

New Ideas and Their Diffusion

A Model For Exploration & Production Companies in the
21st Century

Arthur E. Berman

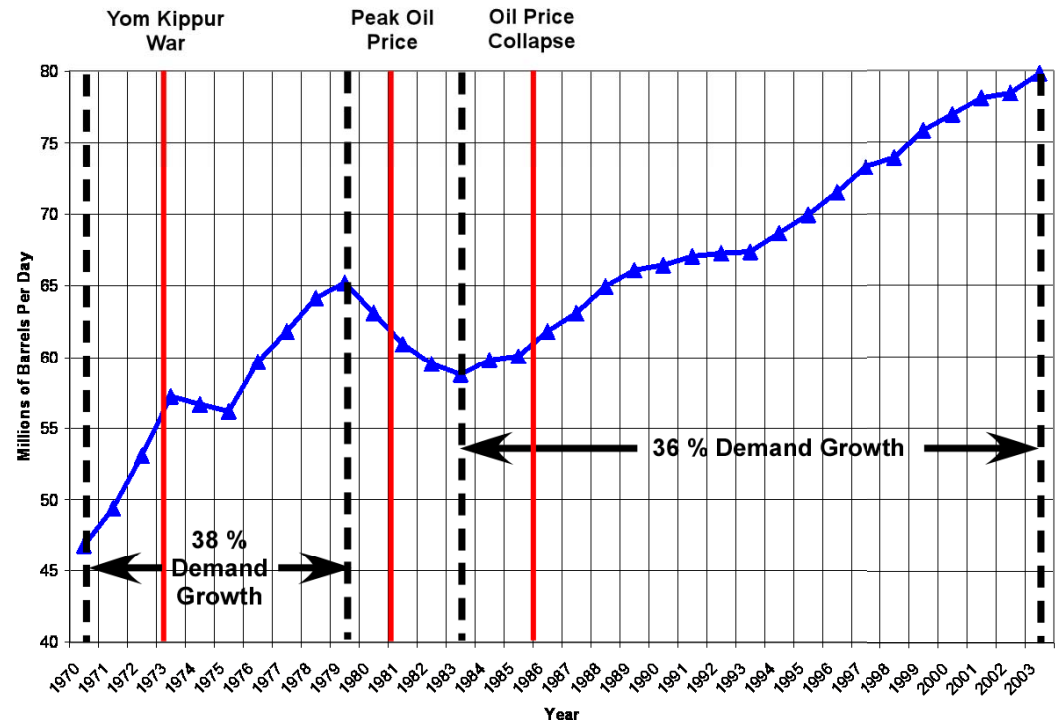
April 12, 2006

The E&P Organization At Its Limits: 25 years of Idea Neglect

- Industry in Crisis: prospect-constrained/ not replacing reserves, failed to see major trends in price, staff, declines
- Few new ideas from staff or management: the Diffusion Model
- E&P organizations lack means to change the current state because they refuse to embrace instability
- To survive, a paradigm must emerge based on the core business of finding oil and gas
- E&P companies must recognize that we are in a business primarily of ideas, not commodities
- We must develop an understanding of where new ideas come from and how they spread, then transform the E&P environment to accommodate this knowledge

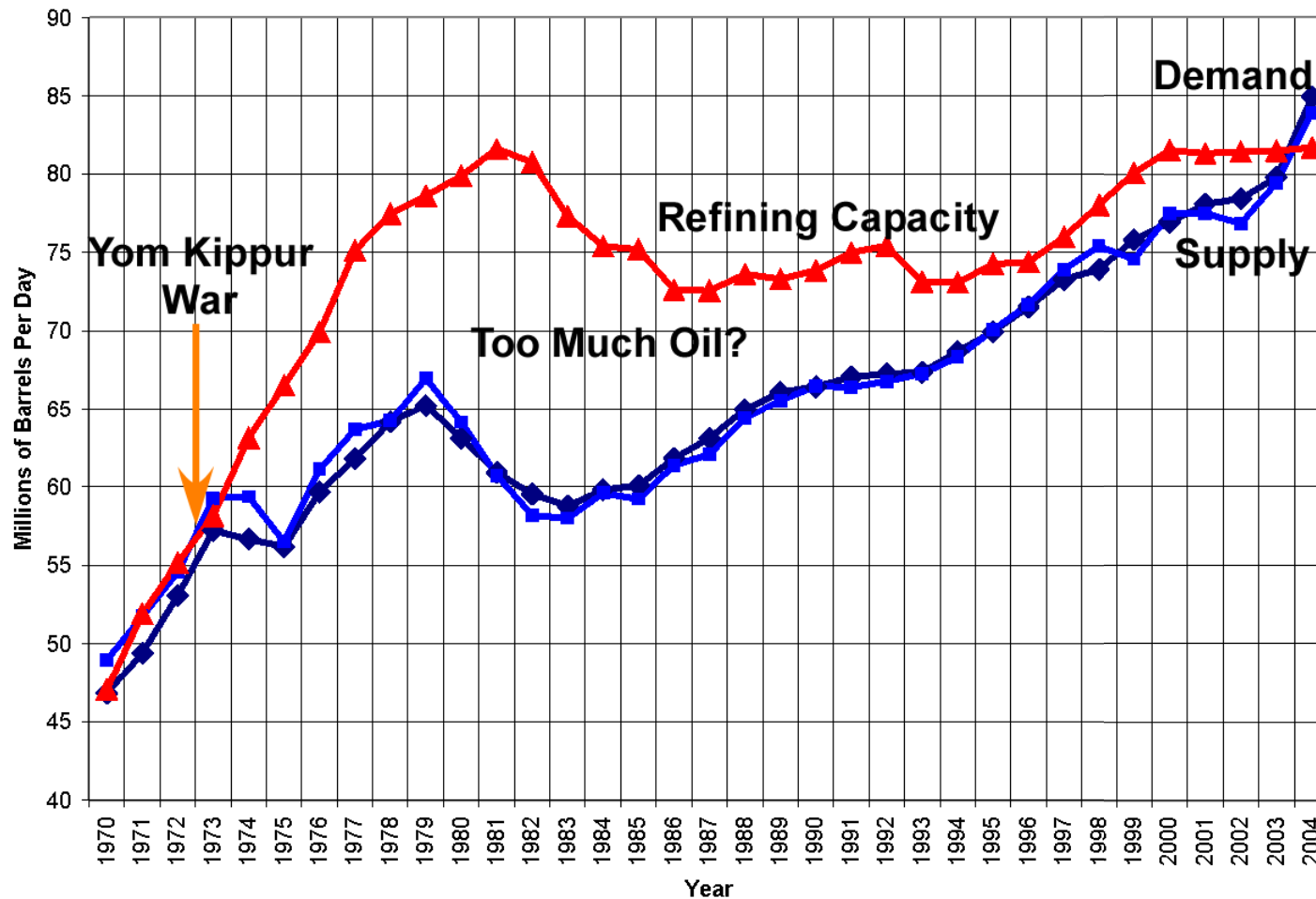
How We Got Into Trouble: Misunderstanding World Demand

