

# Superior decision making

Bart Willigers

13 May 2013

## The E&P industry:

- 75%  
\$1bln

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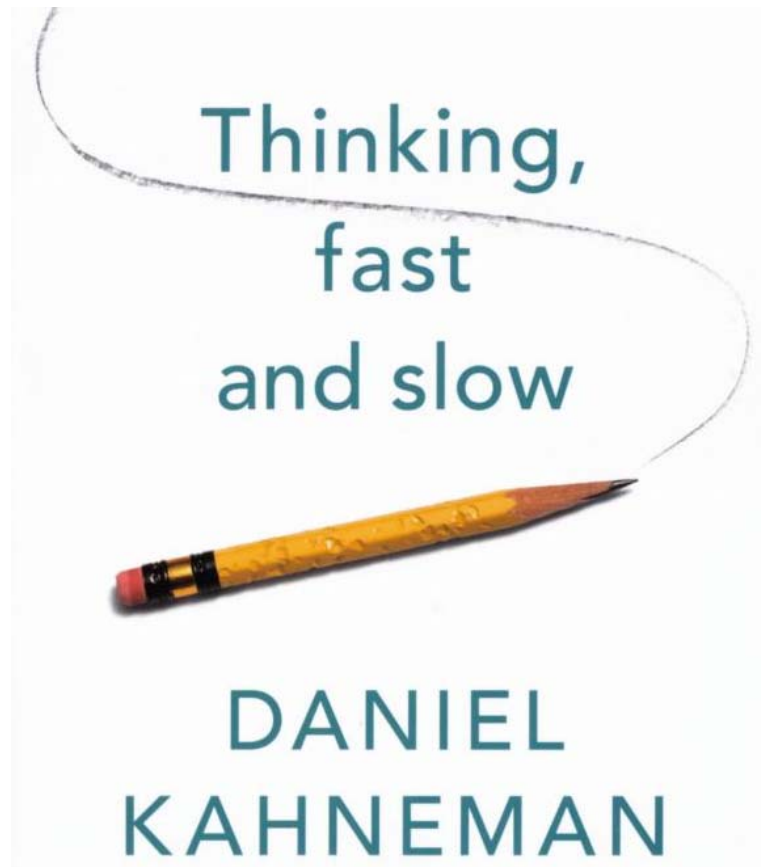
- 75% of E&P mega-project (costs in excess of \$1bln) fail

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## Independent Project Analysis (IPA)

- After analysing hundreds of mega-project over three decades Edward Merrow concludes:
  - “Most of the big mistakes that companies make...stem from a incapacity to pursue a common goal with clarity and lack of front end definition”
  - Cause: Time and money?

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## Answering judgmental questions

### **System 1**

- Intuitive
- Spontaneous
- Effortless
- Fast

### **System 2**

- Rule-governed
- Effortful
- Slow

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# Answering judgmental questions

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# Answering judgmental questions

## System 1

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## System 2

- Rule-governed
- Effortful
- Slow
- True or false:  $23*14 > 27*12$

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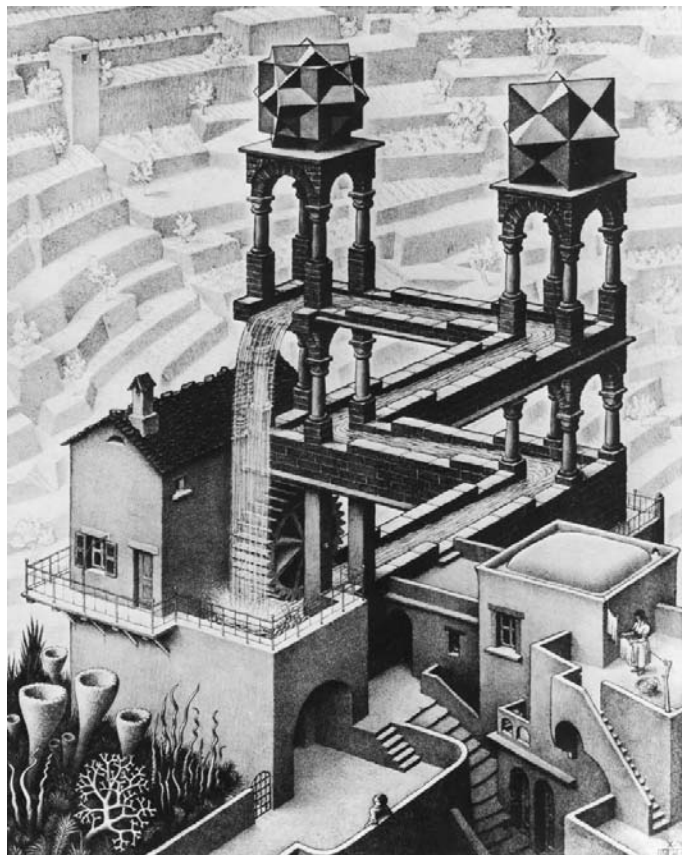
# Question....

