Creating Value from Uncertainty and Flexibility

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It’s All About Decision Making

The only way you can purposefully influence your life, your family, your organization, your country, or your world is through the decisions you make.
Uncertainty is inseparable from all significant decisions.

You can’t make good decisions without embracing uncertainty.
Consider the potential benefits from a technology implementation.

Integrated risk mgmt
Risk registers
Risk matrices
Risk urgency
De-risking
VaR (value-at-risk)
Risk adjusted value
Risked reserves
Correlated risks
Risk mitigation
Holistic risk mgmt
...
Flexibility Should be Used to Manage the Impacts of Uncertainty

While risk management is important, it is a poor proxy for value maximization.
Classical NPV Valuation Focuses on the Downside and UNCERTAINTY IS VIEWED AS VALUE DESTROYING …
… However, Uncertainty, Combined with Flexibility, Holds the Potential for Significant Value Creation
Empirical evidence from the NCS demonstrates that we are both optimistic and overconfident in our assessment of uncertainties.

Even worse, there have been NO IMPROVEMENTS (bias reductions) over the past two decades.
Cost

Time

Production

Value erosion

Inability to capture the value potential from flexibility
When to Invest in New Technology
A Sequential Decision Problem

<table>
<thead>
<tr>
<th>Cost</th>
<th>Expected Benefit</th>
<th>Impact on value function</th>
<th>Optimal short-term decision</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gather information</td>
<td>+ / -</td>
<td>Adopt</td>
</tr>
<tr>
<td></td>
<td>Better technology</td>
<td>+</td>
<td>Adopt</td>
</tr>
<tr>
<td></td>
<td>More optimistic prior</td>
<td>+</td>
<td>Adopt</td>
</tr>
<tr>
<td></td>
<td>More favorable signal</td>
<td>+</td>
<td>Adopt</td>
</tr>
<tr>
<td></td>
<td>More uncertainty about technology</td>
<td>+ / -</td>
<td>Wait</td>
</tr>
<tr>
<td></td>
<td>Reduced adoption cost</td>
<td>+</td>
<td>Adopt</td>
</tr>
<tr>
<td></td>
<td>Cheaper information</td>
<td>+</td>
<td>Wait</td>
</tr>
<tr>
<td></td>
<td>Better information</td>
<td>+</td>
<td>Wait</td>
</tr>
<tr>
<td></td>
<td>Improved future technology prospects</td>
<td>+</td>
<td>Wait</td>
</tr>
</tbody>
</table>

Modified from Smith and McCardle
A significant fraction of the overall value potential from oil & gas investments comes from flexibility.
Two Cheers for Uncertainty

- The enemy is not uncertainty but our lack of acceptance of it combined with a biased and error prone approach to dealing with it.
- Embracing uncertainty requires a deep awareness of the fact that we are dealing with a world for which we do not have perfect information, do not fully understand, and never will.

Uncertainty is not a negative; combined with decision flexibility it can be a source of value.