

## Why is it so hard to get our wells drilled and on-stream?

Over the course of several engagements with upstream oil and gas companies Dynawise has encountered a recurring set of circumstances: it is hard for companies to shepherd a set of drilling prospects from the geological concept through the regulatory processes, drilling, completion and tie-in.

There are often long delays, errors and omissions that require re-work, delays in approvals or access rights acquisition that cause expensive drilling rigs to be idle or moved too much, or partially completed projects that languish between steps (e.g. completion and tie-in).

What causes the delays, the errors and the wasted effort that costs money directly, makes a mockery of forecasts, and delays revenues? What drives this behaviour?

The conventional wisdom is that the behaviour is caused by poor processes in the various departments, bad handoff processes between departments, and the general belief that the problems can be cured with an all-encompassing automated workflow system and rigid step-by-step process enforcement.

Our experiences would suggest that, unfortunately, the cure does not seem to work as predicted!

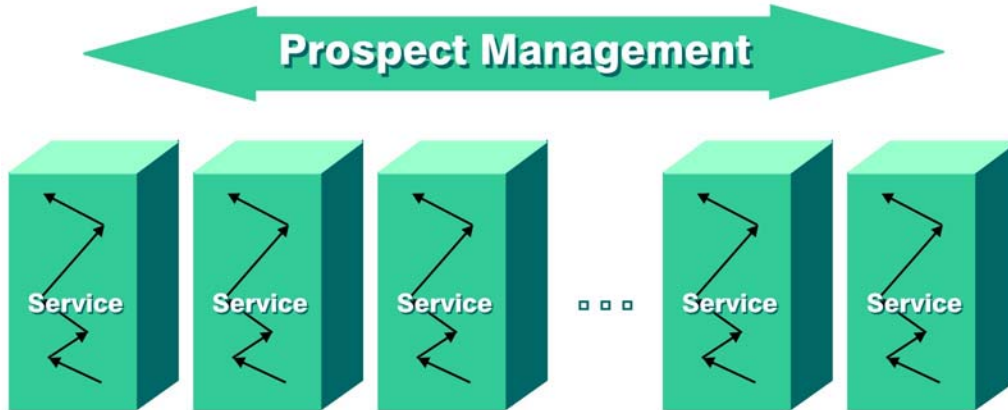
We think the following observations may be useful in addressing these types of issues in this domain.

### Nature of Processes

There are two layers of processes involved. A Macro process (Prospect Management) is seen by the prospect manager as a series of big activities, usually performed on his behalf by a series of service, or discipline, groups (see *Figure 1*). The discipline groups each have processes of their own—only parts of which are directly related to the Macro process of getting prospects to fruition.

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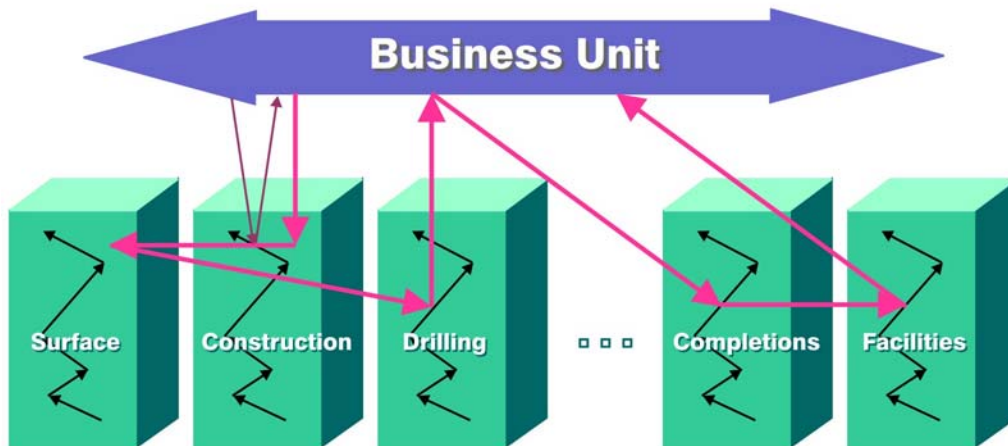
Figure 1



Let's look at how the prospect is handed back and forth from group to group. Sometimes work by two groups may occur in parallel and sometimes in series. Often the 'ball' gets passed back to the prospect manager (the business unit) for a decision before it is sent on to the next group.

