Risk Analysis for Unconventional Resource Opportunities*

By
William Haskett[1]

Search and Discovery Article #40320 (2008)
Posted October 1, 2008

*Adapted from oral presentation at AAPG Annual Convention, San Antonio, TX, April 20-23, 2008

[1]Decision Strategies Inc., Houston, TX. (bhaskett@decisionstrategies.com)

Abstract

A decidedly different approach must be taken for risk analysis (chance and uncertainty) in unconventional opportunities. Due to the non-applicability of field size distributions (FSD's), a new approach to range-based resource estimation involving multiple well size distributions (WSD's) is warranted. Single WSD evaluation methods are inherently flawed resulting in gross error, inclusion of significant bias (usually upside), and poor development decisions. Uncertainty envelopes for both resource and production potential form the starting point for evaluation. As seen in a typical Shale Gas project, the impact on NPV of resource uncertainty is greatly reduced from that of conventional opportunities, whereas, production and cost uncertainty have significantly increased impact. Unconventional assessments should provide guidance as to the certainty of making a correct decision as opposed to simply calculating a mean or deterministic result on a risked or success basis. Valid opportunity assessment is enabled through a full value-chain approach that helps make land, pilot, and development decisions in a timely and effective manner.

Risk Analysis for Unconventional Resource Opportunities

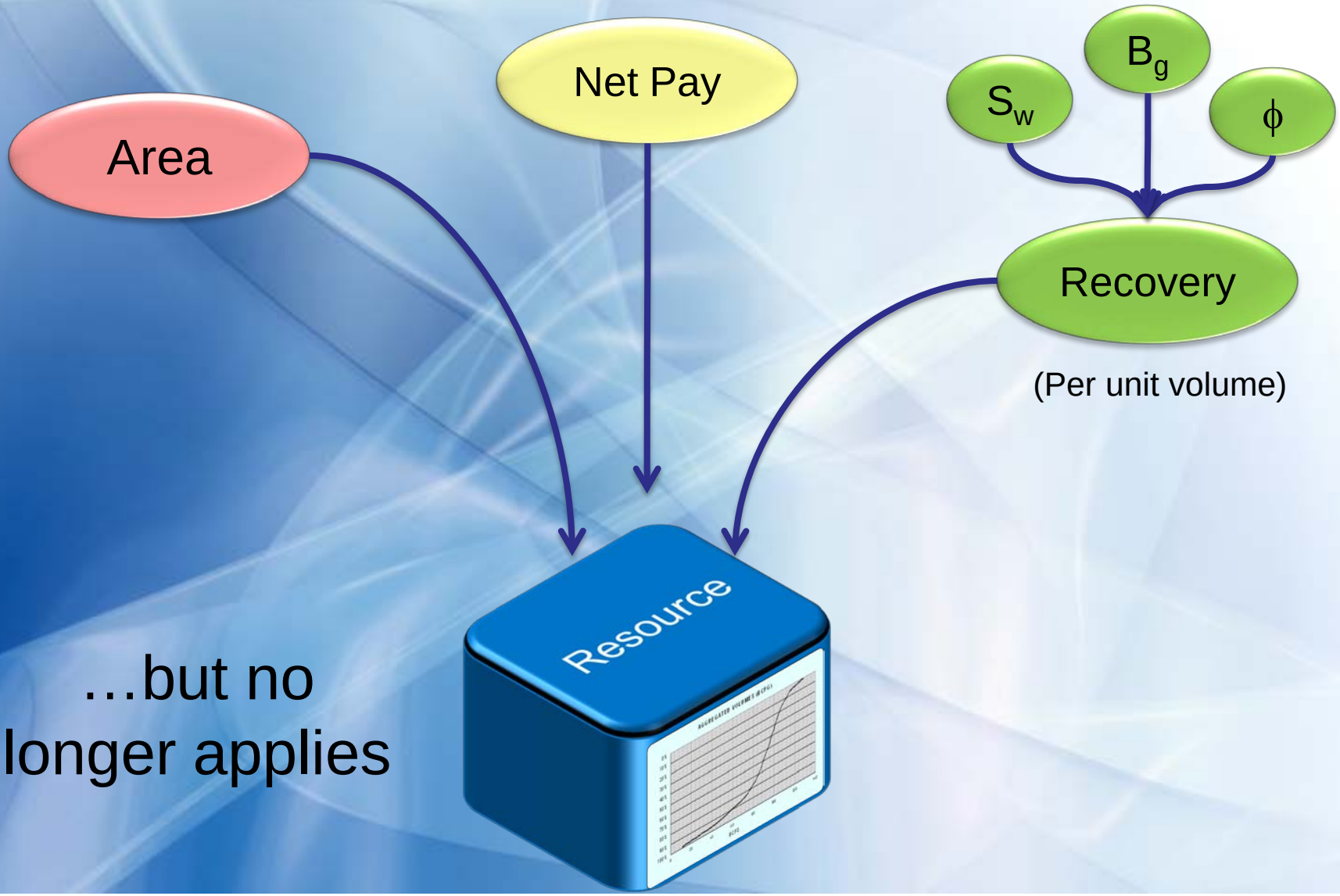
Bill Haskett

AAPG - April 21, 2008

CONFIDENCE THROUGH CLARITY

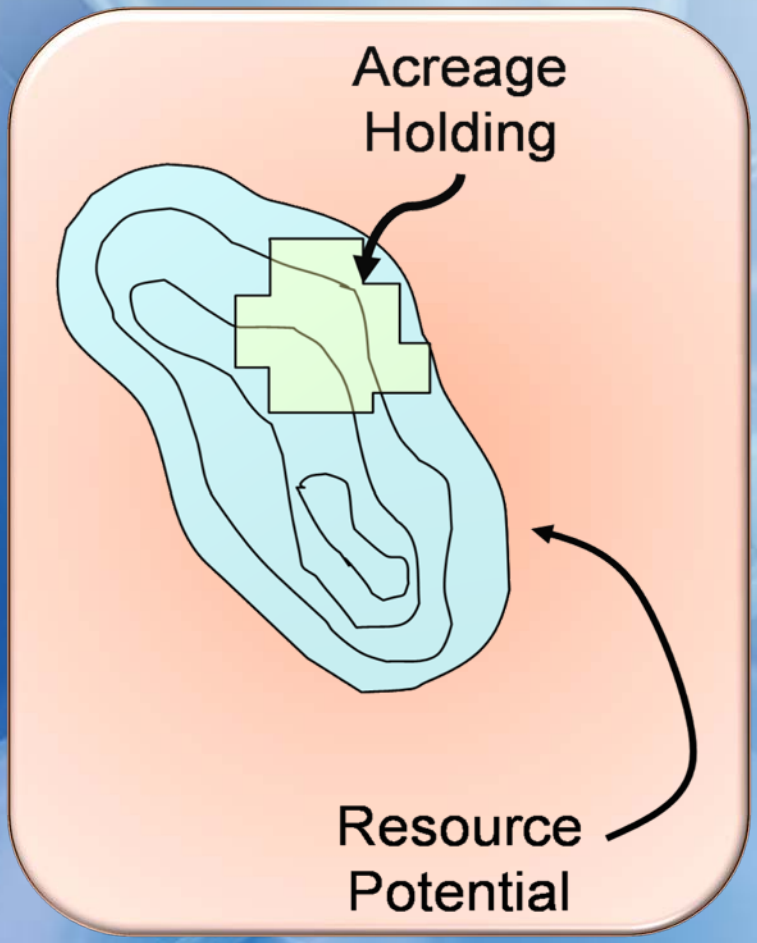
Decision Strategies

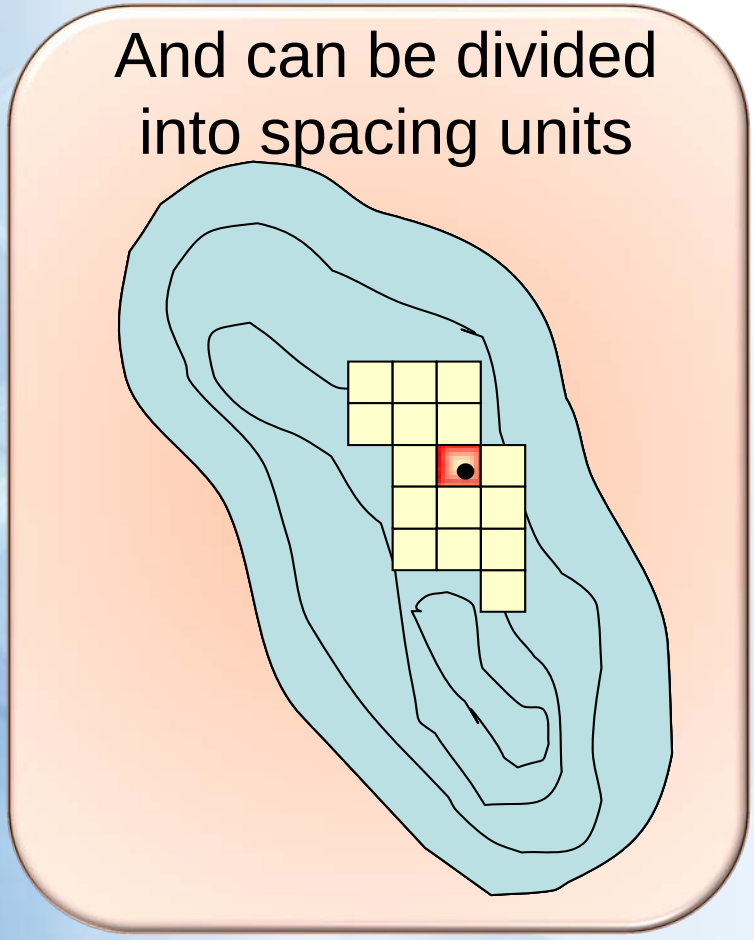
Conventional seemed straight-forward…



…but no longer applies

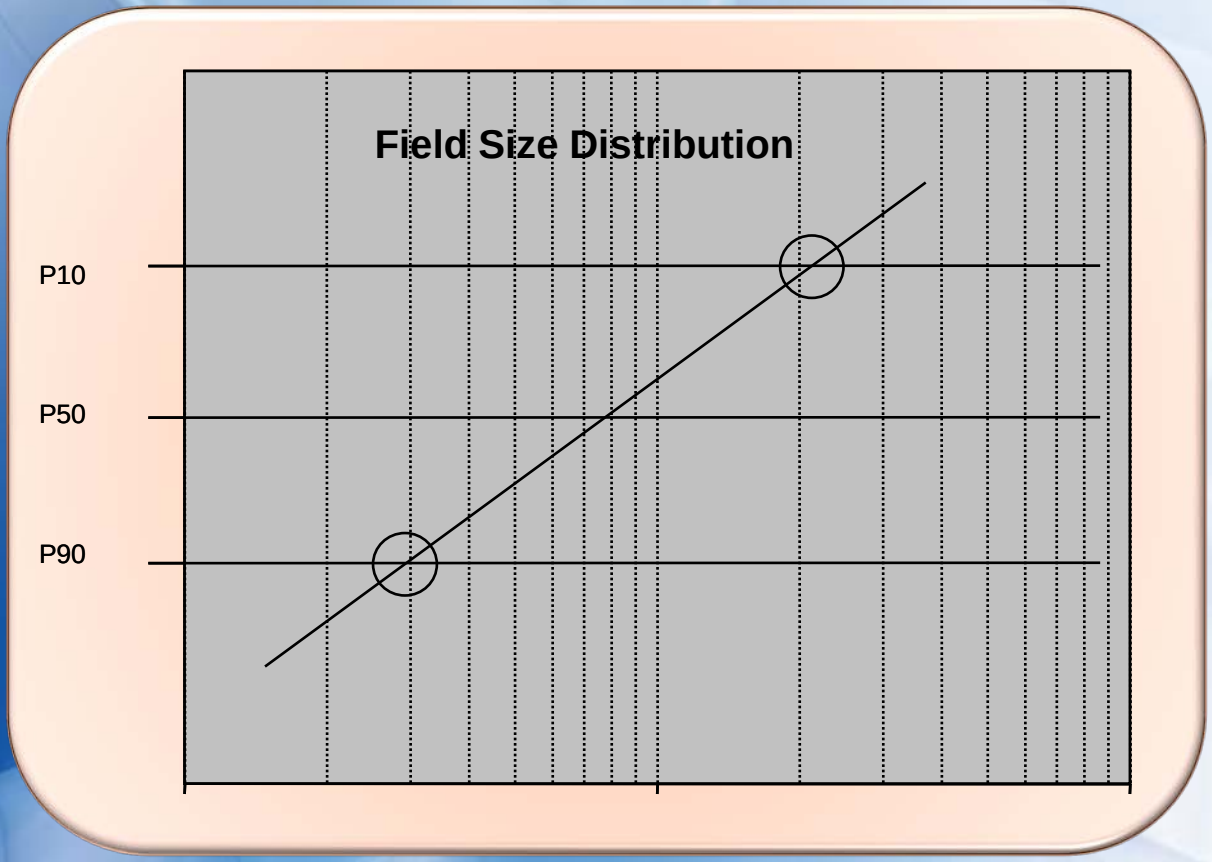
In Unconventional, the area of potential is usually big.





