Practical Guide to Optimal Planning in Oil and Gas Firms

Make Better Planning Decisions with Indisputable Data

Introduction

In recent years, data science has been the force behind major shifts in the oil and gas industry, allowing decision makers to extract valuable insights that can help circumvent the industry's growing challenges and regulatory scrutiny.

However, as technological advancements improve the ability to capture data, many upstream oil and gas companies face the challenge of managing and guiding their businesses with inconsistent, inaccurate, or old data.

This leads to inefficiencies, lack of insights and increased risk due to a lack of information and alternative solutions.

In this guide, we explore the disconnected data challenge faced by major oil and gas organizations, outline industry tried-and-tested solutions, and detail an ideal best practice approach that will help connect the data between functions in your business and unlock planned shareholder value.

The Business Problem: Disconnected Data and Glass Walls

The oil and gas industry has had a significant history of digital technology uptake, and today – through advancements in sensors, communication, computation and analytics – there are more ways than ever to collect valuable business data to improve your competitive edge.

According to Deloitte's digital maturity index[1], the oil and gas industry scores considerably lower than most other sectors, potentially losing $1.6tn in revenue by not fully embracing digital. Digital in oil and gas, among other things, include having the ability to continuously process data that supports automated corporate planning and decision-making capabilities.

While most upstream oil and gas firms have invested in sophisticated hardware and software to streamline business operations, they face major challenges obtaining accurate and consistent data to use in strategic, long-term planning, budgeting, reserves reconciliation, and reporting.

Broadly, the data required fits into three categories:

1. Corporate Data
This data changes often and regularly there isn't 'one source of truth', and different versions are being used by siloed teams, which impacts measured and calculated data. Examples include FX rates, prices, inflation indices etc.

2. Measured Data
Compared to corporate data, measured data is generally used against defined metrics to identify if certain outcomes – for example, optimum operational efficiency – are being met. Examples are production data, CAPEX, OPEX etc.

3. Calculated Data
Calculated data uses both corporate and measured data as well as a range of information from other sources. This data helps oil and gas businesses see where they are at financially, forecast production, and defend themselves against scenarios that consider timing, fiscal and operational constraints. It is essential data that helps keeps things consistent in an often-unpredictable field. Examples include Revenue, Tax, Free Cash Flow etc.

All data used by oil and gas companies should be reliable. For data to be considered reliable for corporate decision making, it should be accurate, consistent, complete, and timely. These factors all rely on how the measured data is entered and distributed to various parts of the organization. However, there are a few challenges, such as:

◇ Differing processes often produces data at differing levels of granularity. For example, a Strategic Planning team will often work with decision units that are aggregations of several projects. Yearly granularity is common for long-term planning while budgets are monthly.

◇ Another common problem is the time required to gather the data compared
to time available for actual analysis. This often leads to plans being adopted with very little scenario analysis having taken place.

◯ There is also the "glass walls" phenomenon where departments or individuals are siloed and do not share data. These "glass walls" can lead to confusion, inefficiency and decisions being made using inaccurate information.

When corporate leaders collaborate to make important investment decisions, it is imperative everyone has the same data.

With a lack of consistency and visibility into the right information, it becomes a drain on time and resources to use ineffective data to plan, forecast and manage risk efficiently – when it should be helping oil and gas organizations to plan effectively for shareholder interests.

Commonly Tried-and-Tested Solutions

First comes the data you need to collect, then comes the way it is being interpreted and used to drive fruitful actions. While some companies are progressing well into using data solutions to negate the above issues, many are still struggling with some common approaches (Note: most oil and gas companies use combinations of these):

Manual Spreadsheets

Excel spreadsheets are commonly used for tracking, updating and reporting in oil and gas firms. Each department generates a spreadsheet representing its data, which is aggregated across the business unit or at corporate level to provide a snapshot of the business.

There are several issues with this approach:

⬡ Spreadsheets do not align assumptions used across departments. We have all heard the story where the drilling team assumed 10 wells, production assumed 12 and facilities 5. Additionally, there is often little visibility into the assumptions used.

⬡ Spreadsheets lack visibility and transparency as data is aggregated and more so as contributors increases.

⬡ Calculated variables can only be generated once all the contributing sheets have been combined/ aggregated.