In *Figure 2* we see a simplified version of the Macro process and the 'discipline processes'. The bold arrows show the nominal flow of activity.

Figure 2



However, the nominal flow does not always occur. For example a geologist may select a location to drill and the construction folks are asked to survey the location. Normally the survey is done and the surface folks are advised to begin the acquisition of access rights and the associated regulatory rituals peculiar to the jurisdiction. But sometimes the location is not suitable (terrain, land use, etc.) and the location is referred back to the geologist to see if

movement of the target is possible and, if not, should a directional drill be considered? This is both a geological and an economic decision, the result of which is fed back to the survey folks, and all goes on (per the lighter arrows at the mid left).

If only it were so...

Meanwhile the drillers have been planning a rig for a vertical drill in that location. If the location changes they must be notified. Now the drillers are put off by the geologist who has changed the location (and perhaps even changed the whole drilling program). “Can’t these guys make up their minds? Now we’ll have move Rig 3 ten kilometres south and bring in Rig 6. Four more ‘move days’ and there goes our budget!”

This little saga is repeated many times in many ways every day. The Macro process changes things and ‘fouls up’ the discipline processes that have been planned based on previous input.

First, let’s explore the nature of the process types that exist in the Macro process and the discipline processes.

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## **Two Process Types**

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The first process type is the ‘pull’ process.

The pull process occurs when tasks are created or defined by synthesizing information from many sources, i.e. practitioners seeking out information to make a value judgement. Think of the editor’s desk at a daily newspaper. The editor seeks out wire service stories, looks at reporters’ articles and constantly juggles everything to formulate the front page. The work is never absolutely settled, as new bulletins arrive, or a reporter breaks a new story. The editor’s mind changes as to what is ‘right’ for the front page. The output of a pull process is unstable with time: new information—new ‘task’ created!

The second type of process is the ‘push’ process.

The push process occurs when a specified trigger causes a task to be created. The trigger may be associated with a set of fixed data or may be an act of volition. Think of a

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passport office. Step one is when someone requests a passport. Step two begins when the applicant supplies a fixed set of information. Step three might be to check references, while step four (perhaps in parallel to step 3) would be to verify birth information. Step five would occur if steps 3 and 4 are successful and would result in the issue of the passport. The key here is that step x starts only when step y is finished—the process is pushed along by the arrival of a fixed trigger.

Now let's examine the viewpoints of the people who are involved in getting our prospect drilled.

### The Coign of Vantage

We have identified at least four broad communities that are characterized by the drivers and constraints they experience in their work.

These communities are:

- Those that are driven by **reward**.
- Those that are driven by **cost**.
- Those that depend on **relationships**.
- Those that are constrained by the **rules**.

See *Figure 3*. We refer to these communities as “The Four Solitudes”.

Now let's look at each of these communities:

#### ■ The **Reward** folks:

For the reward folks, the goal is the issue. They ask how much? Is it still ‘good’? They deal with a balance of forces and they will change direction with new information (or just a rethink). They generally use pull processes but act as a trigger to others. In our domain this is the dominant characteristic of the prospectors (i.e. the geoscientists and prospect managers). They select locations based on ‘balanced judgements’ of available data, and then change them based on new information or situation changes. They plan drilling programs, come up with ‘locations of opportunity’ and drop



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long planned activities.

- Now let's look at the **Cost** driven community.