- How many animals of each kind did Moses take into the ark?

# Question....

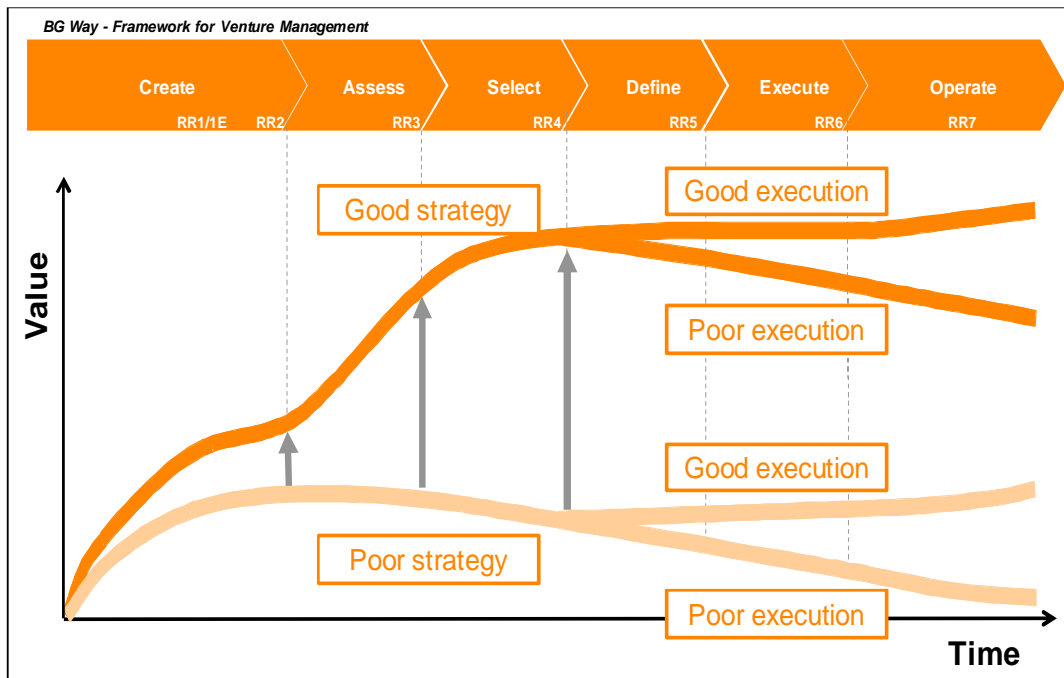
- How many animals of each kind did **Moses** take into the ark?

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# Value creation



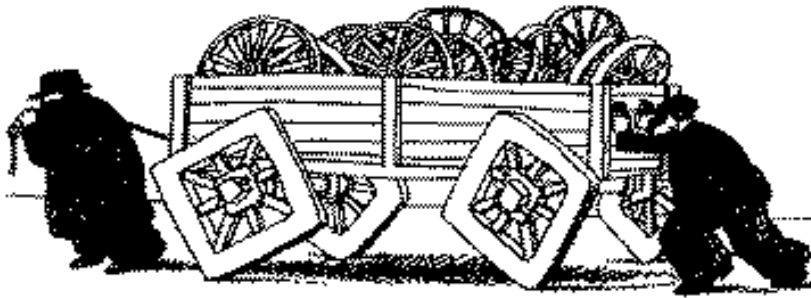
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# There is no time..

- We don't have time to analyse!
- Lets' do it!



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# There is no time..