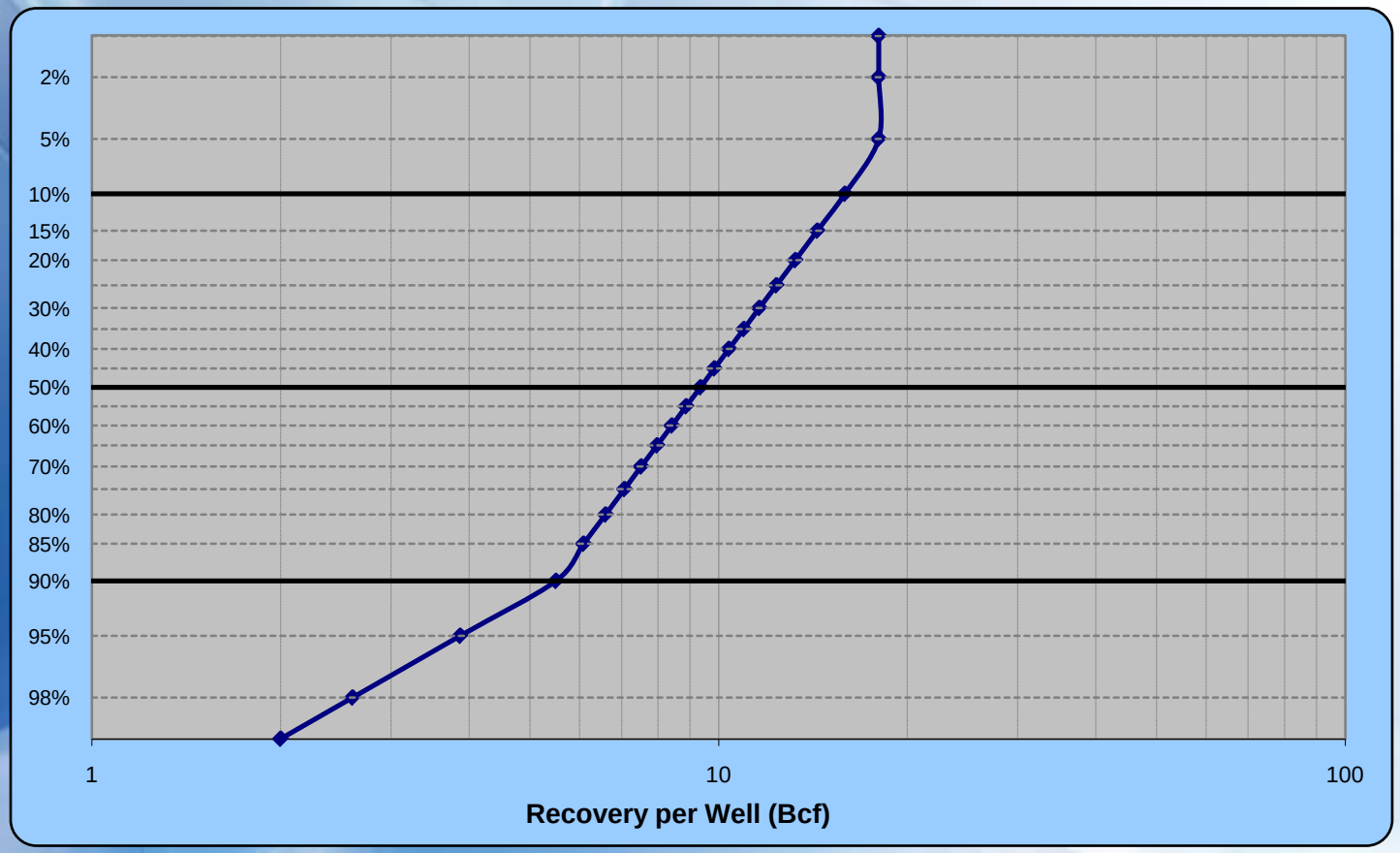
The collection of spacing units forms a “Pseudo-Field”

Conventional uses Field Size Distributions



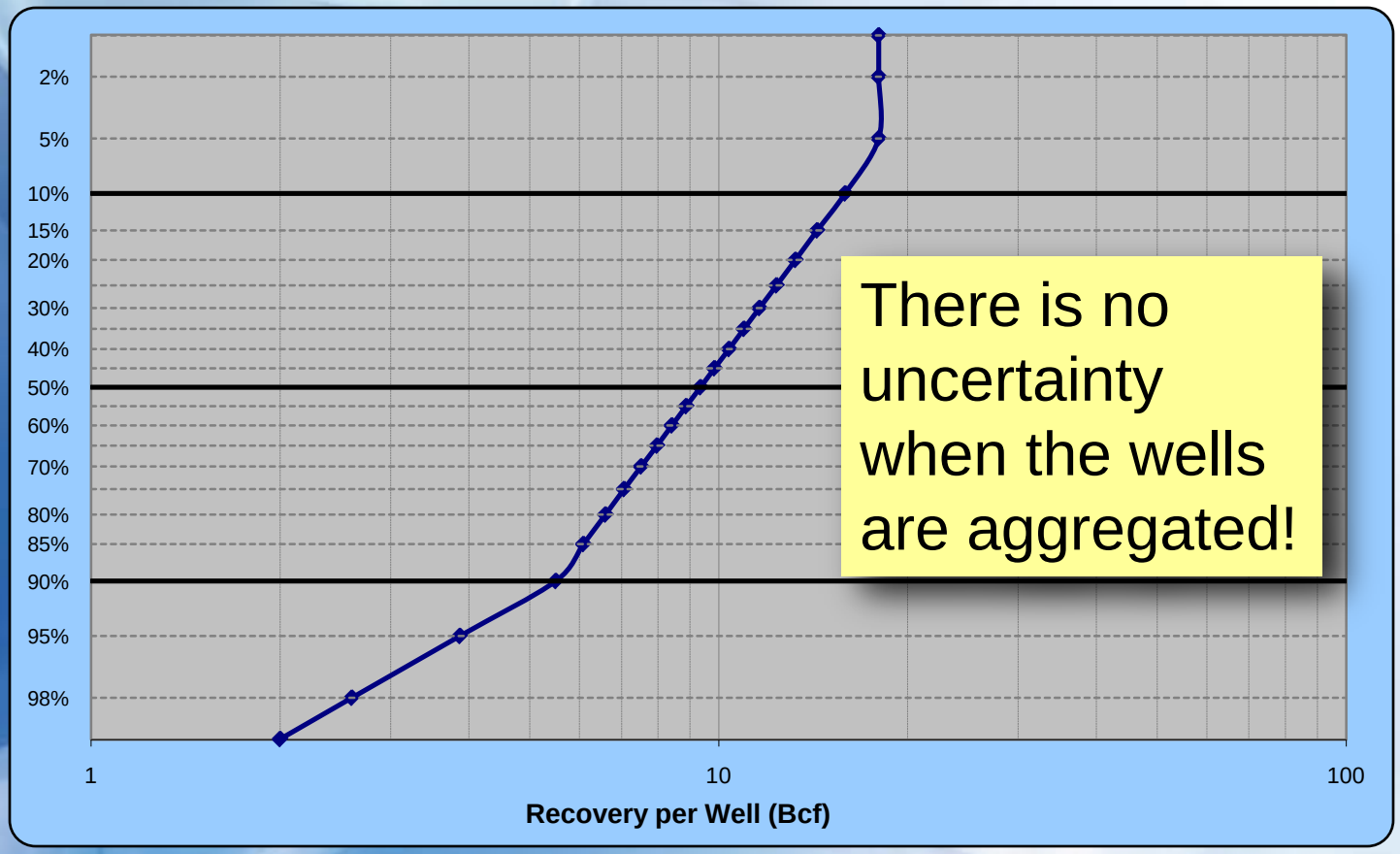
But remember… each field is a collection of wells… or spacing units