The cost driven folks measure how much a task costs and are then driven to minimize that cost. Planning is the issue. Good plans reduce costs; change drive costs up. Time to prepare minimizes cost. These folks generally need solid, fixed information as a trigger and are generally involved in push processes. In our domain, the drillers (completions, construction) are good examples. Well-planned programs minimize cost per meter drilled by reducing rig moves and downtime. They make decisions based on minimum cost for *their* task(s).

- Now let's look at the **Rules** community:

The rules folks are bound by rigid definitions of 'good'. Accuracy and completeness are *the* issue. Order and sequence are paramount. Close is not good enough. In our domain, this is the dominant characteristic of those who deal with regulators. They must obey the law. The reward for absolute accuracy is 'normality' but the penalty for failure is great (re-work, fines, delays, increased scrutiny, etc.). If they do their job perfectly, they are often seen as 'in the way' (red tape), but if they make a mistake the stink can be detected for miles! They are measured by their errors.

- Finally, let's look at the **Relationships** people:

The Relationships folks are engaged in tasks that are dependant on contacts with externals. The nature and length of the tasks varies greatly with the people involved. The time lines are uncertain. Very often, informal agreements are struck to progress the work, and these people are often in pull processes. They drive planners and rules folks mad. This is usually the realm of the surface land man and those involved in partner relations (mineral land, farm in/out) and other third party agreements.

## **Implications**

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These four solitudes are driven by widely varying imperatives and often come into conflict with each other as one group attempts to optimize its own world, which is then seen as a harmful activity by the other groups. Strictly

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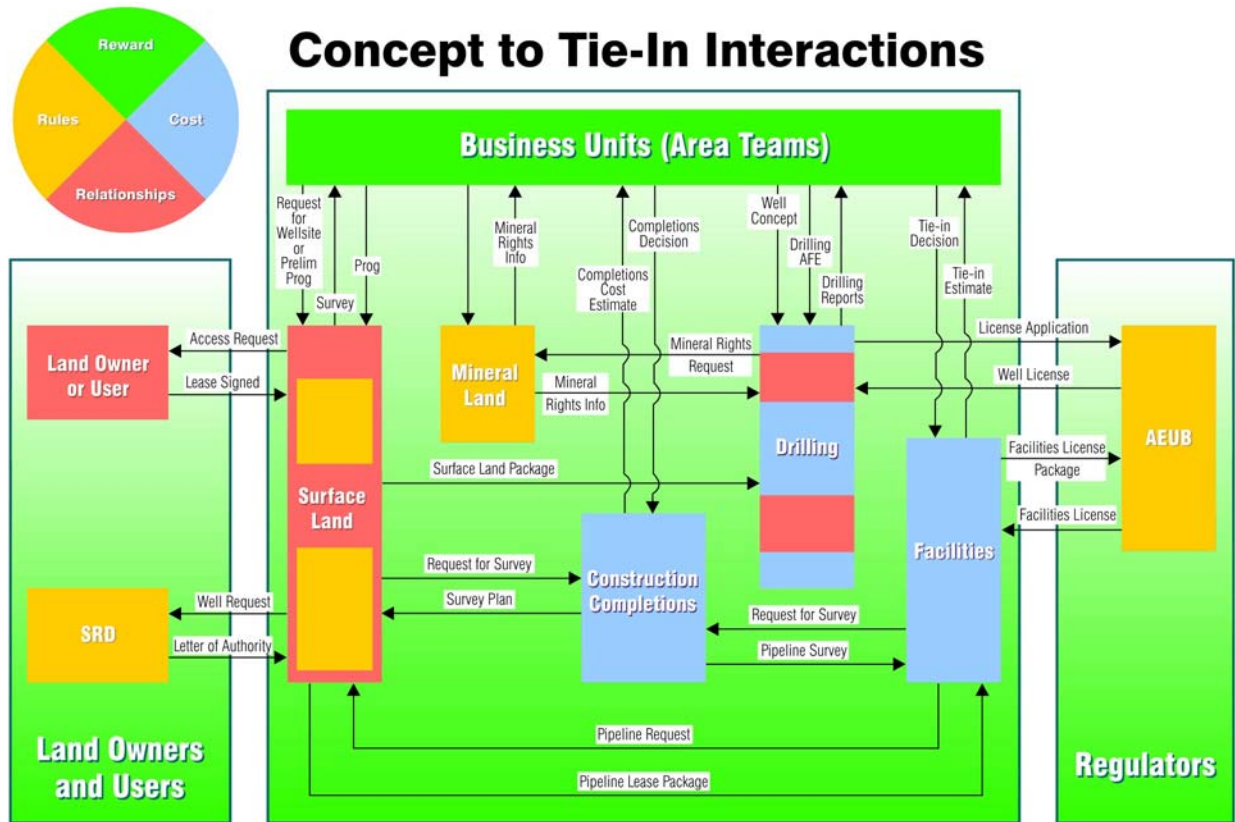
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controlled workflow systems that satisfy the rules folks are seen as constraining by the reward and relationship types. Fast acting reward folks, who may suddenly change direction with new information, will be seen as the cause of added cost.

