

Enabling business agility with Production Allocation in the Cloud



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What is production allocation?

The extraction, transport and processing of hydrocarbons from oil and gas reservoirs is a complex and costly business. Typically, companies co-operate in this effort, usually through part-ownership of equity in the field or in the infrastructure required for processing. Costs can be astronomical; as an example, Wikipedia reports the cost of the BTC pipeline at \$3.9bn.

A single offshore platform in the North Sea is likely to gather product from a number of fields and wells, each owned by different parties, and commingle it before transporting it to shore for subsequent processing. This processing may require a refinery, gas plant, or LNG plant. An LNG plant, for example, might take gas from multiple incoming pipelines, each carrying products from multiple owners, and process this to produce LNG and NGLs.

It is impossible, except in very unusual circumstances, to measure the exact quantity of commingled or processed stream that is produced by an individual well or that is owned by a specific party. The job of allocation is to apply pre-agreed commercial or technical rules to the available metered data to derive computed figures for:

- The proportion of the produced fluids owned by each party;
- The proportion of the produced fluids contributed by un-metered production entities (such as individual wells).

Transparency, reliability, resilience, and repeatability are essential features of any systems used for this task, and confidence must be assured by the existence of a full audit trail.

The terms used to describe these calculations vary widely across the industry: production allocation, well allocation, hydrocarbon allocation, hydrocarbon accounting, production reporting, and hydrocarbon value realisation, to name a few.

As a company, we tend to use production allocation as the term for any allocation and reporting process that involves commingling of fluids, but which does not involve any processing beyond basic separation. This would encompass the majority of allocation from field to wells. We use hydrocarbon allocation to describe allocation of commingled fluids that have undergone some degree of processing, such as gas from a gas plant or liquids from an LNG train.

As an aside, considerable skills are required of those who undertake the job of production or hydrocarbon allocation, encompassing knowledge of metering, chemistry, measurement methodologies, statistics, and mathematics, combined with significant negotiation skills. It would be ideal if the industry picked a single title for this role, and developed a defined set of skills and training to support it.

What is business agility?

Agile business is not business at lower cost. An agile business is one that has the capacity to maximise the value of every opportunity presented to it. To achieve this, the cost of change must be low, for sure, but low cost is a consequence of a business strategy and not an end in itself. Another characteristic of agility is a relentless focus by a business on its core strengths.

Opportunities for agile business abound in oil and gas. Acquisitions, divestments, marginal fields, mature fields... all of them demand that owners and operators act decisively and rapidly to maximise value. While cost is clearly a concern, the focus on value is reflected in the fact that investment in an asset often increases after an acquisition. This is an echo of the ideas promoted by Treacy and Wiersama in their book (*The Discipline of Market Leaders*), where they identify success with the pursuit of operational excellence.

All too often, though, IT systems are like anchors that hold the business back. In response, the business resorts to implementations of solutions in spreadsheets, thereby sacrificing control, auditability, security and robustness to gain flexibility and rapid change.

The mission for an agile business must be about increasing responsiveness and maintaining flexibility through relentless focus on improvements to the entire supply chain. For those companies, the cloud offers agility for their IT systems.

What is the cloud?

Whatever you know about the cloud, it is almost certainly wrong. There is a tremendous amount of nonsense from vendors, analysts, and government organisations, much of it contradictory and much of it seemingly designed to obfuscate and confuse. Nowhere is this more clearly true than in references to private or hybrid clouds. There are no such things. There is cloud, and there is not cloud.

Part of this is semantics, for sure, but part of it is the benefit of clarity in the naming of things. If you want to buy a service, and do so on a consumption-based pricing model on a multi-tenancy platform, and the provision is elastic, then you have the cloud. Taking these defining characteristics in turn:

- When you buy a service, you're buying the ability to do a task, not the components that underpin it. So you're not buying an Oracle database, or storage, or processors; you're buying the ability to run your production allocation or do your well test analysis. It doesn't matter how big the server is,

if you can't do your job for any reason then you're not getting the service you're buying. In addition, all aspects of the service, from changing the behaviour to adding new users, should be under your control.