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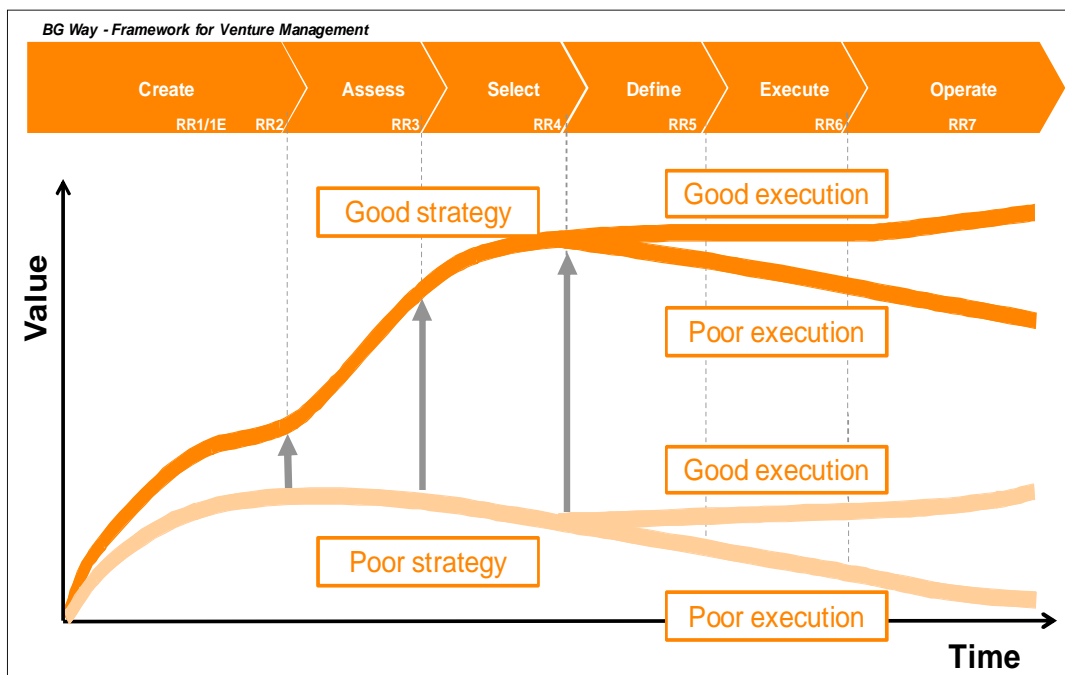


# Let's do it!



Gary Gilmore: "Let's do it!"