The Macro process of getting a prospect drilled crosses all these boundaries. See *Figure 4*.

Figure 4



If we optimize the Macro process, we will set up a situation that guarantees a sub-optimal performance within each of the four solitudes! Small wonder that those involved in the process have difficulty in understanding the needs of other groups—with the resulting errors, delays and re-work we see associated with handoffs and interdepartmental interactions.

The act of shepherding a prospect along towards a producing asset requires sensitivity to the part all participants play and requires that the participants be informed of how their work affects the overall economics and timing of the work and be able to see (and appreciate) the work of those upstream and



downstream from their own place in the process.

### The Nature of Work

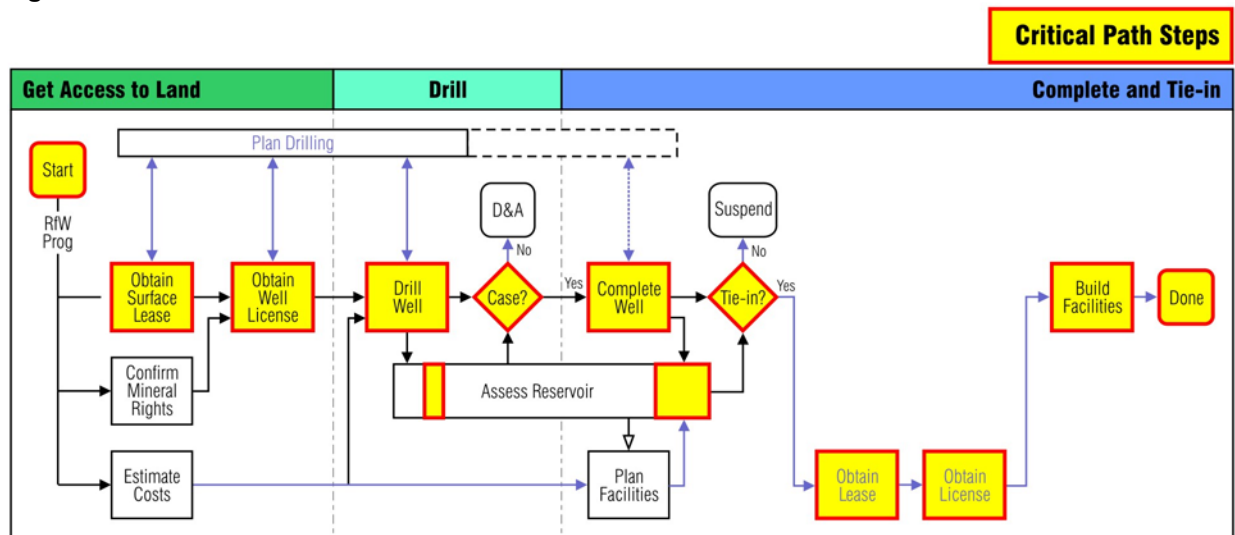
It is not only the nature of the processes and the viewpoints of the people that add complications to the Macro process, but also the nature of the work.