Meet the Well Size Distribution



Every field has a family of wells.
Good wells… and bad wells

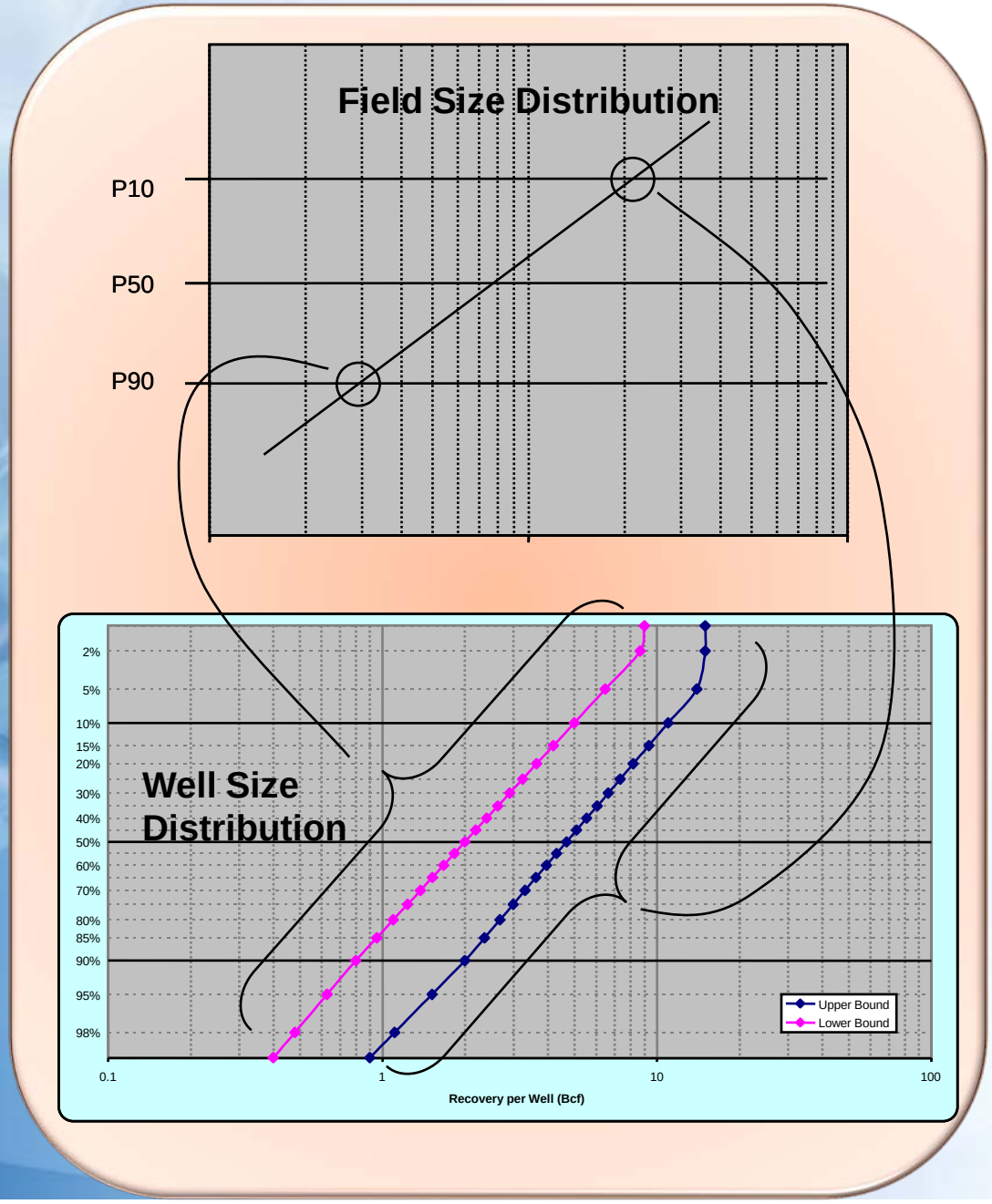
But even Well Size Distributions Have Problems