⬡ It is time-consuming to compile, update, track and compare using manual spreadsheets.

Templated Spreadsheets

A more refined approach of manual spreadsheets is where a defined template spreadsheet attempts to contain all the data needed for planning, reserve consolidation and reporting at a specified hierarchy unit in the organization.

Usually completed within a given schedule, the sheets are held in a specified folder and bespoke software allows the appropriate accesses to read the sheets into planning or reserves systems.

This approach partially addresses the problem of sharing common data; however, there are challenges:

- Generating the data and updating the sheets is often regarded as a low-value activity that yields very little benefit for the department.

- It is time-consuming and hard to amend the template if changes need to be made, and the sheet usually only contains data at one level of granularity.

- It is challenging to compare and identify changes in the data during planning cycles. As templates are updated at fixed points in time, this means data is updated infrequently during the planning cycle, resulting in uncertainty or incorrect data.

- If the template contains calculated data related to fiscal measures – such as free cash flow – then this fixes the value of the data to that set of corporate data assumptions. Different scenarios require new folders and new sets of templates to be created.

Data Cubes

This approach stores pre-calculated data and shares data via a Business Intelligence system's reports. It is primarily a reporting tool; however, it has limitations as a partial solution that include:

- The data is all pre-calculated and is designed for good performance when retrieving data. However, due to vast amounts of data, the cube is usually built overnight and so provides access to the previous day's data instead of current, real-time information.

- The non-dynamic nature of data cubes means it is not possible to have the latest data available. While under normal circumstances this may be acceptable, but towards the end of a planning cycle there are usually several last-minute changes.

- Data cubes are often ill-suited to aggregating data, differentiating between gross and net, rolling up data through hierarchies etc., all crucial during each planning cycle when various departments are weighing in.

Commercial Software Tools

Commercial tools are available to address specific business processes in oil and gas, in areas such as Asset Planning and Capital Management for example.

While these tools offer good point solutions for specific business needs, they often:

- Are not designed to integrate and share data with other tools that are also needed for seamless integration within the business.

- Are challenging to set up. The IT systems at most oil and gas companies include streams of legacy software purchased from various vendors in different formats across many different functions, so obtaining modern tools and integrating it with existing

solutions is a hurdle. Where companies have purchased multiple individual software solutions, the initial effort to pass data between them, via bespoke links, is large. Changes or updates to the software can involve significant work to maintain pre-set links.

- Can be exhausting to use all at once. When teams must use more than five or six different types of software in order to get one job done, productivity and efficiency tends to decrease while error rates rise.

With the above challenges still very much present today, it is common for oil and gas companies to allow each division to store and use data in whatever way it finds most useful, or to use data formats provided by vendors. This has also made it challenging to build repeatable

use cases or to combine data in cross-functional use cases.

Compounding these issues, IT is typically set up to tailor solutions for individual functions rather than for use across the value chain.

The result is segmented brackets of data and siloed departments, which in turn means key personnel cannot see the big picture, and make decisions using data that can directly impact the bottom line and deliver infinite business value.

A Best Practice: Connecting Data Between Functions for Optimal Planning

Much has been said about the need for oil and gas companies to manage and use their data better in order to drive better decision making. When it comes to planning, we have found that in an ideal world what is required is:

- Shared consistent "evergreen" data across all processes and divisions within the business.
- Having levels of granularity suitable for the process in question.
- Aggregation as required but without sacrificing visibility, sometimes known as the "Golden Thread".
- The ability to capture "Actuals" and compare it with forecast data.
- Having calculated data, such as fiscal data, consistently updated and on demand.
- The ability to archive and compare data historically.