The geology, geography, regulator and even the climate can have significant impacts on the process and how it is operated. Whether an area is dominated by surface land titles that are in the hands of private individuals or titles that are predominately public lands, whether the reservoir fluids likely to be encountered are potentially sour or are known to be sweet, whether the mineral rights are held by individuals, partners, the public or the company, can all have profound effects on how the process works.

Figure 5 shows a simplified process flow, leaving out things like economic stage gates, and showing the ‘usual’ critical path.

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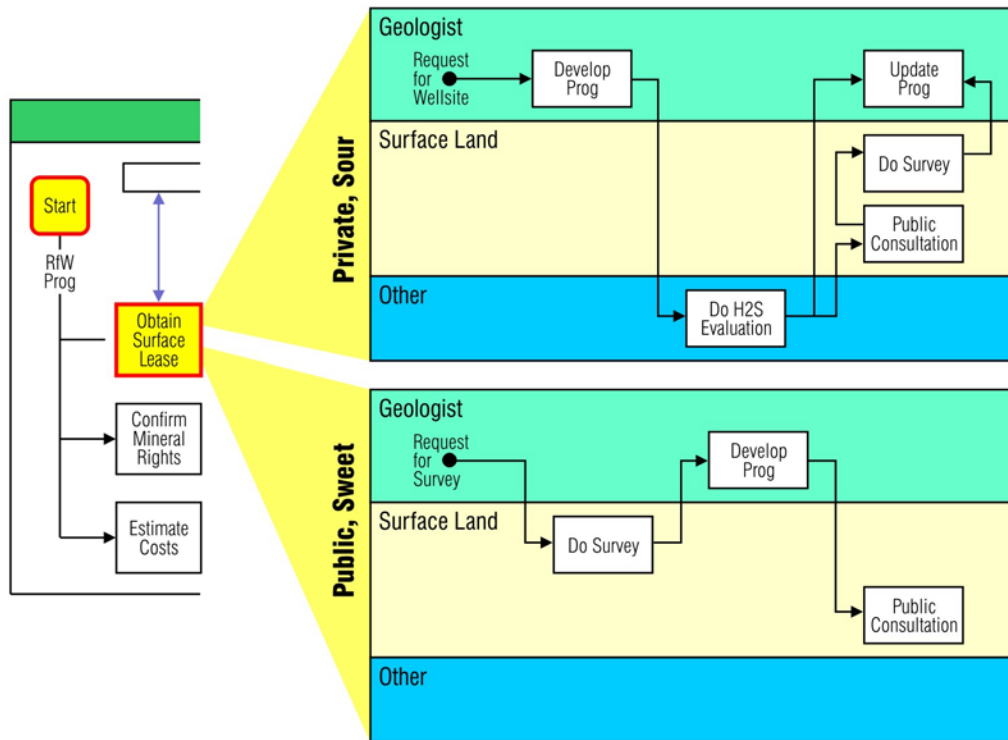
Figure 5



This will be the overall process in most cases (e.g. sweet or sour, vacant or occupied, public or private, etc.).

However, let's just take a look at the first step in two different cases, taken from one operating company. See Figure 6.

Figure 6



Here we see how the order in which steps are taken in the discipline processes has changed, and a new step introduced. The risk associated with drilling on occupied land with the potential for the escape of sour gas has shifted the order of doing the geological prognosis and the site survey.

Figures 7 and 8 illustrate how, although we start and end at the same place, we may go down different paths depending on the ‘nature of the work’. We can also come up with many examples of how seasonal constraints and regulatory demands can affect the way the work is both planned and executed.

