LEAN TIMES

Lean, a powerful improvement process, can enhance E&P operations. But it must be used with care.

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An onshore operator found that the single largest source of delay and waste was associated with teams and leaders getting together to make timely decisions.

The exploration and production community may not have completely readjusted to the changed economics of the past 12 months, but at least the shock has lessened. Although some stability has returned to oil prices, natural gas prices continue to languish. As a result, companies have turned their attention to strategies to rebuild profitability and grow their businesses in the current commodity-price environment.

What they have worked out, not surprisingly, is that they need to operate significantly more efficiently and cost-effectively. This is easier said than done, however.

During the past five years, growing production and maintaining safety have been the dominant themes, with cost reduction a distant third. But as oil approached $140 per barrel and the U.S. rig count soared, costs rose to new heights. Now, cost is front and center.

But with capital and operational budgets severely trimmed, and the need to continue to produce at least at current levels, and to do so while improving safety and integrity, companies can't solely defer spending on future projects. They also have to get better at what they do. And they are looking at "Lean" tools and techniques as a proven solution.

A new way of operating

What is Lean? Unlike some of the amazing new reservoir-modeling tools developed over the past several years, Lean is more than just a set tool. Rather, it must be seen as a new way of operating, a new way of working. While Lean tools and methodologies can be readily identified, adopting Lean in an E&P environment requires a fundamental change in the organization's behaviors.

This is not to say that E&P companies haven't managed costs over the past five years—they have, but selectively. Through this period, companies have achieved significant cost improvements by rationalizing supply chains and streamlining support operations and back-office functions. But core operations in E&P have not only remained untouched, they have actually become more costly, as more and more resources were poured into producing $140 oil. With no more low-hanging fruit, companies recognize that their core business areas must be the focus for improvement now.

Seven Wastes In Onshore Oil Operations

Implementation/ Improvement area	Seven Wastes	Wastes Identified	Improvement Opportunity
Core process improvement (operations/ maintenance)	Overprocessing	Maintenance effectiveness not quantified, leading to too many preventive maintenance (PM) routines	Increase in equipment uptime Increased throughput of work
	Waiting	Poor planning leading to technicians having to wait on jobs, causing low maintenance productivity	Increased effectiveness of PMs Capacity release
	Defects	Ineffective PMs	
	Transport	Travel time between wells not optimized	
	Inventory	PM backlog not managed and prioritized	
Business management	Overproduction	Too many meetings, reports and key performance indicators	Simplified and rationalized management system Improved focus on health, safety and maintenance, production and cost
	Overprocessing	Lack of clear structure and purpose to meetings leads to overattendance, impacting meeting effectiveness	Capacity release
Organization design (creation of area-based organization model)	Motion	Time lost through maintenance teams driving between wells	Increase in equipment uptime Increased flexibility (resourcing, skills, priorities)
	Defects	Not having the right skills available locally when needed	Increased throughput of work
	Inventory	Not being able to manage PM backlog effectively because of the above	Capacity release
	Transport	Driving time to get materials not available locally	

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The term Lean in its industrial context was coined by John Krafcik in a 1988 *Sloan Management Review* article, from the MIT Sloan School of Business, to describe the car production system developed by Toyota. Lean can be defined as achieving more production with less work, by eliminating waste, variation and complexity.

The Lean toolkit includes a number of improvement tools, including value-stream mapping, 5S, kanban and kaizen. But the concepts and tools Toyota deployed to become lean had been in use at the company since World War II.

So established is Lean, in fact, that occasionally E&P managers embarking on a Lean program are disappointed to find it materially comprising tools they've used before, rather than new, "magic bullets." But in this case, familiarity should breed trust rather than contempt. Lean has been proven to be effective in sustainably reducing costs in the automotive, manufacturing, pharmaceutical, aerospace and banking industries, as well as in the oil and gas downstream industry.

It might seem, however, that not all aspects of an improvement technology developed in manufacturing are readily transferable to E&P. Take, for example, the Lean concept of muda, often referred to as "seven wastes" (transport, inventory, motion, waiting, overprocessing, overproduction, and defects). This would appear to be a manufacturing-focused concept, but one onshore operator successfully supported its operational teams in using muda to identify improvement opportunities and implement significant changes in core processes, business management and organizational design (see table). A crossfunctional team was deployed to develop a comprehensive process map identifying the key areas of waste in the well operation and maintenance process.

The team made an unexpected finding. The single largest source of delay and waste was associated with teams and leaders getting together to make timely decisions. Although staff reviewed status in regular meetings, actual decisions were being made in an ad-hoc fashion and were not well aligned with the cadence of the business. Once this alignment was made, and an improved management system was deployed using improved communication technology (web and video conferencing, etc.), decision making became virtual and field-based. The delays associated with waiting for someone to make a decision were virtually eliminated.

Just-in-time E&P

Another application of Lean is just-in-time, in which an operation reduces in-process inventory by creating visual signals of demand, or kanban, at different points in the process. Resources in the system are replaced just-in-time as they are consumed in production.

Managing drilling operations is a difficult task characterized by significant complexity even before there is a hole in the ground, because of the legal and regulatory agencies involved in authorizing the proposed program, and the need to assemble rigs, crews and equipment in a timely manner. This complexity makes creating an accurate drilling program difficult.

