

SOA Removes Traditional E&P Barriers to Production Optimization

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Despite the fact that production is the process by which exploration and production (E&P) companies exploit their valuable oil and gas assets, historically they have invested less in transformation of production than on exploration and drilling. With foreseeable demand beginning to exceed supply, all available options are being taken and it is apparent that production is where the next major breakthrough is required. Because of this, upstream technology companies like Landmark are now driving the industry to transform the hitherto overlooked production lifecycle into a more agile process through a service-oriented architecture (SOA).

Utilizing SOA, E&P companies can create production processes that utilize sophisticated business strategies and quickly leverage the latest technological advancements to achieve production optimization goals. The result is a robust solution that is responsive to business and operational needs, easy to maintain and manage, and can incorporate an operator's existing and future technological investments.

Production Complexities Limit Conventional Technologies

The industry's revitalized interest in production has encouraged the adoption of new technologies and techniques, but most conventional solutions have been designed by a plethora of firms each specializing in point solutions for specific production problems. In other words, most current business processes, activities and workflows in the production space are dependent on technology solutions that span multiple databases and software applications from a number of different vendors. This results in disparate, siloed environments that create disconnects and layers of inefficiency.

To date, two approaches have dominated the upstream industry's attempt to address these disconnects. Many companies seeking to provide a mechanism for streamlining the production process are turning to business process management (BPM). BPM identifies, models, measures, orchestrates and optimizes processes and activities, mapping and automating the flow of data from one business process

to another and enabling companies to track key processes, eliminate or minimize bottlenecks and identify opportunities for improvement.

For others, the drive to production optimization is fueling a focus on integrated workflow solutions. These companies are utilizing technical workflows to capture expertise and automate processes as they integrate data, models and real-time production optimization systems.

Although both approaches have merit, neither is sufficient to completely integrate the myriad software applications and processes being implemented in the production environment today.

SOA Provides Flexible, Adaptable Interface

The SOA service model is a strategic approach that replaces tightly coupled proprietary interfaces and data formats with standards-based, reusable business interfaces. These interfaces can build and organize back-end information technology applications into a set of discrete services that can be called upon independently and orchestrated to address changing business needs. This model facilitates flexibility, reuse and interoperability by advocating a layered, loosely coupled approach to organizing information technology applications and an infrastructure where complexities and implementation dependencies associated with each functional layer are isolated from each successive layer above it.

A typical SOA service model will have the following layers, as shown in Figure 1:

- Data services layer – Facilitates the retrieval and persistence of data;
- Data abstraction layer – Transforms data to elements of a domain data model that adds value to consuming applications;
- Application layer – Processes that transform data to add specific domain value;
- Service layer – Includes all the services defined within the SOA and minimizes dependencies on other layers; and
- Business process layer – Combines groups of services into flows under the purview of the BPM application.

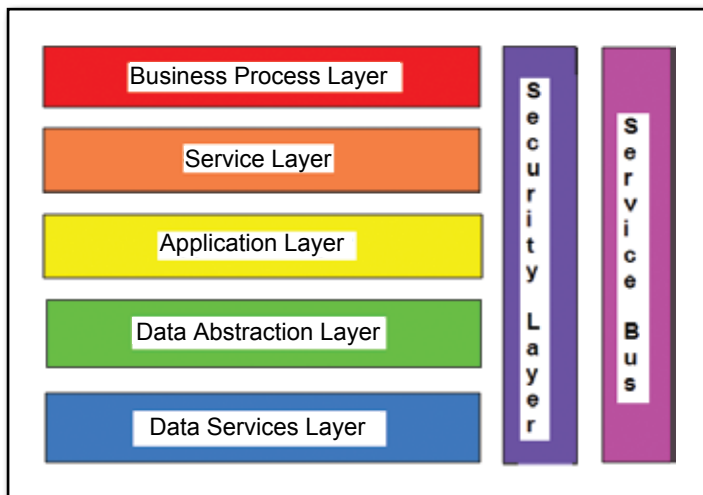


Figure 1. A typical Services-Oriented Architecture (SOA) stack.

The goal, then, is to achieve business agility through interfaces without compromising the data used to make business decisions. In an SOA system, the service layer becomes the single point of contact with the back-end information technology environment, enabling the use and orchestration of applications in a loosely coupled fashion.

SOA uses standard protocols and conventional interfaces – usually Web services – to facilitate access to services. Because each service is accessible through a standardized interface, the underlying implementation of the individual service providers is free to change without impacting how the service is utilized – effectively a black box providing appropriate outputs.

This flexibility has a number of benefits, including the opportunity to consolidate redundant applications and decouple functionality from obsolete and increasingly costly applications while still leveraging existing investments. It also facilitates the rapid restructuring and reconfiguration of business processes and integrates information technology systems across siloed applications.

Agile Production Model Enhances Collaboration

The oil and gas industry is heavily dependent on estimations for everything from predicting the amount of hydrocarbon reserves to forecasting production rates to calculating decline curves and determining net present value. The multi-variable mathematical models used for these require regular maintenance, as their results are often history-matched and validated against operational measurements and updated to reflect the latest known field events and conditions.

Results of one or more upstream mathematical models often serve as input to other downstream models, creating a large mesh of interdependencies that suggest the need for close coordination to ensure relevance and accuracy. In other words, when one upstream model is updated, downstream models must also be updated.

In practice, however, there are inevitable business, organizational, administrative, operational and software silos that divide these naturally related systems, leading to inefficiencies in production and operational capabilities.

Even within each business level silo there is misalignment between business needs and technology solutions. Because technology often dictates the business processes and activities, this can lead to organizations and systems that are rigid and incapable of responding to changing business needs. As many operators place emphasis on greater human collaboration and teamwork as the solution to industry challenges, it is imperative that the technologies and systems that support their people also need to facilitate collaboration.

With SOA, technology and, more importantly, data, will remain in place when a company's business model changes. Conversely, businesses can factor in real-time changes in the operating environment and respond more quickly and cost-effectively to changing market conditions without worrying that changes to the business model will adversely affect data retrieval or management.

Integration Overcomes Barriers to Production Optimization

Though the service model is usually implemented using Web services, deriving and defining this service model is as much a business or domain activity as it is an information technology exercise. Therefore, the service model should be first arrived at from a business perspective. When done right, such an approach will facilitate business workflows that are universally portable.

In fact, SOA should optimally be implemented by information technology developers and solution architects with substantive input from stakeholders that can drive the design of the system. A service model for production optimization should therefore eliminate any hint of information technology implementation, vendor specifics or technology details and expose only services and data formats that are relevant and useful to the business function of oil and gas production optimization.

A well-defined service model provides benefits not only to operators, but also to the technology vendors. This is crucial as E&P companies struggle to manage the varied software applications used in the production environment. Vendors are beginning to take on the task of defining portions of a service model for areas in which they intend to deliver solutions, enabling them to change their technology and still provide the same services without disrupting their clients' business processes.

With SOA, E&P companies have the opportunity to attain greater business agility and productivity while utilizing existing investments in technology, and decision-makers gain the flexibility to access up-to-the-minute information in a form that meets their needs. Operators no longer have to log into multiple systems, search for relevant data, and integrate the results manually. The information appears as a single application, delivered on a single screen with a single login.

SOA ties together BPM and technology-based solutions to create an integrated system that is versatile enough to optimize production. Barriers to production optimization, such as the lack of integration, untimely information and the inability to access data, are becoming things of the past.

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