- Fairly consistent demand growth since early 1970s
- Steady demand growth since price collapse
- 12.5 MMBOPD demand growth, 1995-2004
- Failure to understand the trend and belief that the world had too much oil
- Created siege mentality among technical staff by reductions and abusive treatment
- Closed research organizations
- Poisoned the nest for new entrants into petroleum fields
- Still failed to meet conventional standards for industry success

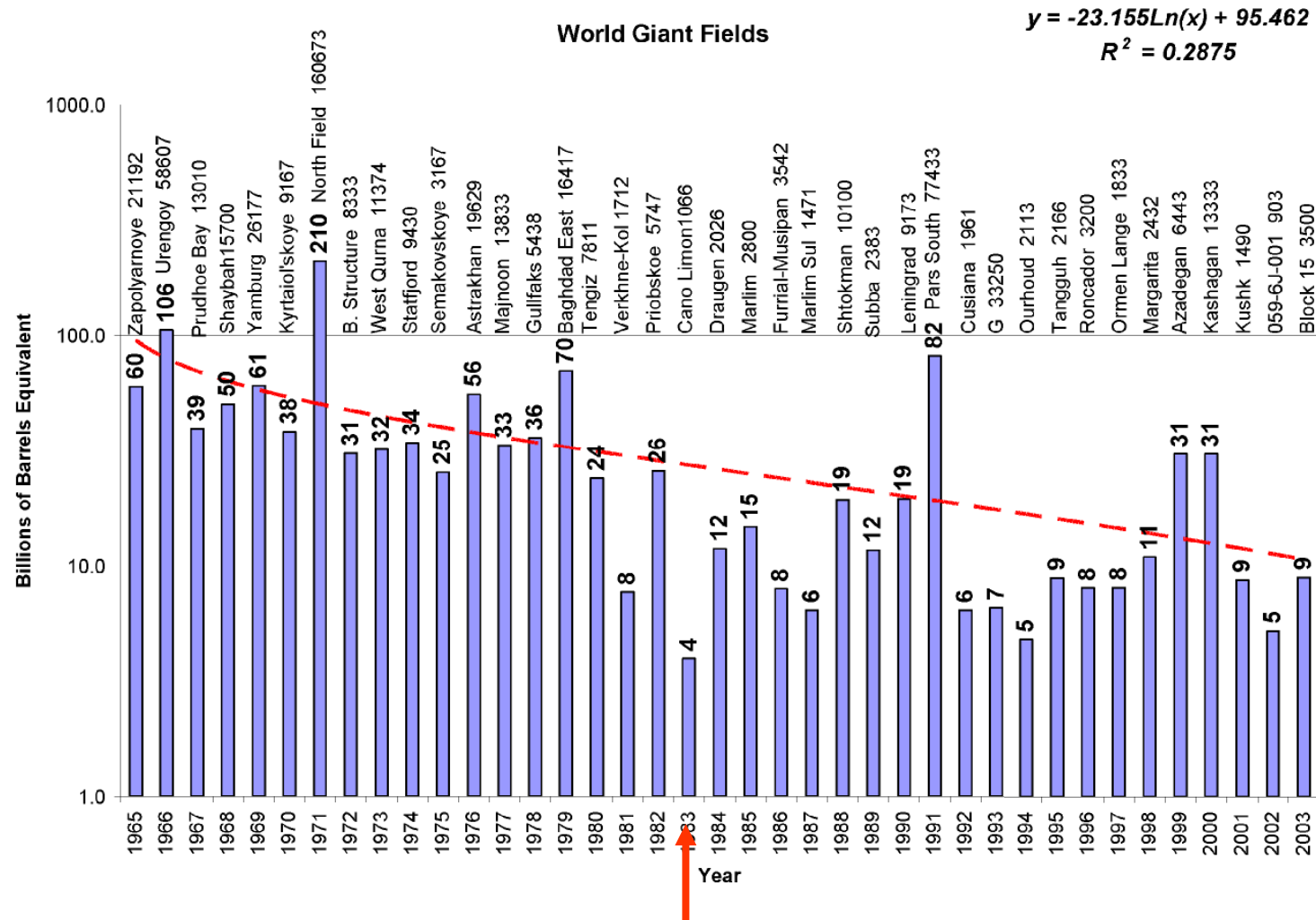


All this under the mantle of strategically managed companies!