Using a proven Lean tool—in this case, value-stream mapping—teams can redesign the customized well-planning process to look remarkably like a repeatable manufacturing process. Each process step can be analyzed and improved and the team can determine how many well locations should be ready to drill at any one time.

Teams can then employ simple but real-time visual controls to monitor the current status of the number of available-to-drill locations against this target, giving stakeholders the right information to best balance available resources (rigs, drill crews, engineers, contractors, etc.), ensuring that new well sites are brought on just-in-time.

Other examples of Lean in E&P include using lean design principles to drive down non-value-added time in operations and using a cycle-time-reduction approach to improve wrench-time productivity and accelerate work-order execution.

This illustrates both the power and adaptability of the Lean way of working and its ability to help teams reduce the waste and unnecessary variation associated with complex operations.

Avoiding the dark side

Lean has much to offer the E&P community as it faces the challenges presented by a changed economic reality. But a word of caution—Lean has a dark side.

To a degree, the Lean concept has been a victim of its own success. So compelling is the argument for Lean and so accessible is its toolkit, that many Lean implementations amount to no more than general training in key tools and a sprinkling into the organization of Lean experts who are somehow supposed to transform how everyone else works. Where this happens, Lean risks being seen as the proverbial magic bullet, the new technology that will fix everything. Except that, as pointed out earlier, it isn't new.

Companies have had access to the same tools used in Lean for many years and have failed to create the thriving, continuously improving businesses this strategy was supposed to deliver. This track record tells us that making Lean a success requires more than knowledge of the concepts and access to the toolkit.

Lean works best when other strategies are in place. Toyota, which has come to represent the power of Lean, rose to the top of the world's automotive industry by deploying a powerful suite of Lean tools not in isolation, but as part of an overall environment having critical elements that drove continuous performance improvement.

Success factors

Companies that have deployed Lean effectively share success factors. First and most critically, they are clear about what "Leanness" has to achieve: more product at greater profitability. They set for themselves stretching performance goals and ensure that all managers and shopfloor teams understand their part in delivering that performance.

This clear focus on the end result contrasts with what is commonly seen in implementation of Lean initiatives. Frequently, companies have no specific organizational result in mind. Rather, they simply presume that "doing" Lean will yield better results. This approach falters because it fails to recognize that specific, stretching results are an input to the change process as well as its output.

Simply put, an organization cannot achieve sustainable performance improvement through Lean, or any other improvement methodology, unless people in the organization build their capability and do things differently. Unfortunately, people will stay resolutely in their comfort zones unless they are required to stretch to meet performance goals.

Therefore, a Lean program without a specific performance goal that the organization has committed to becomes a "nice to do" item and is perceived as optional. People won't challenge their own performance or proactively learn how to use the Lean toolkit to improve.

The second key success factor is to take a companywide approach to how the organization is going to improve. Having a high-level business performance goal for a Lean initiative means that everyone in the organization could be, and needs to be, involved in the journey. Everyone is clear about what they need to achieve and how they will go about it. Making the Lean initiative "what the whole company is doing right now" greatly increases its chances of success, avoiding internal competition for resources and management time, aiding collaboration across teams and departments, and aligning the whole organization behind the achievement of one goal.

Looking at the process from another angle, it is almost impossible for one person, team, or department to be successful using Lean if their colleagues are satisfied with being overweight. But surprisingly, this is exactly what many companies attempt to do. By reducing their Lean initiative to the limited deployment of a few experts in an effort to minimize disruption and remain transparent, they inadvertently maximize the distraction while killing off the initiative's chances for success.

Involving everyone in the Lean initiative will also help overcome one of the other major obstacles to sustainable improvement—fear. Managers in all areas of E&P have worked hard for a long time to get where they are, and often they are less than willing to let go of the cultural paradigms that have defined their businesses in the past. But for the organization to move forward, particularly in today's economic climate, people at all levels must try new things.

Typically, this step triggers a fear response, most commonly manifested as resistance to change. Helping people get past this fear requires a number of interventions during implementation, but additionally, having the entire organization go through the change process at the same time creates a supportive environment as people take their first steps into new ways of working.

While the tools and methodologies to achieve this may not seem like Lean processes, they are critical to help move the organization forward. By measuring and tracking organizational resistance, E&P leaders can deploy the right communication and coaching to move through resistance and bring the entire organization to a new level of Lean performance.

Building capability

The third factor in making a Lean journey successful is the understanding that being Lean is about building the capability of leaders, managers and supervisors to make improvement happen. Lean is about creating new skills in the workforce rather than pushing Lean through specialist change agents. By providing a common process for improvement, common management systems for tracking performance and consistent leadership, Lean allows people to effectively develop their use of its tools through practice.

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In other words, a Lean implementation needs to be driven by leadership but enabled by the entire organization.

While there will be tool and methodology specialists, everyone from the asset manager to the field-based operator or mechanic must understand their role in achieving success. This starts with helping leaders unlock their ability to influence, motivate and, most importantly, communicate with the organization. Establishing this as the default behavior moves the business towards a Lean culture, rather than slavishly promoting a particular tool or approach as having some special significance over others.

The key fact for E&P managers to remember as they seek to take maximum advantage of Lean is that Toyota never set out to implement Lean at all. The company wanted to be a great car manufacturer and was willing to work over the long term to create and sustain an environment in which its people could learn how to work in a way that constantly drove business improvement. If E&P companies want to harness Lean effectively, they must ensure that their program has a similarly holistic approach. □

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