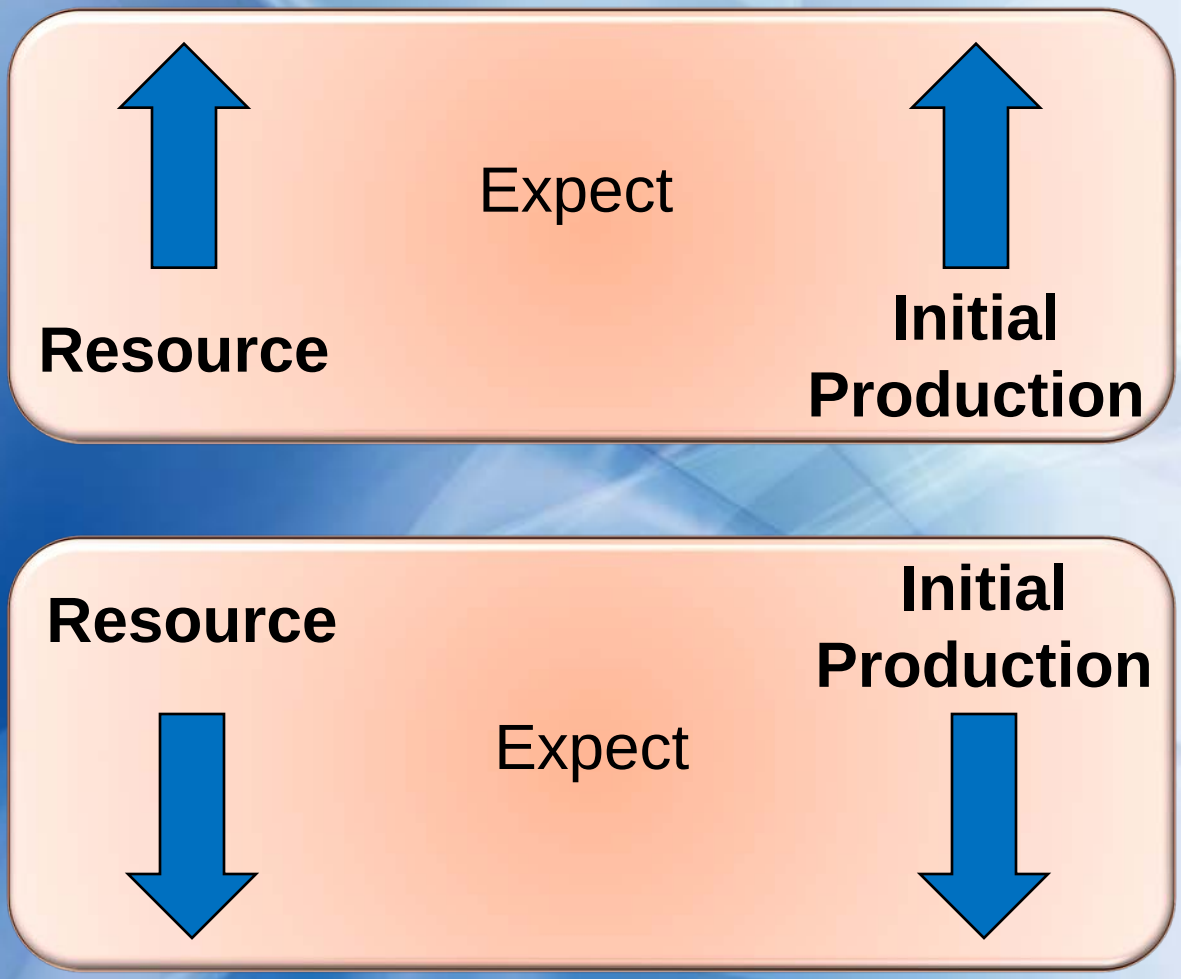
Even though it has a distribution, it only has one mean… so

The Correct Approach is an Envelope

An unconventional opportunity will have a resource unit distribution someplace in between the bounds