How We Got Into Trouble: Mistaking Refining Capacity For Oversupply of Oil

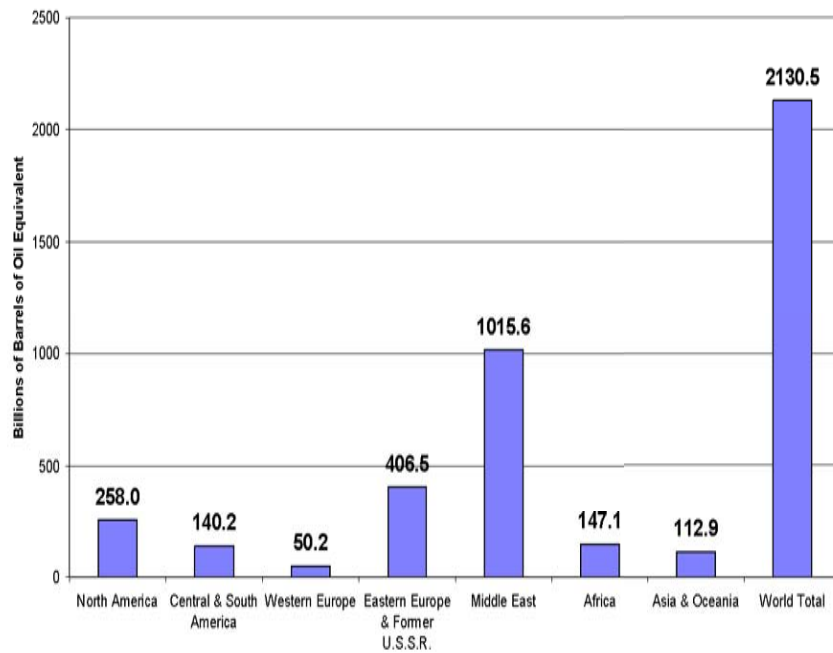


How We Got Into Trouble: Oil Companies Not Finding Big Reserves (and thinking the we could manage our way out using a risk analysis process)

