New conventions for unconventional oil and gas series:
Reducing the drag to achieve speed and efficiency
Horizontal drilling and hydraulic fracturing have dramatically changed the North American energy landscape over the last decade so much so that it now comprises more than 25% of domestic gas production at 553,000 barrels per day in 2011.¹

This growth rate is expected to continue unabated through the next decade reaching 50% of domestic production.²

Supermajors, independents, and oilfield service companies are developing tens of thousands of well sites, and the increase in scale, geography, and complexity on top of existing base operations is pushing traditional management approaches beyond their breaking points. The competition is tough and the market is rewarding companies that can produce and deliver their products faster and more efficiently than their competitors.

Despite the exponential growth over the last decade, the industry is still in its formative stages and management practices are rapidly evolving. These practices differ from company to company and basin to basin, but the management of shale gas/liquids development remains dominated by local and independent approaches that are heavily dependent on Excel spreadsheets and the talent of the team in the field. Given the scale of the work and the projected expansion over the next decade, this approach cannot be sustained long term.

Companies are beginning to take on the challenge by stepping back and analyzing what is and what is not working across the shale gas value chain. From strategy and financial planning to turning the bit and ultimately producing oil and gas, there are thousands of repetitive activities and hand-offs between functions that look as much like manufacturing operations as they do traditional oil drilling and production. In this complex and dynamic environment, information technology and enterprise systems are emerging as enablers to improve decision making and drive productivity. In PwC’s experience with companies in the shale gas/liquids market, a clear trend is emerging with early movers driving improvement through three distinct steps:

1. **Reducing the drag**

2. **Optimizing the play**

3. **Gaining speed and flexibility**

The first improvement step is reducing the organizational and administrative “drag” on all of the activities required to efficiently produce shale oil and gas and get the products to the market. Although considered low-hanging fruit, the rewards of reducing the drag can be substantial. Then, with an integrated operating model in place, the focus shifts to optimizing operating expense, capital investment, and resources across the full portfolio of development and production. It is essential to plan and align all activity and resources within a basin to deliver optimal returns. Finally, with optimized resources and greater insight into the full portfolio, the competitive advantage is achieved when sophisticated analytics are applied to improve decision making and increase the speed and flexibility in the field and in the market.
Companies have to go through “reducing the drag” before they can “optimize the play.” Organizations cannot “gain speed and flexibility” without insight into the full, integrated portfolio of work. Each step delivers clear benefits that both inform and fund the investment in the next step. The ultimate results depend on the organization’s ability to get into shape for the journey and to stay the course.

This publication is the first of a three-part, point-of-view series focusing on how to make the journey from current operations to being in position for “gaining speed.” The discussion begins with “reducing the drag” which focuses on ways to make the shale gas/liquids end-to-end process faster, more efficient, and less labor intensive. The second piece in the series will focus on “gaining speed” and how companies are optimizing resources and investment in their shale gas/liquids plays. The final piece will present how to apply advanced analytics to shale gas/liquids development to dynamically optimize investment for maximum returns.

**The crux of reducing the drag**

Given the high stakes, cost pressure, and intense competition in the build-out of the shale industry, companies are beginning to apply a holistic lens to all aspects of shale development and managing them end-to-end in an integrated way. Instead of many loosely related development projects in a field, the development of the entire field becomes the project. Key activities and resources are tied together into an integrated plan and executed in a comprehensive manner.

Seeing the end-to-end picture spotlights the most powerful sources for improvement—managing the hand-offs between functions. In North America, for example, many unconventional wells are in geographies where the infrastructure and facilities that are needed to produce, process, store, and transport the product to market do not exist. The planning, engineering, procurement, and construction of this infrastructure must be tightly integrated with the well development and production processes. These activities span functions and groups that do not regularly work closely together and the hand-offs between them often fail. As a result, production targets may be missed because the road to a new site was not completed in time, a permit was not received, or the local power company did not get the last mile of power distribution to where it was needed. These delays in production are compounded by increased capital and operating expenses due to stand-by time for crews and equipment.

Improved results can be achieved by establishing a standard approach for activity planning and resource scheduling that tightly integrates with functional planning. Leveraging a seamless, automated flow of data and information across the enterprise, companies gain the enhanced visibility and discipline to align development, operations, human resources, environmental health and safety (EH&S), engineering, projects, finance, and supply chain units into a cohesive system for effective enterprise portfolio management. Through the detailed mapping of all activity and resources required to develop the whole shale field following a plan that meets production objectives, companies have clear insight into the current status and forecast of all activity and the demand for resources. With that visibility, manage-
ment can acquire and deploy the right resources (labor, tools, materials, and equipment) to the right place at the right time. When market conditions shift, the integrated plan also provides the organization with the information needed to adapt the portfolio quickly to meet the new requirements.