The diagram below illustrates an optimum flow of connectivity between several key planning processes within oil and gas businesses, and how data should be shared within these key functions to ensure data consistency.
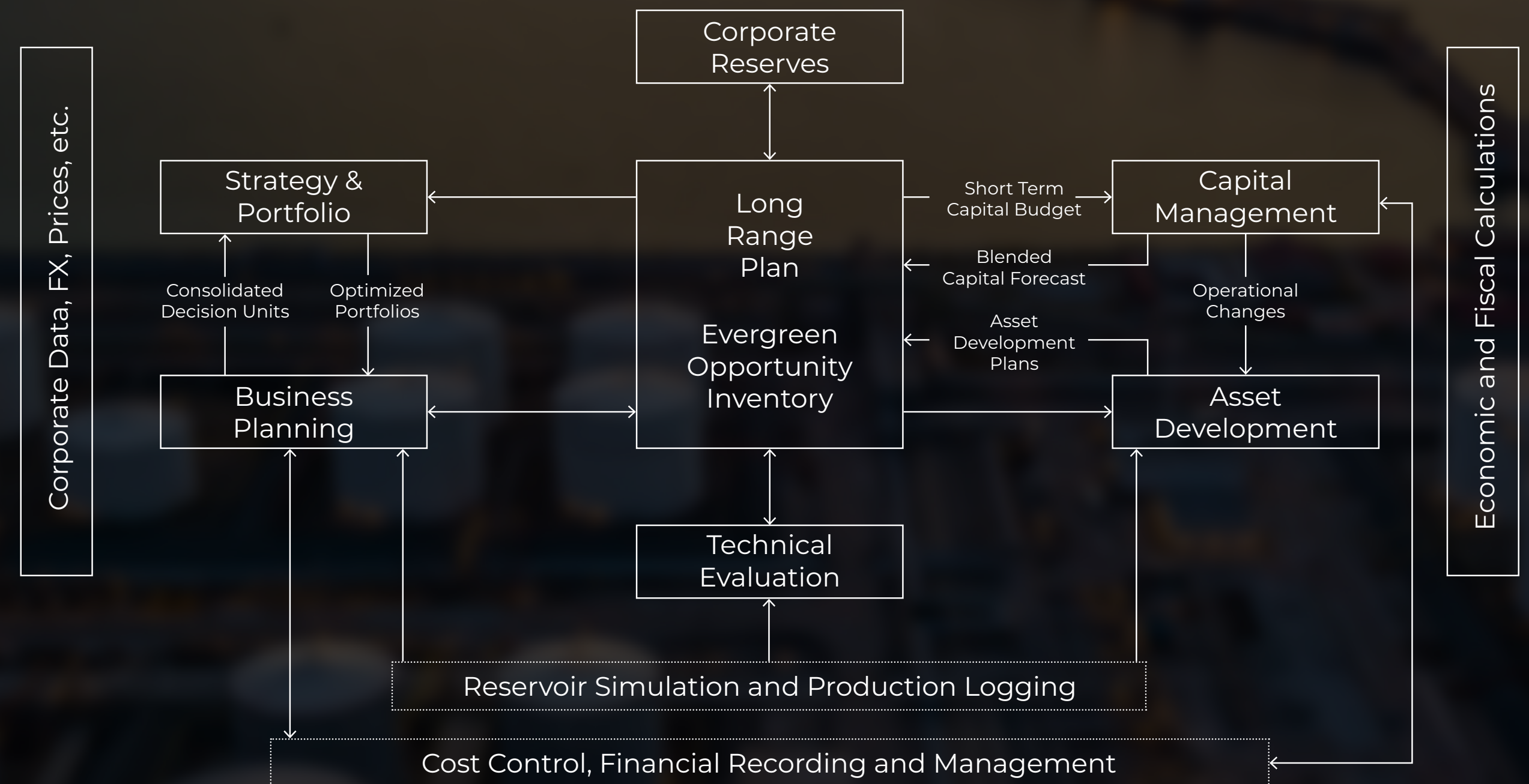
Strategy and Portfolio

The strategic planning process extracts all existing projects and opportunities from the inventory and aggregates them into decision units.

- How large or small these decision units are will depend on the size, risks and dependencies of the projects or opportunities.

- Optimizing portfolios and analyzing scenarios will allow teams to gain insights into the data and the feasibility of meeting corporate strategic goals.

- The Strategy and Portfolio process produces guidelines for the business units that define targets, constraints and project mixes that are required to meet corporate goals.

Business Planning

Long-term business planning can take place looking ahead using the corporate guidelines set out by the Strategy and Portfolio process.

- The granularity of the opportunities and existing projects will vary depending on their maturity.