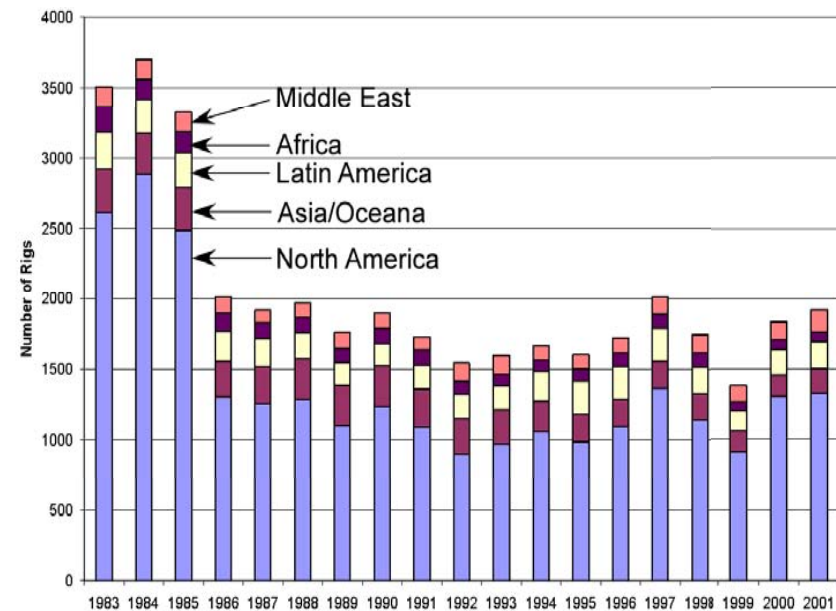


1983 Worst Year for Reserve Discovery

Current Petroleum Context Analysis : Oil Companies Not Finding Big Reserves

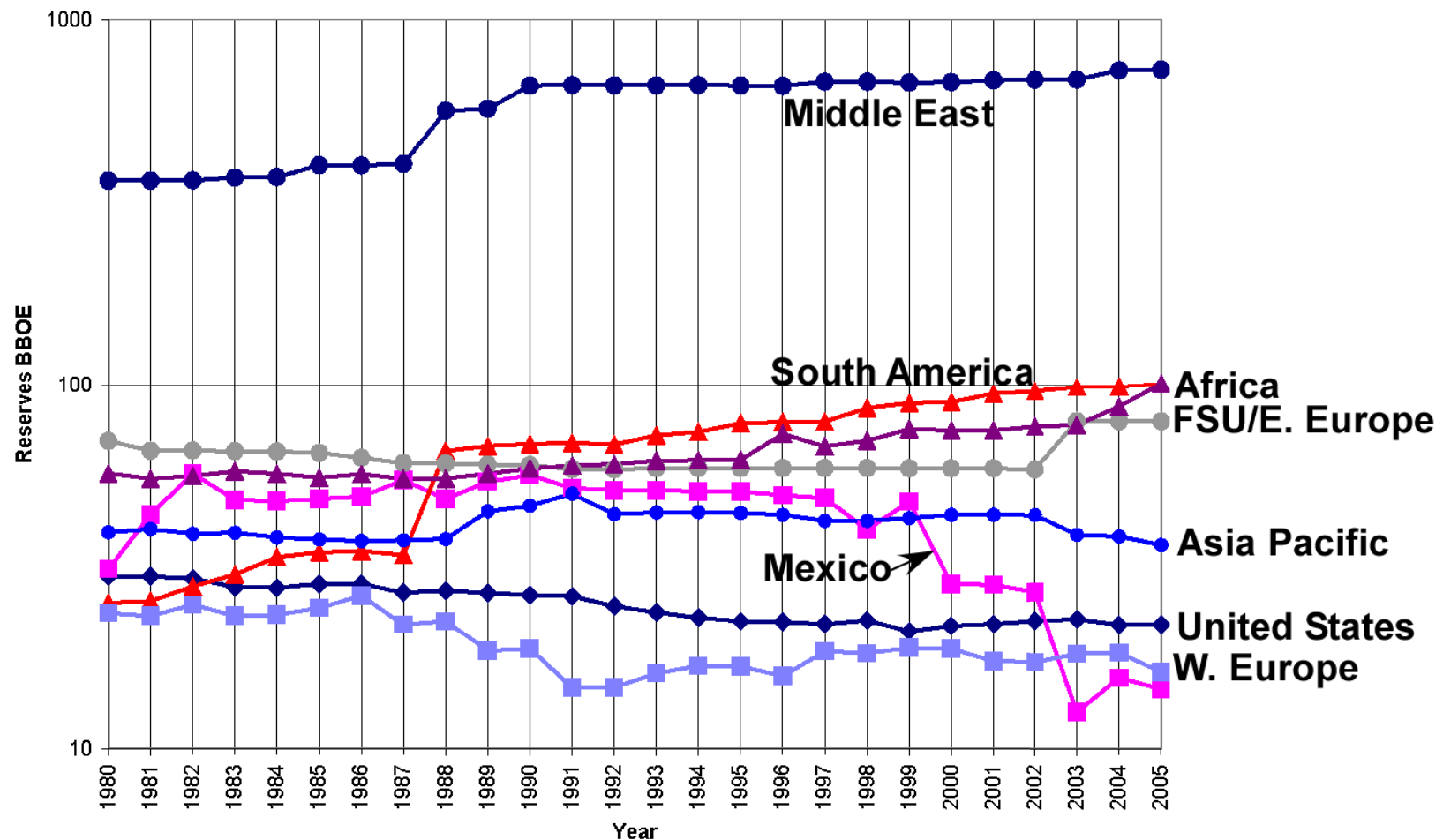