**Reducing the drag in planning and execution**

Although the devil is in the many thousands of activity-level details, the essence of managing a portfolio of shale development and production activity is fairly straightforward: detailed process and data mapping that connects field activity planning with the corporate functions supplying funding, resources, equipment, business support, and expertise required by the field.

As supported by the graphic, this detailed process and data mapping provides a nomenclature and common language that translates operations and project activities into timely and accurate demand information on which multiple functions in the organization can act. Changes are readily identified and incorporated into the plan, and the right resources are consistently delivered to the right place at the right time. Because the entire portfolio of work is connected and clearly visible, rework declines, waste reduces, and overall efficiency increases with the bulk of the gains coming from the hand-offs between functions.

**Tightening the hand-offs between functions and creating a clear line of sight from the demand in the field to the capacity of the organization can drive eye-opening results. By doing this, cycle time reductions of 30 – 40% and annual cost reductions of 15 – 25% are not uncommon.**

The following sections further explore the three key elements necessary to reduce the drag.
Managing the “play” as a portfolio

The integrated planning approach to shale development also underpins the ability to manage the full portfolio and execute a realistically achievable strategy: the full integration of strategy, objectives, scope of work, required resources, timing, and funding. If one factor changes, for example, moving a production schedule ahead two weeks to meet a sales agreement, the company can immediately assess the impact on resources and cost and determine if the goal is achievable or if a different approach will be required to meet the goal.

By planning all activities, process inefficiencies and non-value-added work can be readily identified and eliminated. The plans also establish the baseline for managing performance, controlling change, and delivering results. Cost, schedule, and resource forecasts become more accurate and the corporate “burden” placed on the work in the field is reduced as functions become more and more efficient throughout the full shale value chain. In short, managing the full portfolio is the tool that converts strategy to results.

Working the silos

As supported by the illustration below, integrated planning and execution involves many levels and functions of the organization. Although the elements are straightforward—alignment around strategic objectives, activities, and activity owners—many companies manage these separately and do not focus on their interrelationships and dependencies. Integrated portfolio planning and execution provides the data and information each function needs to balance the demands placed on it from the field: how it needs to prioritize its work in light of all the conflicting priorities of other functions dependent on its work. Without connecting the touch points between all functions, execution at the well becomes inefficient and activities are rarely aligned to the degree that work consistently moves forward in a controlled manner to deliver the expected results.

Portfolio planning and field execution should be a tightly integrated process.
The drilling function, for example, might determine that padded wells (multiple pads per well) are the best course of action versus a single well. For the entire enterprise to act on that decision effectively, it must be communicated to all the relevant parts of the company. Operations needs to know when the drilling is scheduled so it can build the needed roads to accommodate the arrival of drilling rigs. The drilling and completion unit needs to ensure that construction teams are aware of the “batch” approach. Completions needs to coordinate its work with the supply chain organization to ensure timely delivery of materials, minimize downtime, and avoid racking up needless storage costs. Completions must also coordinate its plans with operations to make sure hand-offs happen smoothly. From the single decision for padded wells, hundreds of hand-offs must occur for the work to proceed as expected.

**Integrating business systems**

The “rubber meets the road” when the movement of data is automated and required information is provided to the right function at the right time. For example, a project group may be forecasting that the costs for a certain activity will exceed budget because of unforeseen developments in the field. The finance organization needs to know this in a timely manner so it can provide the funds or take different actions, as needed. In many organizations, such communication occurs, but it is usually informal and does not reach everyone in a timely manner. Understanding the impact of any unplanned event or variance in the context of information from other systems, processes, and applications is important. An integrated business and systems capability creates a more efficient workflow and orchestrates information by linking elements from different processes and systems across all functions. With the processes and standards described in this point-of-view, the integration becomes largely automated, delivering needed information across the enterprise to in a timely manner to all that need it. Enterprise level technology is the driver of that automation.
To leverage technology, companies must focus on two dimensions: integrated data models and leveraging structured and unstructured data.

The technology dimension

Efficiently coordinating the planning of thousands of shale development activities in hundreds or thousands of projects cannot be effectively managed in spreadsheets. There is simply too much information changing too quickly for any one person or function to manage manually. Enterprise technology provides the tools that allow companies to manage their portfolios at the detailed level needed to produce extraordinary results in an efficient, automated environment.