- The first year of the long-term plan is the budget which will take on a monthly level of granularity. Projects and opportunities are flagged to indicate submission into the current long-term plan.

Asset Development

This process of planning provides a detailed analysis of an existing field or opportunity, and detailed data is input into the inventory at a fine granularity.

- There may or may not be a use for this level of granularity, but the data can be aggregated. The key point here is that there is a "Golden Thread" of data to allow visibility at each level.

Capital Management

This part of the process controls the spend that has been approved and the reforecasting of spend for existing projects. It should also add data to the inventory of existing projects.

Technical Evaluation

An assessment of reserves extracts data from the inventory for existing projects to update the forecasts. Updated forecasts are then placed into the inventory.

Corporate Reserves

This part of the process has all the data required within the inventory for reporting and consolidation. The inventory contains production, updated forecasts, plans for new opportunities, and have the data to undertake reserve forecasting.

The above interactions are often iterative, and archives are kept for each iteration to allow comparisons and tracked changes. To be certain data can be relied on for effective decision-making, the following need to be present:

- A common evergreen inventory of existing projects and new opportunities used by all the processes to ensure consistent data.

- A common set of corporate data such as FX, prices etc. to ensure that all planning activity ties back to the same references.

- A common set of on-demand economic or fiscal models to avoid mismatching numbers and reports.

- Ensuring that historical data and forecast data is accurately captured for comparison.

Integrated Planning Systems are Essential for Future Growth

As the market evolves, the oil and gas sector will see even more digital enablement through the convergence of numerous technologies. Data generated from these technologies will transform how vast data stores are analyzed, and actionable insights are derived leading to Big Data and the need for greater digital transformation.

As people, equipment and processes become more integrated throughout oil and gas firms, the need to unerringly manage and use data to a business' advantage will increase. It is imperative for companies to start reducing planning inefficiencies now, or face being left behind.

Oil and gas organizations need to ensure its skilled staff are able to spend time on the right tasks –strategic planning, economic analysis for instance – instead of on low-value activities, such as manual data entry and gathering, and report generation.

In the last decade, research by Gartner has found:

- Organizations believe poor data quality to be responsible for an average of $15 million per year in losses (Gartner's 2017 Data Quality Market Survey[2]).

- Poor data quality is a primary reason for 40% of all business initiatives failing to achieve their targeted benefits, and data quality effects overall labor productivity by as much as 20% (Gartner's 2011 Measuring the Business Value of Data Quality report[3]).

"The difference between oil and data is that the product of oil does not generate more oil (unfortunately), whereas the product of data will generate more data."

-Piero Scaruffi, Cognitive Scientist

More recently, a survey conducted by Quorum showed that almost 40% of respondents indicated data-related tasks were the single largest draw on their time, while only one in seven indicated they spent more time on modelling and analysis.

In order to focus organizational efforts on stronger planning, strategizing, analysis and forecasting, oil and gas companies need more intelligent systems in place to facilitate a seamless flow of real-time, accurate data throughout their operations.

The valuable data harnessed from smart equipment – installed from field to refinery – needs to be integrated enough for key decision makers in each department involved to be able to trust its quality across the board.

With indisputable data, oil and gas leaders can collaborate with confidence knowing their numbers reflect reality. Only then can department silos become connected, investment decisions made confidently, and productivity soar.

Make Each Planning Cycle Count with Better Data Integrations

Quorum Planning Software Solutions help upstream oil and gas operators deliver complete asset to corporate Workflows for integrated planning across the entire organization, allowing planners and senior executives with the right data to make accurate, timely investment decisions.

Unlike other upstream software providers, Quorum integrates with your organization to fill the white space between planning, execution, and reserves. Thereby allowing for better planning, strategy, and financial decisions.

About Quorum Software

Quorum Software is the largest fully-dedicated energy industry software provider in the world, serving more than 1,800 customers across the entire energy value chain in 55 countries. Quorum's solutions power growth and profitability for energy businesses by connecting people, workflows, and systems with decision-ready data. Twenty years ago we delivered the industry's first software for gas plant accountants, and today our solutions streamline business operations with industry forward data standards and integrations. The global energy industry trusts Quorum's experts and applications to successfully navigate the energy transition while delivering value today and into the future. For more information, visit quorumsoftware.com.

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