Many companies that have grown through acquisitions have encountered two different processes that appear to come from different cultures, and have tried to mandate one over another. This may work if, indeed, the process differences derive from cultural issues (like the approach to command and control for example) but in many cases these differences have arisen from the various acquired units optimizing their processes for the dominant nature of the work (e.g. sour gas on occupied land). When this is the case, trying to mandate a single process can be quite counterproductive.

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Figure 7

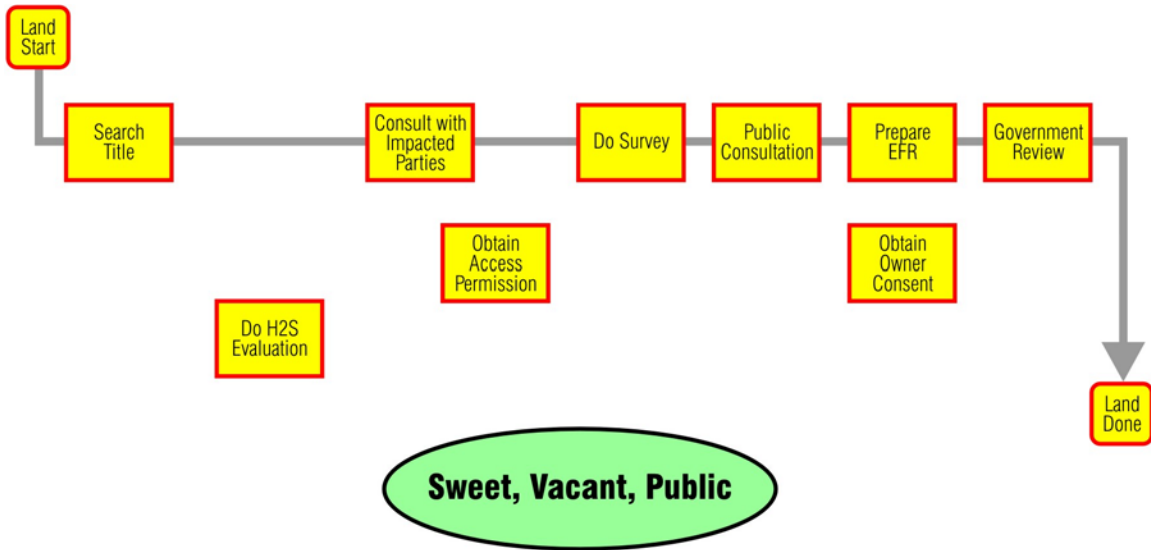
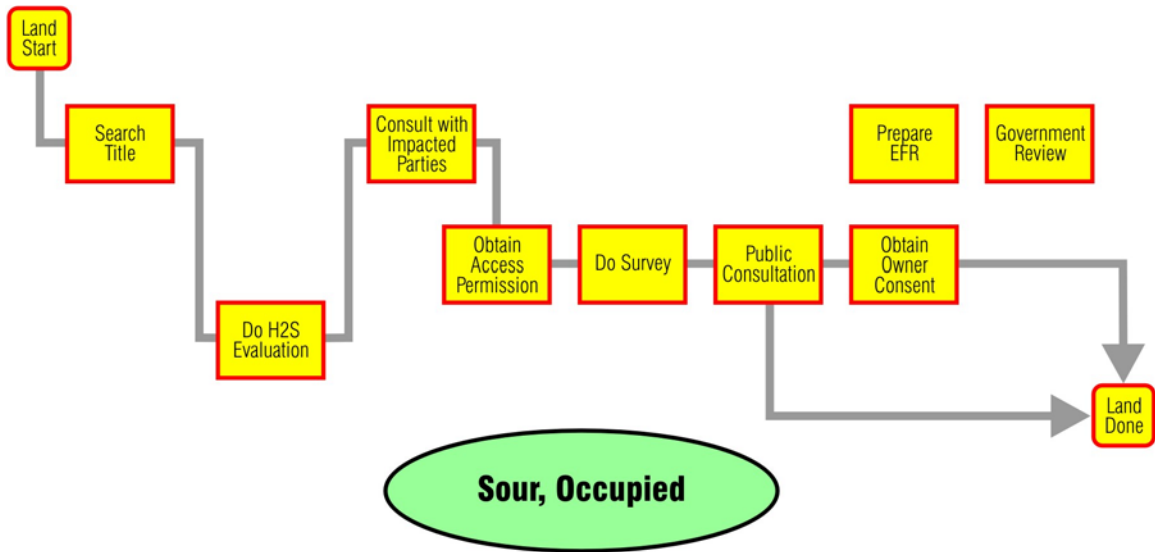