***Total Proved Reserves:
More Than ½ Remain***

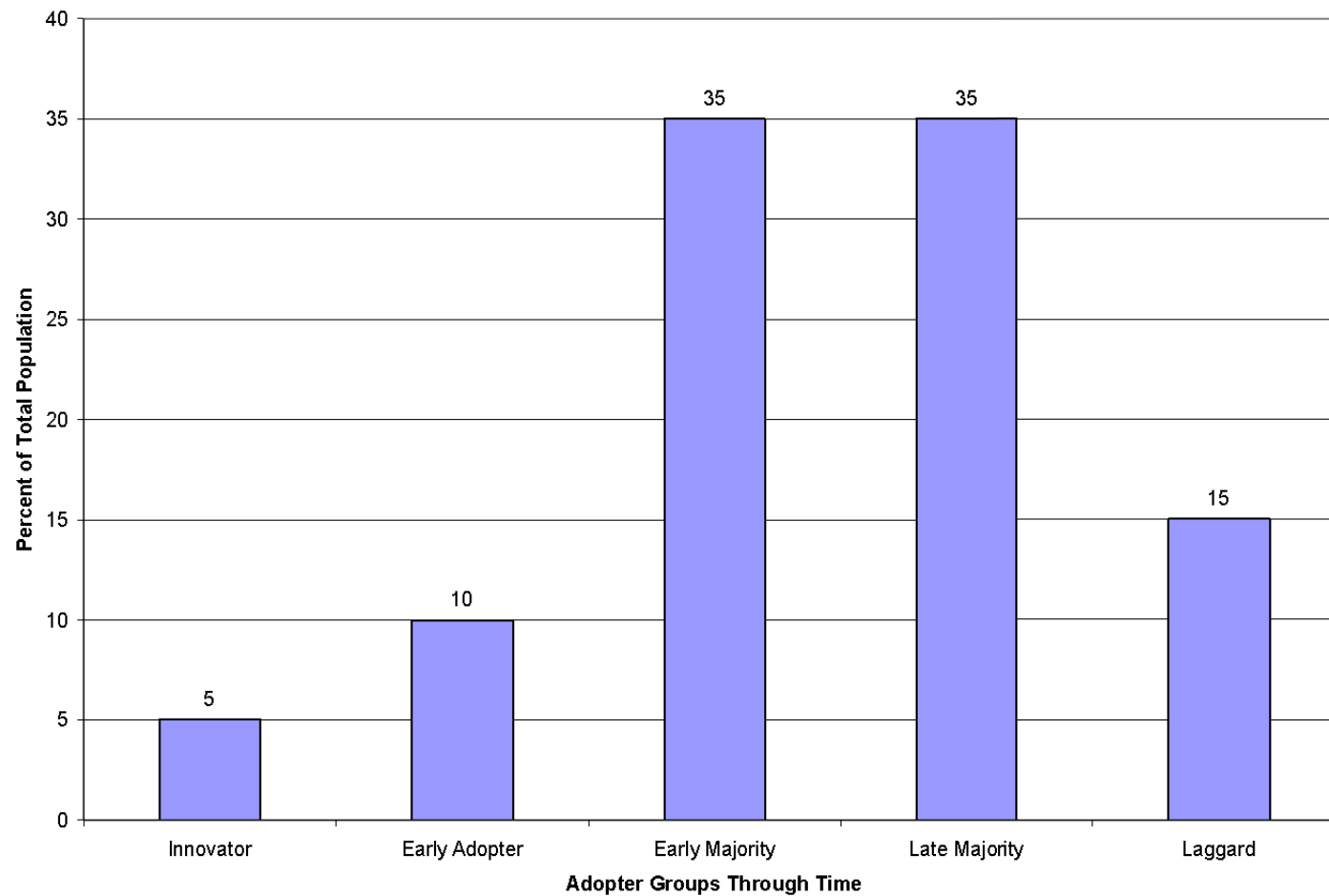


Worldwide Drilling Activity

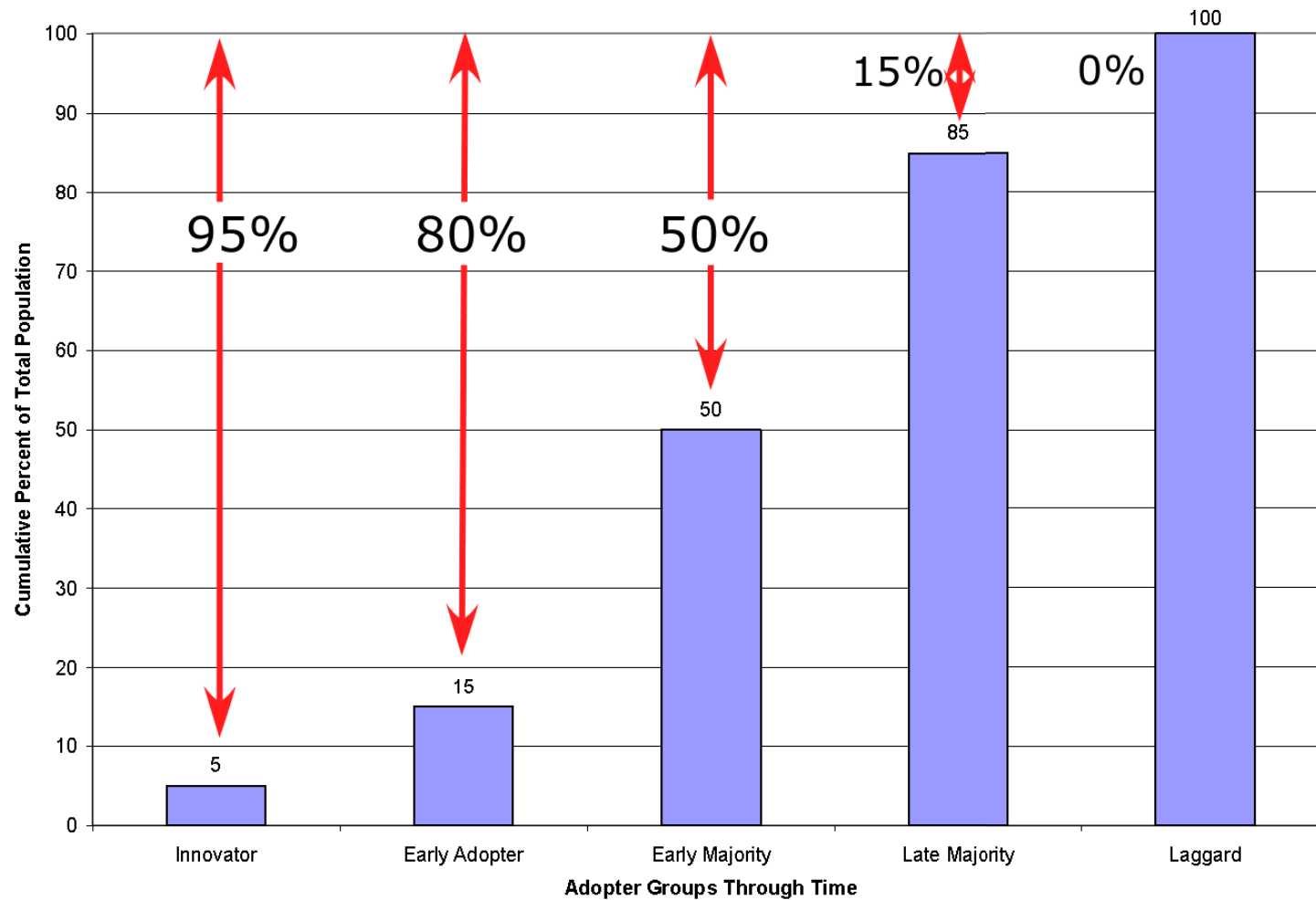
*How We Got Into Trouble: :
How well are the state oil companies doing?*