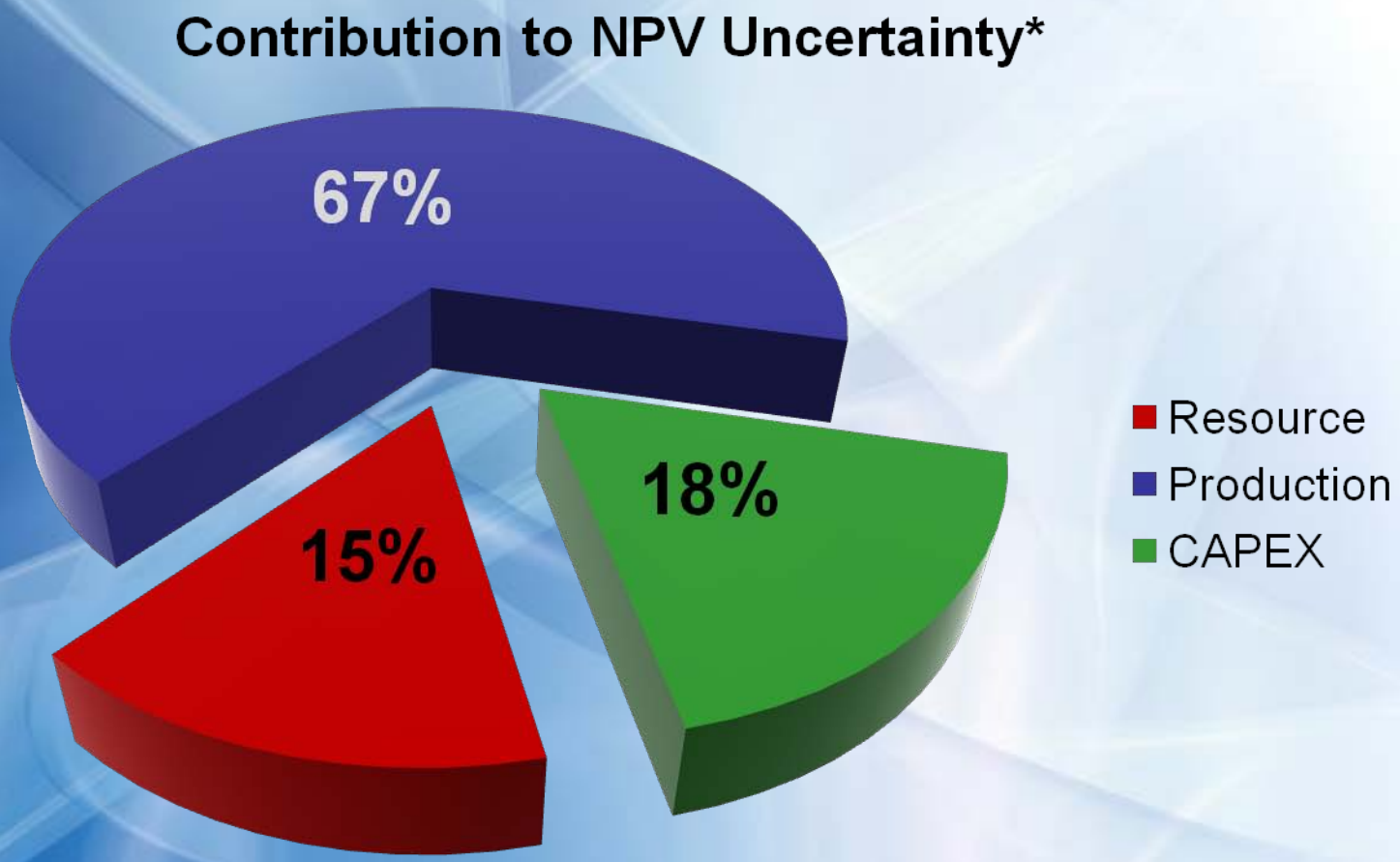


Envelopes are important for both Resource and Production



Correlation of Resource to IP implies an IP envelope is needed

Resource assessment forms the foundation but there is much more…



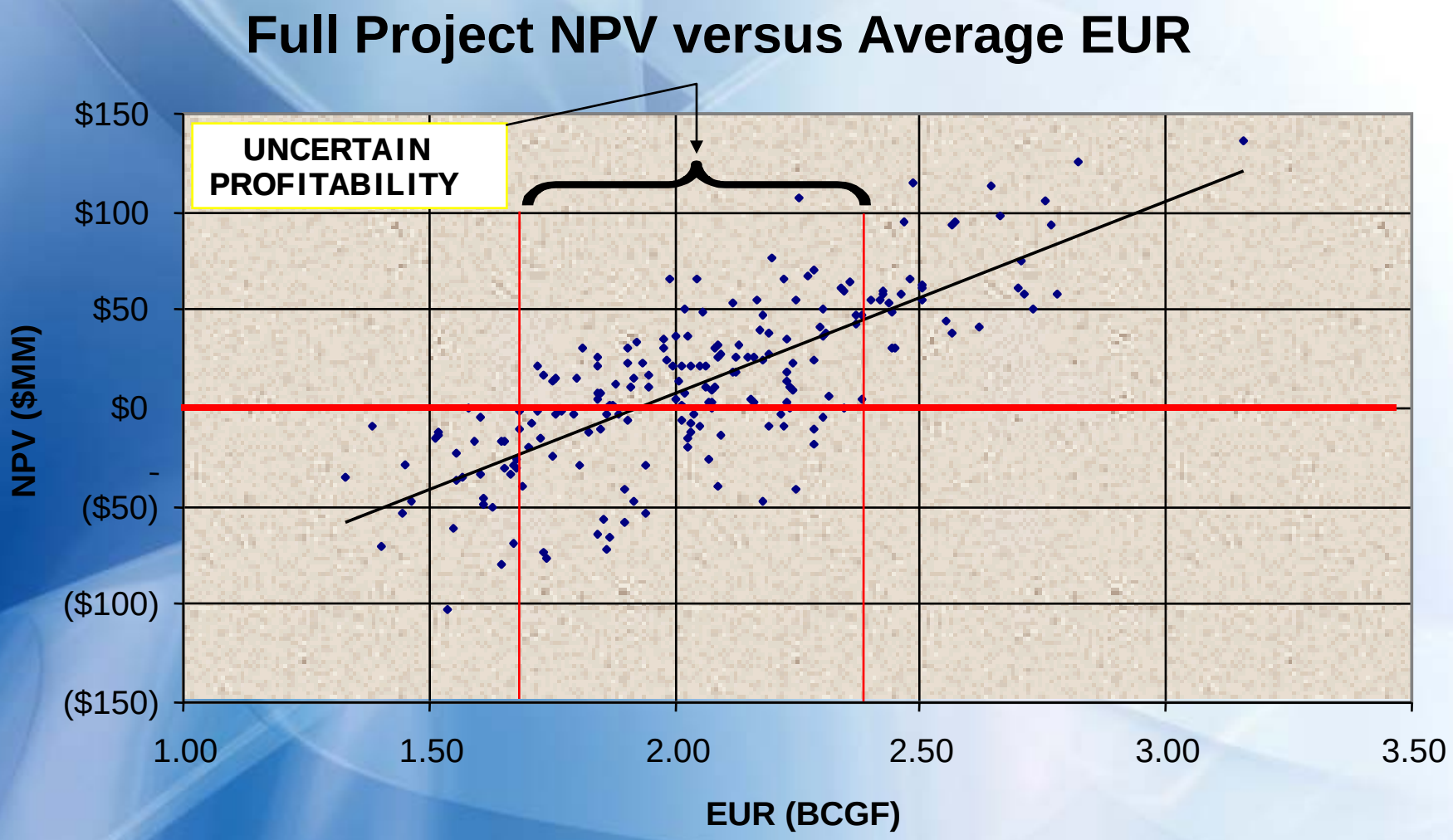
*Typical Gas Shale Play

Work on What Matters

A decision centric approach provides a better assessment

- Create a Learning Plan
  - Pilot objectives
  - Production testing
  - Capital Efficiency
- Recognize what would change your decision
- Ensure Project Management Skills
  - Are in place
  - Are appropriate for Learning and Factory phases

Ultimately we must make our decisions based on a Full Value-Chain approach



Full value chain allows you to manage Pilot, Land, and Rig decisions

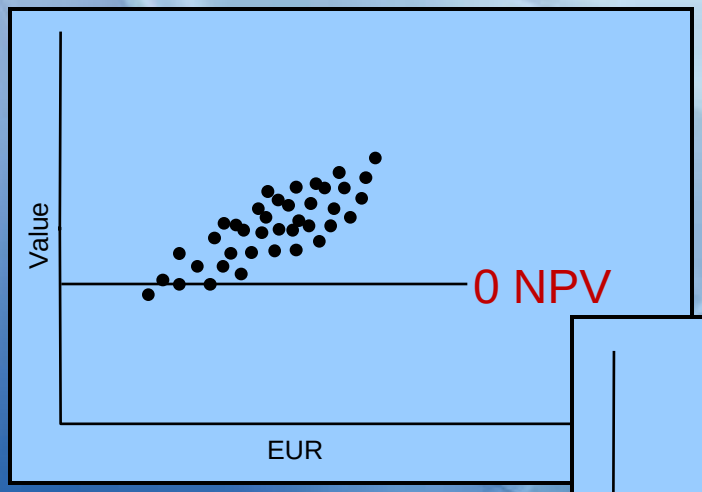
How much land and when?

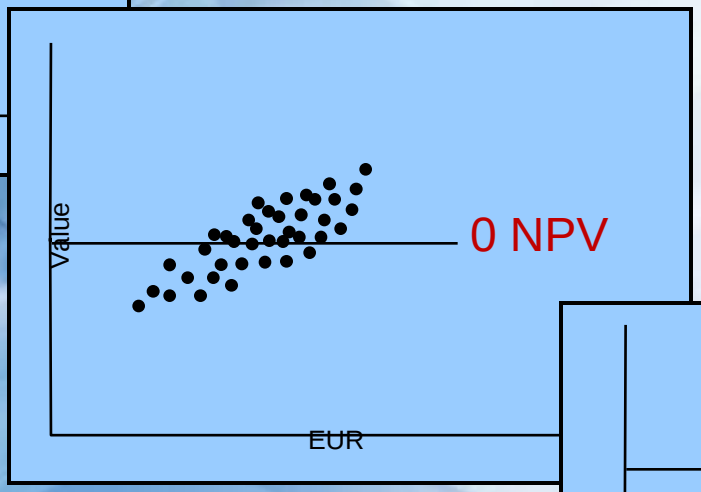
How large a pilot program?