- The pricing model is consumption based. It should be easy and cost-effective to get started (the low barrier to entry), it should be easy and cost-effective to stop (the low barrier to exit), and you should pay in proportion to the value you get. If you're running reservoir simulation, for example, you might pay per simulation minute. If you're running production allocation and reporting services, you might pay per user. When you no longer have the asset, you get your data out and stop paying, or transfer the access rights to a new owner.
- Elasticity of supply is the primary reason why private cloud is an oxymoron. Elasticity is the ability to call on vastly more resources than you usually use, generally for a short period, and is one of the benefits of multi-tenancy. As an example, a company might use relatively consistent levels of resource throughout the year, but might do year-end reconciliations that require significant compute time and storage for a short period. An IT director who tries to build an internal cloud by buying double or treble the required capacity, leaving it idle for much of the time, would not be in his job for long. Obviously, a global multinational might almost be able to justify calling their corporate data centre a private cloud, but few can combine this with the first two characteristics.

The cloud does not imply a web browser, though this is an extremely popular way to access cloud services. Consider for a moment one of the most successful companies in the world: Apple Inc. Think about their latest iCloud offering. There isn't a browser in sight, and few people who've used the service know how it works or where the Apple data centres are located. In fact, I'd guess they've never even thought about it. What it does is to free you from the need to manage your documents, music and photos across multiple devices, and to largely avoid the need for backup. It's a way to have all your movies and music on devices that may not have the capacity to store them all, and to have that availability from anywhere at any time. In short, it's simply about making your life easier, about responding to your needs, and about ubiquity of supply.

Cloud services directly support business agility. They provide capacity on demand, freeing you from the need to plan and build scalable infrastructure. The pricing models reflect consumption, so you only pay for what you use. So, in our oil and gas production allocation example, you can rapidly add new assets, or remove them, and if you sell an asset it's easy to transfer the service to the new owner. No need to worry about hardware or software licensing. Most of all, cloud services let you focus on your core business, and not on IT.

In addition, cloud services allow you to easily build communities. You can more easily share information in a timely and controlled fashion with partners, stakeholders, and management.

What can the cloud do for me?

Production allocation takes place in a dynamic and rapidly evolving context. New wells and fields are added to existing assets. Production methods are changed on mature assets to maximise recovery and life of field. Partners and equity owners change or are added. Commercial rules change as new production with different product characteristics are added. Assets or blocks of leases are sold, and data and services are transferred.

What is required to address this truly dynamic situation is a truly dynamic solution. A solution that can be delivered in days or weeks not months or years. A solution that can be modified rapidly and easily, without recourse to expensive consultants. A solution that must reflect the economics of marginal fields, and that can accommodate assets with potentially short lifetimes.

Case Study: Marginal Asset

Our initial case study is a West African asset, with a large number of wells but relatively low production. It is best described as a marginal opportunity, as is evidenced by the willingness of one of the supermajors to transfer ownership to one of the new agile producers. The installed production allocation system is large, complex, and there are many questions over ownership and licensing of the software and hardware. Significant time and effort would be involved in adopting the system, and in ensuring the availability of data to all stakeholders on a timely basis.

In this situation, a cloud system can deliver almost immediate returns. The high level of configurability means that services can be made available quickly and in an incremental fashion. There are no significant up-front costs, no requirement for in-country infrastructure beyond connectivity, and no software or hardware licensing worries. Data and reports can be made widely available in a secure fashion, and the reduction in the need for manual processing means that operations are more efficient. No complex integration is required, as data can be uploaded via spreadsheets or flat files directly into the cloud system, either manually or automatically.

Further, as this asset would join a number of others managed in the cloud, corporate reporting functionality allows a global view of performance across assets.

Case Study: Mature Asset

This UK North Sea Operator owns an asset that is dependent on new entrants to maintain its profitability and continued operation. The existing hydrocarbon allocation system is effective and has been upgraded a number of times, but the costs of maintenance and modification are significant. Also, like many mature assets, a large number of associated spreadsheets have been developed alongside the primary system, providing additional reports, data validation, and other business services. These have not been added to the main system because they do not appear to be a good fit, or are relatively small in scope, or because of cost. These additional spreadsheets are difficult to audit and maintain, though they are subject to manual version and quality control.