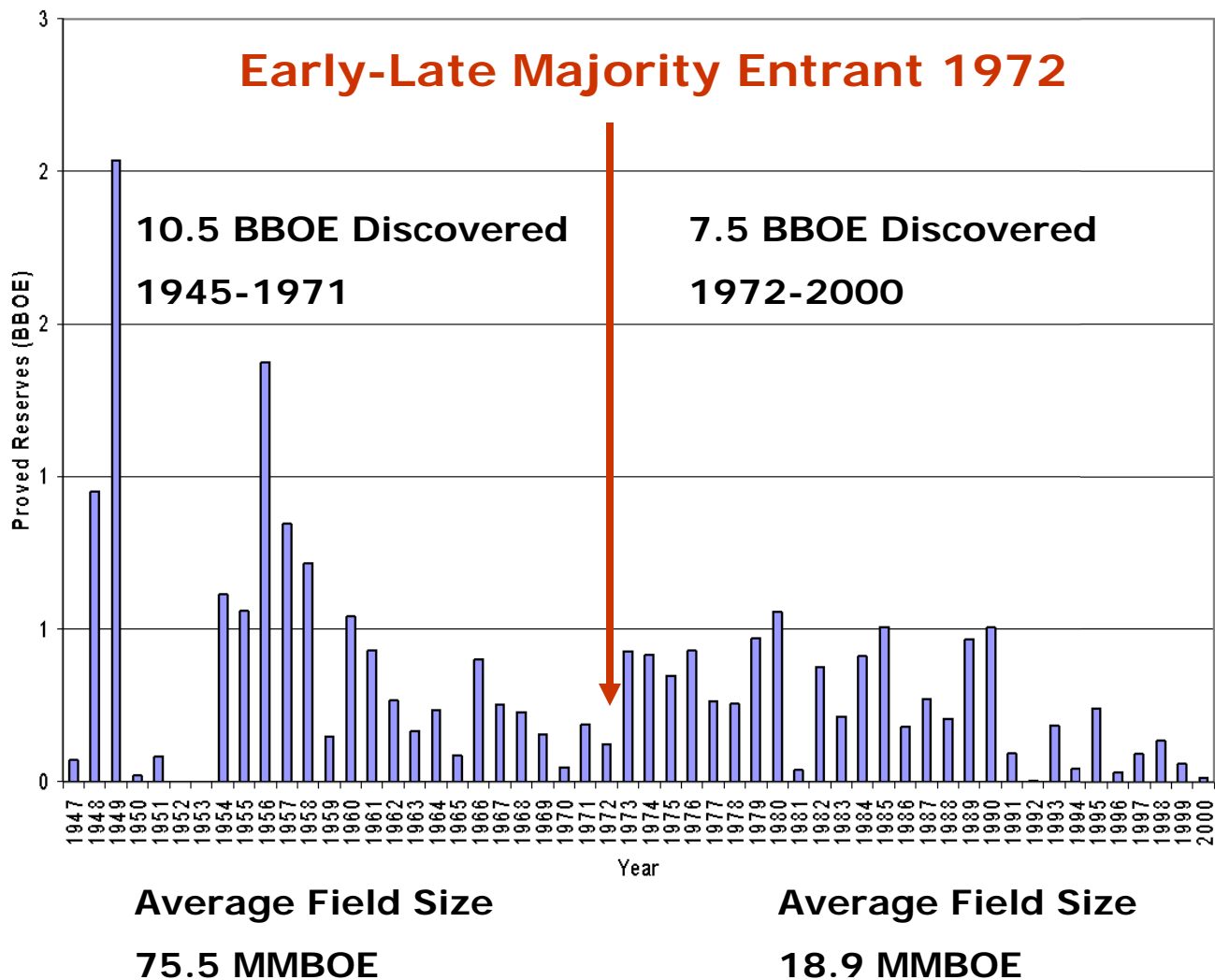
Few New Ideas from Staff or Management: an excursion into the Diffusion Model