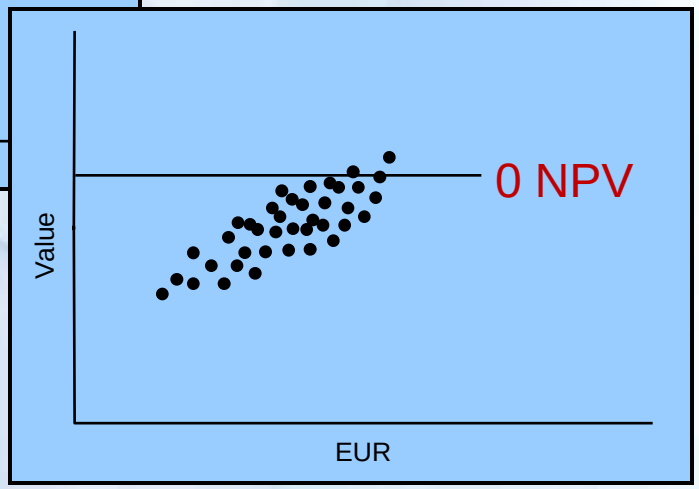
How many rigs and when?

It enables you to create an efficient ***Learning Plan***

How many pilot wells are needed?







If these charts show the aggregate project result uncertainty, and the information that provided this prediction is correct,

qualitatively, how many wells will you need to ensure you are making the correct profit oriented decision?

How many pilot wells do you drill?

Pilot Effectiveness

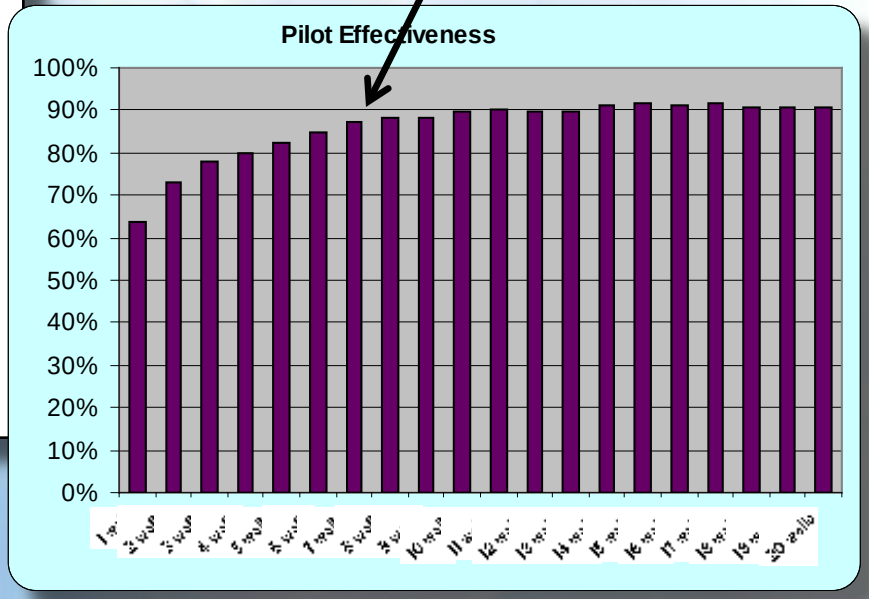
	Pilot Good Proj. Good	Pilot Good Proj. Bad	Pilot Bad Proj. Good	Pilot Bad Proj. Bad	Pilot Effective
1 well	61%	6%	31%	3%	64%
2 wells	71%	6%	21%	2%	73%
3 wells	76%	6%	16%	2%	78%
4 wells	77%	6%	14%	3%	80%
5 wells	81%	7%	11%	2%	82%
6 wells	83%	7%	8%	2%	85%
7 wells	86%	7%	5%	1%	87%
8 wells	87%	8%	4%	1%	88%
9 wells	87%	8%	4%	1%	88%
10 wells	89%	8%	2%	1%	90%
11 wells	90%	8%	2%	1%	90%
12 wells	90%	8%	2%	0%	90%
13 wells	89%	8%	2%	0%	90%
14 wells	91%	8%	1%	0%	91%
15 wells	91%	8%	0%	0%	92%
16 wells	91%	8%	0%	0%	91%
17 wells	91%	8%	0%	0%	92%
18 wells	91%	8%	1%	0%	91%
19 wells	91%	8%	1%	0%	91%
20 wells	91%	9%	1%	0%	91%