Switching to a cloud solution in this case is not a straightforward choice, as the investment in the existing system is significant and it essentially performs in a satisfactory fashion. However, the weight of costs for upgrades, combined with the

increasingly dynamic nature of the business with new entrants, is a major factor to consider. Also, the opportunity to bring all of the associated spreadsheets within a system with audit trails and version control is compelling. Finally, the existing infrastructure represents a substantial cost; the hardware and software require management and upgrade, and services for backup and storage must be maintained. In many organisations this cost is simply part of internal IT, and is not always apparent, but it is real and significant.

Again, all of the other benefits of the cloud in terms of expanding access and creating communities would be available if the upgrade took place.

Case Study: New Asset

New assets provide a variety of unique challenges for production or hydrocarbon allocation. The commercial rules are often poorly understood until shortly before, or even after, the asset arrives at first production. Secondly, the mechanisms and procedures for operating the asset are based on guesses and best practice on other assets, and are frequently subject to change in the first few months of operation. New reports can be required, and calculations must be added or modified. Unexpected consequences of design decisions can be encountered, and these require rapid revision to reflect the new business models. Finally, the asset itself might not perform as expected, and issues like early water cut or changes to tanker lifting schedules can have a huge impact.

As real and important as these challenging problems are, they are compounded by the buying processes associated with the acquisition of a new system. The right approach is to select a system to support the business, and to build functionality incrementally, investing in proportion to the value. Instead, a large, one-off budget is typically allocated, and an attempt is made to capture all possible functionality in a major requirements document. For those requirements documents that avoid the trap of describing how something should be done, rather than simply what, there is still the danger that the only response possible is a bespoke system. Indeed, developing lengthy requirements documents or functional design specifications is virtually a guarantee of the imminent arrival of a large team of consultants and programmers. Further, the need to specify everything in advance, rather than delivering incrementally, means that functionality is frequently wrong, or missing, and spreadsheets are used to augment the primary tool.

The configurability inherent in cloud solutions makes this an avoidable situation. Design decisions are about the configuration to be done, rather than the implementation, and the time to complete this is very short. Business rules can be developed and changed very quickly, and in a completely controlled way. Functionality can be added incrementally, so that there's no need to specify everything in advance. The costs are defined primarily on the basis of consumption, so substantial up-front costs are not incurred, and investment is directly proportional to value returned.

Fundamentally, this is a different way of approaching this problem, and requires an understanding that what is being purchased is a highly configurable but standard system, like SAP, rather than a product or framework requiring bespoke development.

Common questions

Cloud services are relatively new, and some of the questions we encounter reflect mental models associated with traditional provision.

Is it secure?

This is the most frequently asked question, and is very reasonable given the proliferation of externally accessible services and their broader use in the enterprise. The first point to note is that many security breaches are the result of malicious employee actions, and can be highly costly. However, that does not militate the need to ensure cloud services are secure, and the Cloud Security Alliance Cloud Controls Matrix (<https://cloudsecurityalliance.org/research/ccm/>) is an excellent basis for security and risk assessments. Ensuring that cloud providers employ role-based access mechanisms for all their employees is a key requirement. However, security does not just mean restricting access to authorised individuals, it also means integrity of the data. Offsite, encrypted backups, and replicated data centres, add to the benefits a cloud provider can provide, much of which may exceed the standards currently offered by internal systems.

How do I get my data back?

Low barrier to entry, and low barrier to exit, are fundamental tenets of cloud systems. You need to be assured that you can take backups of your data when you want, and that you own all of the data stored within the system. Also, the rights of the cloud supplier to use your data must be restricted to that which is required to carry out their obligations under the service contract, and no more.

Can it meet my requirements?

With any new service, there is a need to understand what it does and what you need. The configurability of cloud services delivers many benefits, as do the regular upgrades that deliver new functionality without additional cost or significant service interruption. However, you need to bear in mind that this is a product, with all the benefits that this affords, and consider first what it offers rather than starting from a wish list of everything that is possible.

Can I install the software in-house?

This is a frequently a question of comfort, rather than anything driven by clear requirements. It is understandable that a company should want to have their data and systems in-house, but the boundaries between in-house and the Internet are already blurred, and this blurring will increase in coming years.

As a supplier of cloud services, our goal is to be best-in-class, and a switch to a traditional model of in-house provision would dilute our focus and reduce the quality of service that we can provide from the cloud. We understand that this will reduce our appeal for some customers, but at the same time we believe that the cloud is the future for the majority of computing needs, and that we can offer unparalleled value to our customers.

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