Integrated data models: Data mapping is central to effective planning and execution. In many oil and gas companies, data is often structured and defined through the perspectives and needs of single functions. The finance organization may have a cost-accounting system with a data model driven by financial and corporate reporting requirements. However, that system relies on the chart of accounts, which is not a framework that project managers can use. By the same token, project management systems don’t capture information in a way that can be used by finance, much less human resources or procurement. An integrated data model takes information requirements from different functions and creates a connected view that can be used, maintained, and updated by the entire organization.

Structured and unstructured data: We often think of data as structured information sitting in databases and accounting tables. In reality, however, a great deal of information needed to manage complex shale portfolios resides in documents, such as contracts, drawings, specifications, spreadsheets, and email. Unstructured data is common in projects such as engineering drawings, plant floor layouts, seismic graphs, well files, and many other functions closely tied to operations. Structured and unstructured data must come together in a fully integrated data model that facilitates the flow of all required data and information.
Making it happen

Although the approach outlined provides the common frameworks, processes, and data flows that make basin level portfolios manageable, portfolio planning and execution must be integrated into the base business with its own myriad of activities and decisions. This integration must start with the detailed activity in the field and tie through all of the hand-offs and transactions required to make sure the right resource and information is at the right place at the right time. This is no small effort and it requires tenacity and discipline to complete and maintain the detailed planning required. Once completed, however, enterprise technology can codify the effort and automate the flow of information and work for the entire portfolio, significantly reducing the drag of getting to first oil.

In PwC’s experience working with oil and gas companies, we have found that organizations may successfully reduce the drag by following these three principles:

1. **Listen to the “silent” business:** Businesses have a base of activities apart from new well development and capital projects—everything from inspections and maintenance to training and meetings. Often, new projects become the focus and can drown out the needs of the rest of the business, making them “silent.” With integrated planning, development project activities are meshed with the ongoing work of the business. For example, of the 100 new well development projects our sample company has slated, 50 may be at existing sites. Crews at these sites are still tasked with operations, inspections, and maintenance. New development activities must be coordinated with this work. Insights at the portfolio activity level provide the visibility needed to inform decisions and effectively balance trade-offs.

2. **Factor in context:** Everything from local climate and geology to regulatory requirements can significantly differ by location of the well. Development projects in Angola are nothing like those in Malaysia, and Wyoming wells are developed differently than those in West Texas. If a company were developing in Wyoming, for example, activity planning and management must account for cold weather factors with considerations such as insulation of pipelines, which would not be the case in West Texas. Not accounting for project context can thwart success at the detailed activity level and planning must done, incorporating a high degree of local knowledge.

3. **Lead and model the change:** All stakeholders need to buy into the planning approach. They must make it part of the business and operating culture by modeling and reinforcing the behaviors they are expecting of others. Key stakeholders must also articulate priorities so everyone will understand when a trade-off has to be made for the benefit of the full portfolio.

Reducing the drag through integrated planning has emerged as a leading trend in shale development. It delivers first oil faster and at a lower cost than the prevailing independent and localized approaches. By assessing, planning, and executing all activity across the development and production system, companies are reducing working capital through higher utilization of assets and resources, and improving returns on capital employed by gaining speed and reducing costs. Integrated planning makes the end-to-end process more consistent and predictable and it establishes a clear line of sight between strategy and execution. This enables the optimization of the investment in the portfolio, which we will further explore in the next piece of this three-part series.
To have a deeper conversation around portfolio management for the energy sector, please contact:

Ryan Hawk
Principal
PwC
ryan.l.hawk@us.pwc.com
(312) 298-3319

Sophia Kim
Director
PwC
sophia.kim@us.pwc.com
(213) 356-6523

Michael Matthews
Director
PwC
michael.f.matthews@us.pwc.com
(713) 356-4615

Manas Pattanaik
Director
PwC
manas.pattanaik@us.pwc.com
(713) 356-8287

Daryl Walcroft
Principal
PwC
daryl.walcroft@us.pwc.com
(415) 498-6512
PwC's Energy Advisory team is one of the largest professional services networks in the world with over 4,000 dedicated industry resources. Serving over 2,500 oil and gas clients of all sizes, including some of the world's largest oil companies, our team understands the energy industry and the issues that our clients face. Our professionals specialize in customer impact, financial effectiveness, people and change, risk and compliance, capital projects, operational excellence, successful innovation, and systems integration. PwC takes pride in our global approach supported by our local knowledge.