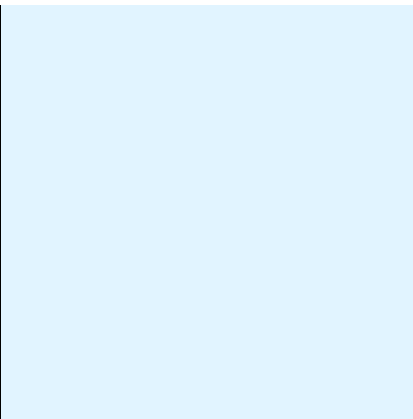
Figure 8



### Conclusion

The answer to the question “Why is it so hard to get our wells drilled and on-steam?” is not simple (rather more complex in fact, than the brief discussion above might indicate). It behoves those who design processes, and the information technology that supports them, to be aware on the multi-path nature of the journey from prospect to cash!

We need to recognise that different sets of information are needed to proceed beyond an anchor point that depend on



the nature of the work—a land package does not look the same for a sweet oil well and a sour gas well.

It is well to avoid silver bullet approaches such as “one single process for all”, or “if we all used the same software package everything will be smooth”. There is usually a germ of truth in these approaches but one may need to consider the subtleties, and consider such approaches as “one Macro-process for all”, or linked discipline processes, with integrated software.

Consider deploying more than one process if you have areas that are heavily dominated by prospects of differing types, but make sure the service groups see secure anchor points where the data is accurate and sufficient to proceed with their work.

Managers should also be aware of how using discipline level measures to define success may result in behaviour that can have detrimental effects on the Macro process (one may get very low drilling costs at the expense of lowered success ratios or regulatory delay).

Some ‘prescriptions’ to consider when addressing the issues in this area:

1. Design the Macro process with key anchor points where sub-processes of differing characteristics can come together with all the information needed to proceed further even if they arrive at the anchor point by varying routes (paths) and especially if they arrive with differing characteristics.
2. Make sure everything is visible to the participants. There should be one place to look for the answer to any given question. It should be clear whether a number (e.g. total depth) is an estimate for planning purposes or a final, observed fact. Changes should be made known to all so the planners can plan as best they can; the relationship folks can prepare the way; the rules folks don’t ‘make an error’ by sending wrong data to a regulator; and the reward folks realize the cost of new insights to downstream efforts. Few things can cause more wasted effort than hiding information in personal or departmental files and systems that only the privileged and adept can access. Make key data easy to see and

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3. Design sub-processes with dominant characteristics in mind. Make interfaces robust in the face of partial or estimated data.
4. Avoid a rigid push workflow throughout the Macro process. There will be exceptions and workarounds (e.g. dealing with informal agreements prior to finalization).
5. Take advantage of the informed professional judgement of those operating the process(es). Well-informed and well-educated process operators who not only clearly understand their roles and accountabilities but also know the roles of others can deal with situations where a rigid workflow process will falter.
6. The ‘prospect manager’ needs to have the tools and training to appreciate the nature of the work and the status of each prospect in each stage of the process. Well-informed early interventions can stave off many a delay—and ill-informed interventions can cost a mint.

Many of the errors and omissions (and the subsequent workaround that take so much time) can be removed from the process resulting in more effective use of scarce professional resources.

There is much that can be done to bring assets to a cash-producing state in a timely fashion—but as usual, it isn’t as easy as it seems! ■

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