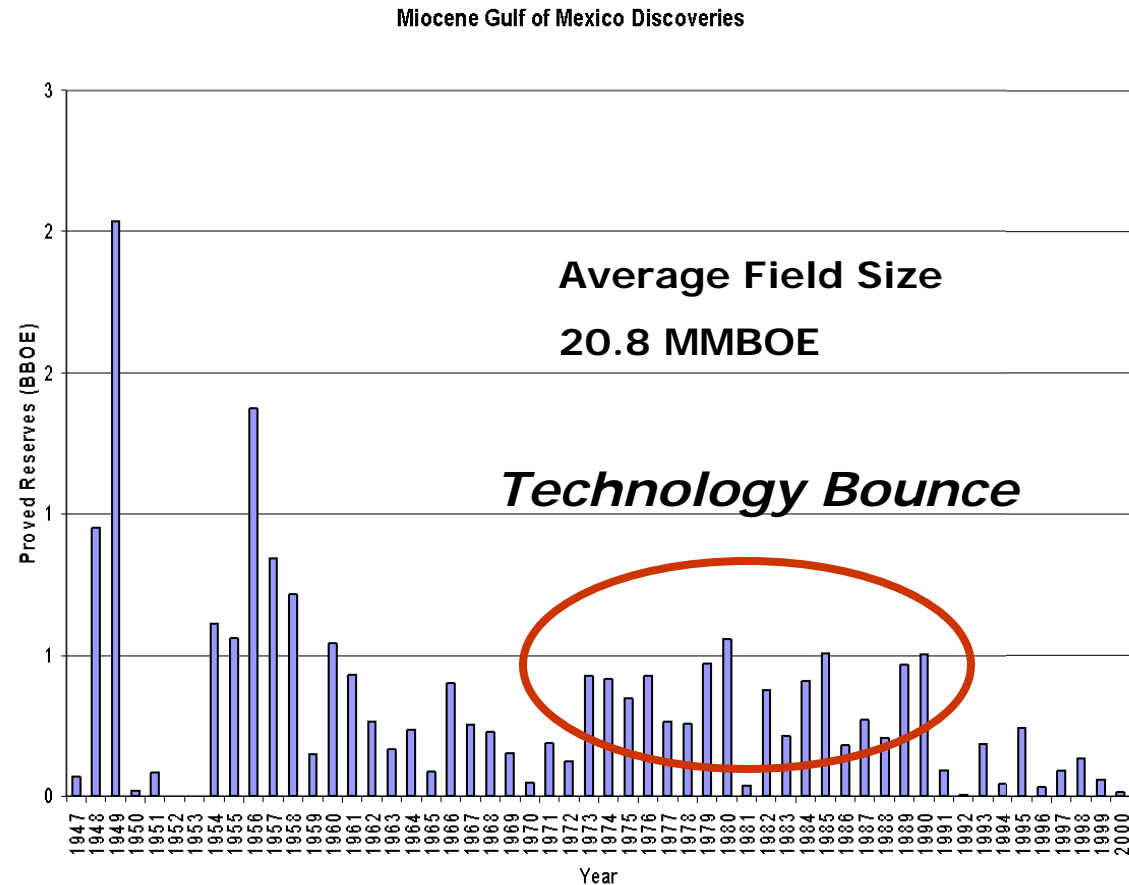
Diffusion Model Remaining Opportunity



Gulf of Mexico Miocene Discoveries

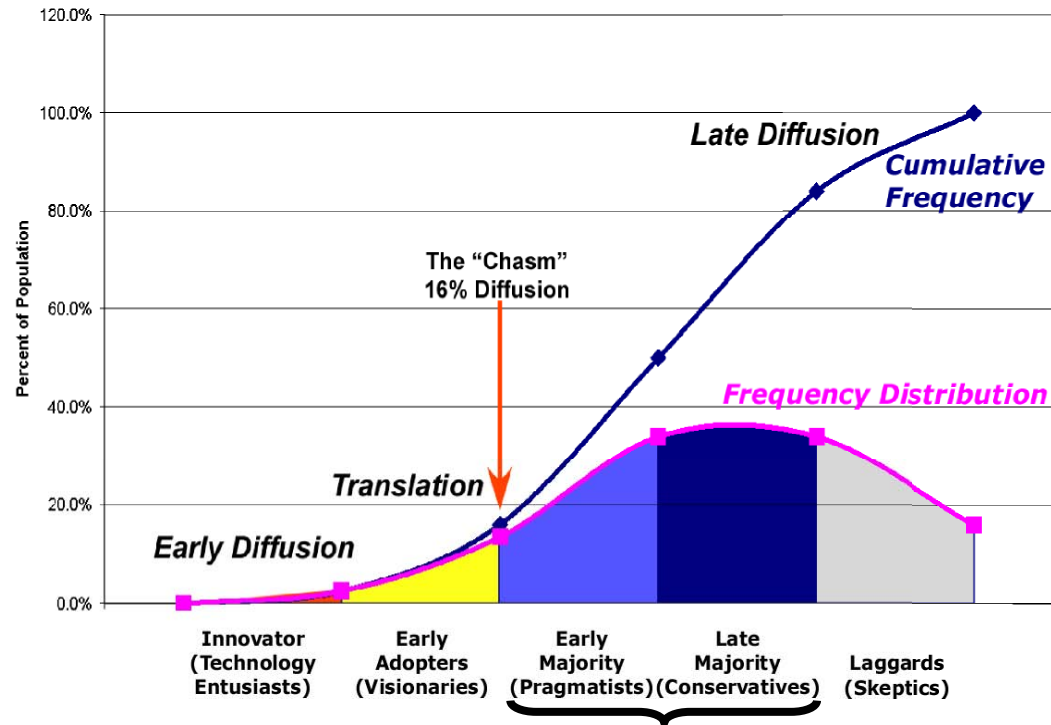


Results of Technology in the Hands of Management: Example from Miocene, Gulf of Mexico



Finding costs increased, field sizes small, declines accelerated

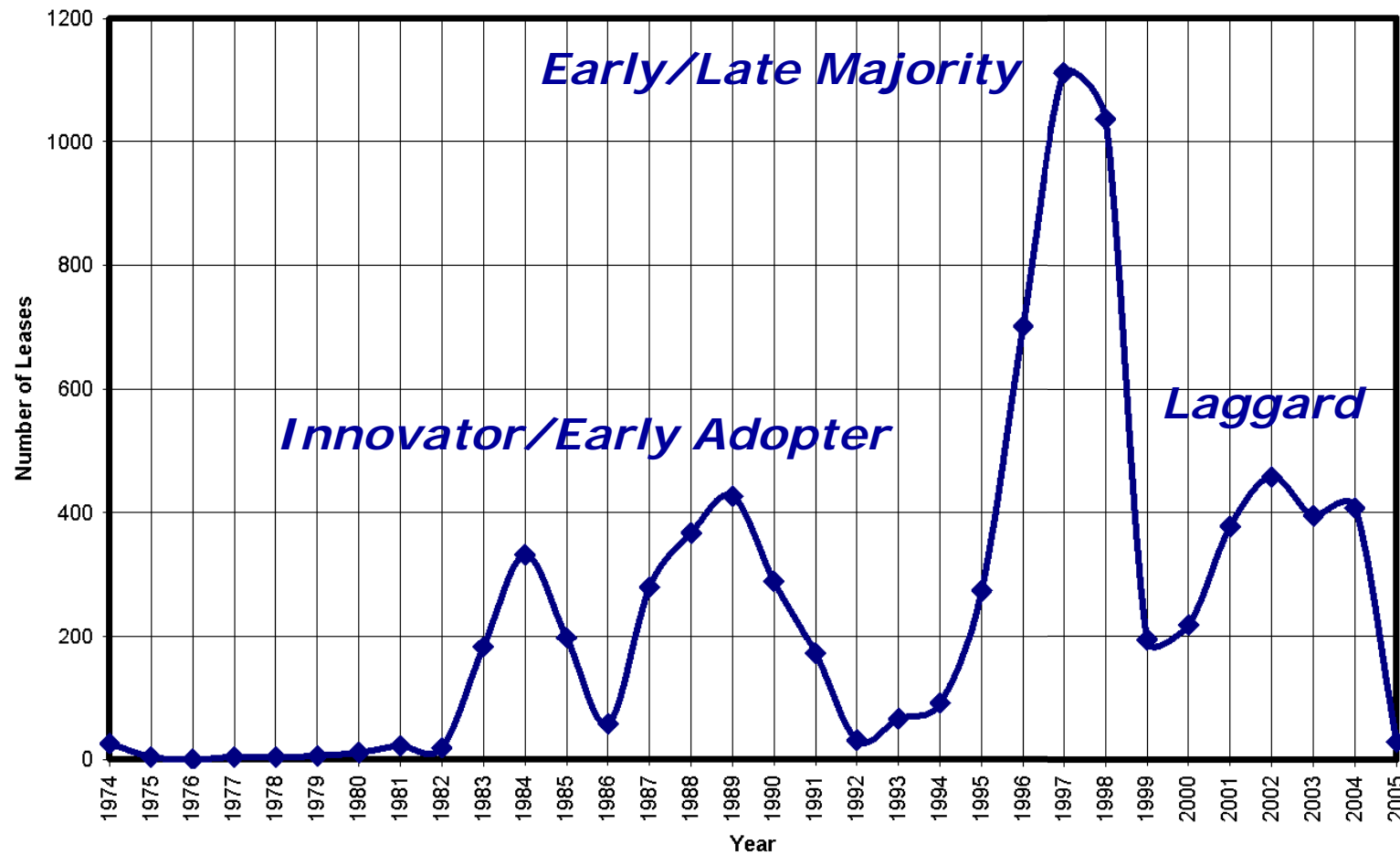
Technology Diffusion Model



Most E&P Companies

"If the goal of the visionary is to make a quantum leap forward, the goal of the pragmatists is to make a percentage improvement—incremental, measurable, predictable progress. The word risk is a negative word in their vocabulary—it does not connote opportunity or excitement but rather a chance to waste money and time. They will undertake risks when required, but they first will put in place safety nets and manage the risks very closely." (Moore, 1991)