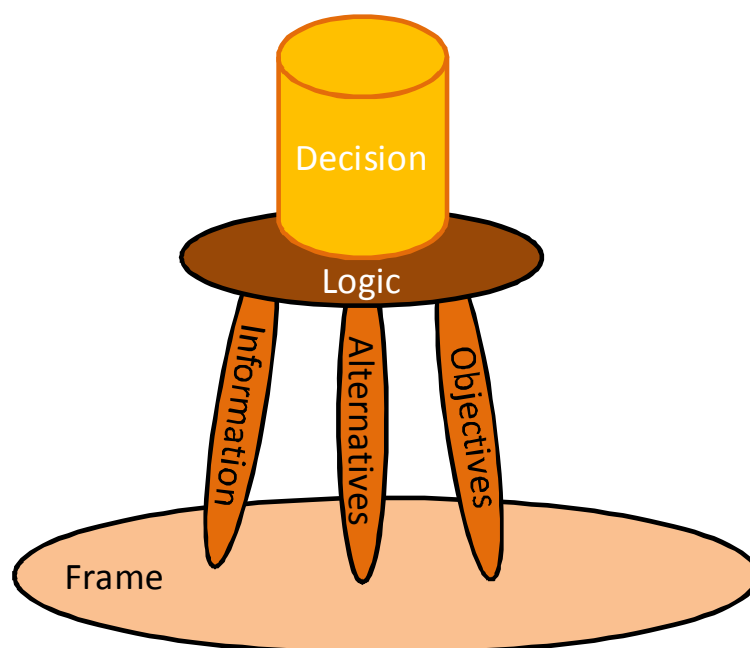
## Value creation



# DECISION ELEMENTS

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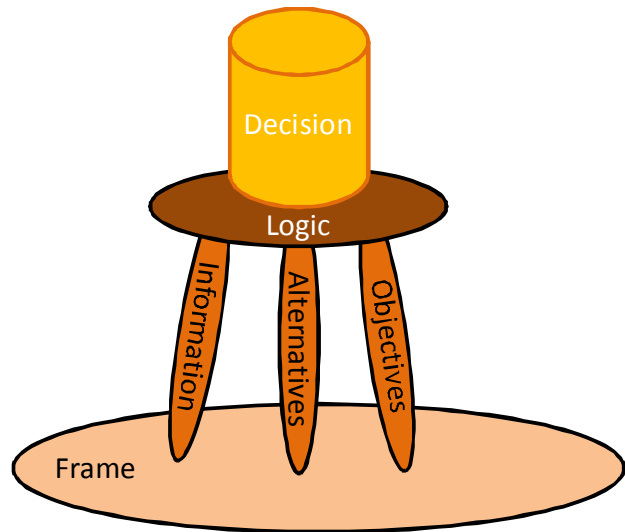
## Howard's stool



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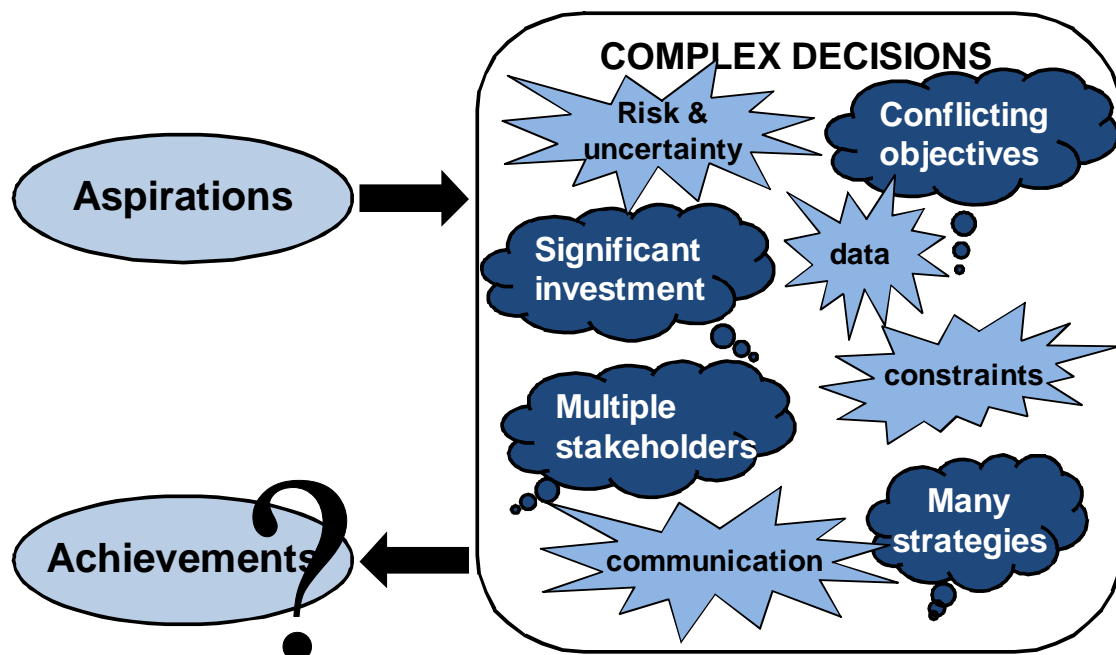
# Decision elements

- Frame
  - Define the question at hand and involve the right people
- Valid and unbiased information
  - Without information one is merely guessing
- Alternatives
  - If there is only a single option one is dictated what to do
- Objectives
  - What does a decision maker wants to achieve?
- Decision logic
  - Determine payoff and rank the alternatives



