software applications for the 3rd Platform. With lower oil prices, the potential reduction in costs with the 3rd Platform sounds good. In addition, the 3rd Platform generates agility and promises the easy integration of new technologies and rapid adaptation to change in the future.

The key differentiators to look for when comparing vendor software functionality include the following: The user interface should make it simple and easy for a client to efficiently configure, add, and customize important functionalities, activities, workflows, and other links internally and externally. Predefined workflows are especially important to enable the rapid deployment of LCPM initiatives and, when used with a purpose-built system, allow for "intelligence" about processes performance to be analyzed for improvements.

Summary

Plagued with lower oil prices today, oil and gas companies are under pressure to reduce costs and improve efficiencies, and one area of high-impact potential is managing large capital projects to be on time and on budget. A recent report from E&Y, *SpotLight on Oil and Gas Megaprojects*, revealed that 73% of oil and gas companies' large capital projects fell behind schedule, 64% came in over budget, and an average of 59% exceeded the original budget plan. One doesn't need to be a rocket scientist to figure out that a \$7 billion project is at great risk based on these statistics. Large projects are data and communications intensive, and it is almost a requirement to have a standardized system in place that ties all requisite information and documents together for distribution at the right time to the right people through the life cycle of the project.

The proposed resolution to this challenge is a purpose-built solution that is designed to capture and deploy best practices with tight feedback mechanisms for continuous learning and optimized performance. IDC advises clients to work with vendors that provide such proven solutions to be configurable rather than requiring heavy-duty coders to make modifications and prebuilt workflows for automation purposes and that are committed to the 3rd Platform to help transform energy companies into agile, resilient organizations that rapidly adapt to change.

About IDC

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