% outcomes that are full-cycle positive

91%

Diminishing learning with additional drilling

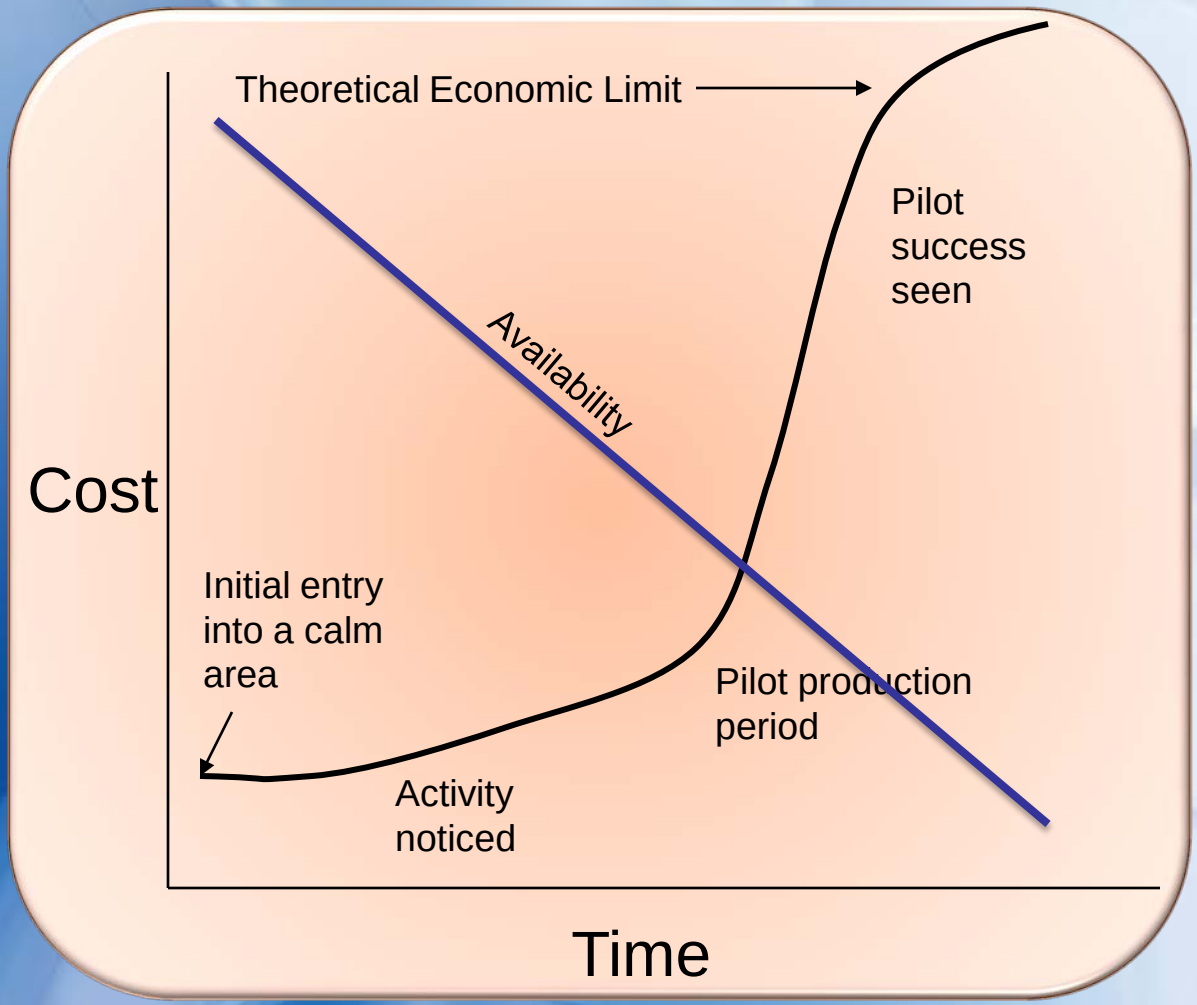
“Optimal” Wells



‘True Positives’

‘True Negatives’

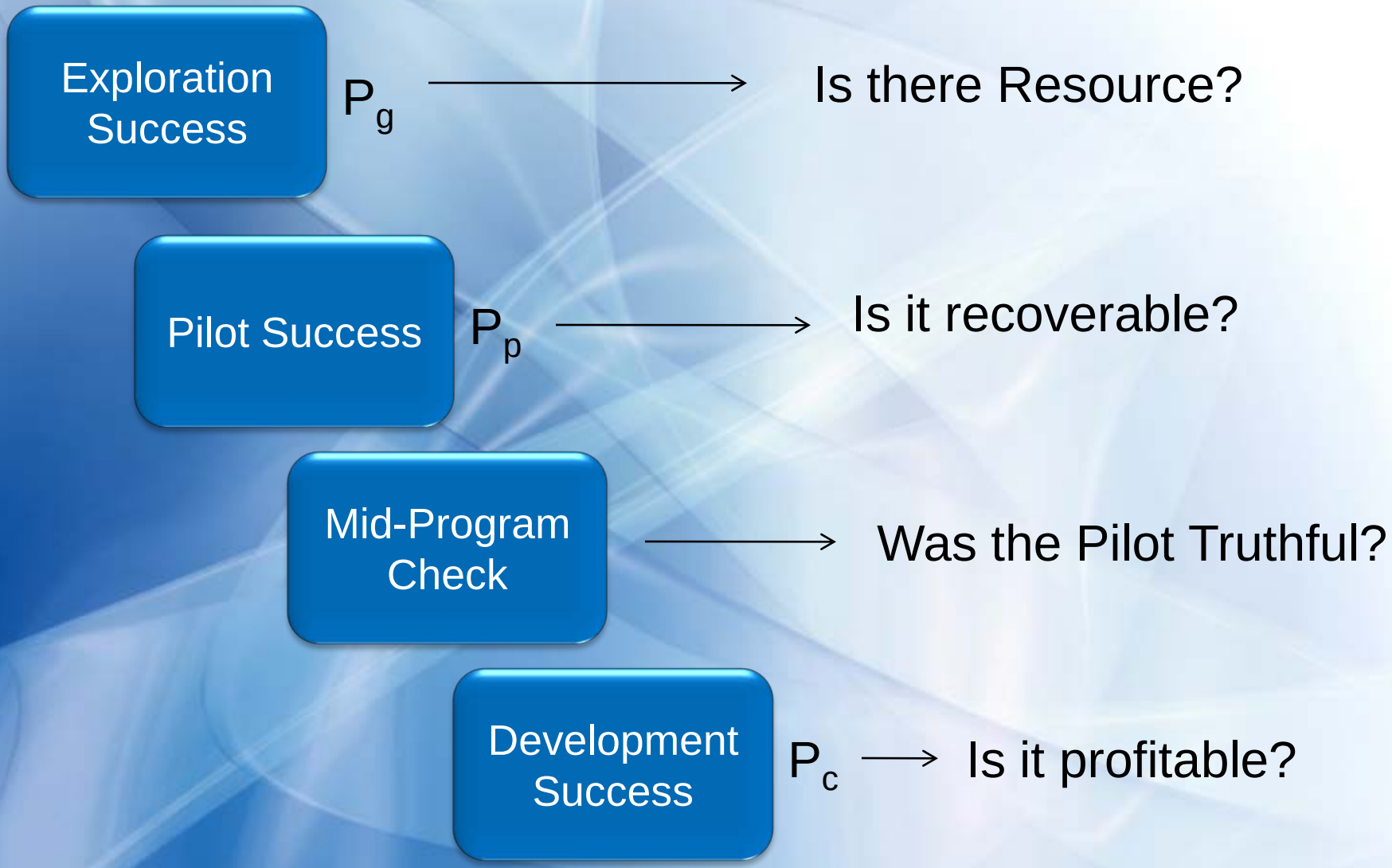
How much land do you secure before the pilot result is known?



- High early purchase risks stranding capital or direct loss from pilot failure
- Both Risk and Cost based optimization
- Potential competition reduces land availability for late acquisition
- Increased competition elevates price for late acquisition

What MUST you know??

Entry and development decisions



Risk Analysis for Unconventional Resource Opportunities

Bill Haskett
Principal
Decision Strategies Inc.
713-526-2410
www.decisionstrategies.com

CONFIDENCE THROUGH CLARITY

Decision Strategies