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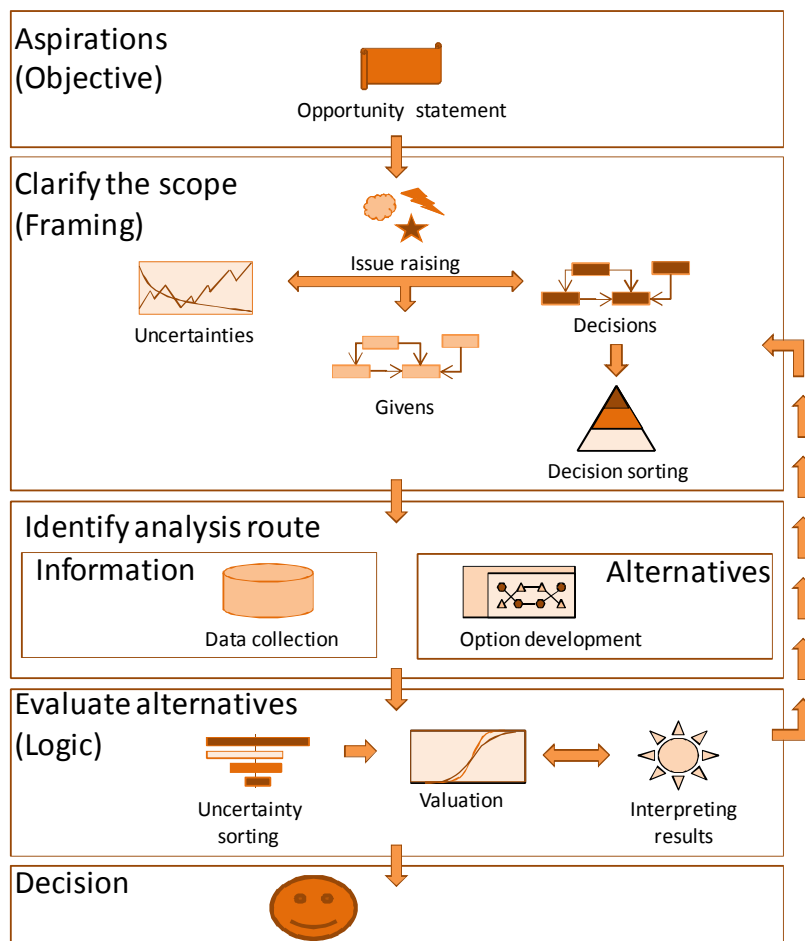
DRA: when



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# Decision analysis

- Decision analysis:
  - Is a process used to evaluate complex problems.
  - Creates a rational decision making framework
  - Compares project development options in terms of values and uncertainties
  - Provides guidance, information, insight, and structure to the decision-making process in order to make better, more 'rational' decisions.



# Why is E&P decision making difficult?

- The spectrum of decisions
- Many one-off-decisions
- The large number of experts that have to be consulted to gather all relevant information
- The large uncertainty of important value drivers
- Competing objectives whose metrics are often difficult to compare
- Lack of clarity on the real objective of the decision makers.

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## The expert's view



- When Ronald Howard was asked in 2011 about the challenge of DA, he replied:  
“..the willingness to employ...”

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# Valuation of Swing Contracts by Least-Squares Monte Carlo Simulation

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## Summary

Natural gas and electricity are commonly traded in swing contracts that enable the buyer to exploit changes in supply or market demand by varying the quantity purchased from the producer (seller). The producer is assured of a fixed quantity at a fixed price, but must be able to supply the demand from the buyer. The flexibility of swing contracts for both parties to mitigate the risks and exploit market opportunities arise from uncertainty in production, demand, and prices. How valuable are they? Traditional net present value methods, based on expected values, cannot value this flexibility. Options/valuation techniques could not model the value of such contracts.

Taking gas contracts as an example, this paper shows how least-squares Monte Carlo (LSMC) can be used to quantify its value in dollar terms, for both producer and buyer. Because the value of a swing contract depends on the ability to respond to fluctuating prices, a useful model of swing contracts must capture the nature of these fluctuations.

development (size, timing, and sequence of drilling reserves on



SPE 164816

## Combining Geostatistics With Bayesian Updating to Continually Optimize Drilling Strategy in Shale Gas Plays

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## Abstract

We present a new methodology for improving the economic returns of shale gas plays. The development of an economically efficient drilling programme in such plays is a challenging task, requiring a large number of wells. Even after a relatively large number of wells have been drilled, the average well production and the variation of well performance (economics) remains highly uncertain. The ability to delineate a shale play with the fewest number of wells and to focus drilling in the