Deepwater Gulf of Mexico Leasing



Staff Has Few New Ideas

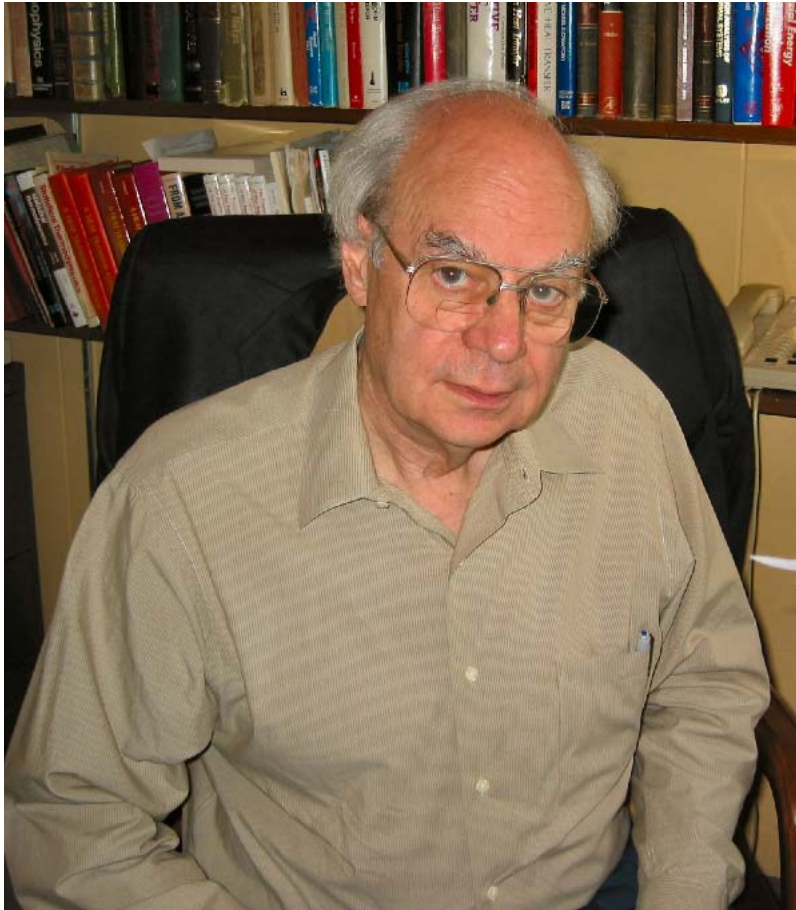
- Petroleum E&P business driven by seismic mapping & attributes
- We are into the Late Majority/Conservative Phase for that approach: “nth” derivative of geology
- Geoscience staff is fearful of learning software applications (limited use of geological analysis and deduction)
- E&P driven by deepwater plays
- We are into the Late Majority/Conservative Phase for that play
- E&P needs new paradigms and models based on basics of geological analysis transformed by software advances

Management Has Few Ideas

- *company leadership far from the work of finding oil and gas and generally too arrogant to ask opinions from technical staff*
- *“awesome businessman model”: management generally has no credentials or track record to manage--manage costs, reduce staff*
- *acquisition and risk model as alternative to finding reserves (after decades of human resource initiatives as a palliative to poor results)*
- *search for the simple idea that reduces complexity of petroleum search to something even management can remember*
- *failure to see manpower shortfall coming (or just didn't care!)*
- *a board of directors system that rewards being clueless*

“If you don't know what kind of an organization you are, you will become part of someone else's value chain”

E&P organizations must abandon stability and embrace invention



John Lienhard,

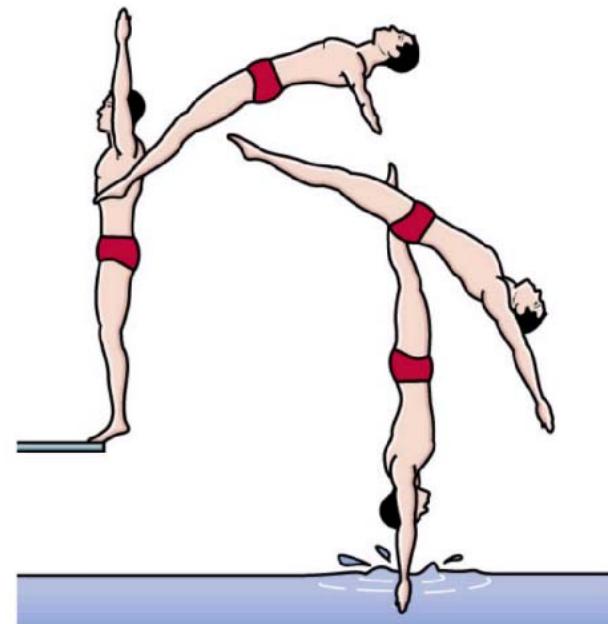
*University of Houston M.D. Anderson Professor of
Technology and Culture, Emeritus*

***“Invention is a trip into an
uncharted land. Invention is
eccentricity. It can be no other.”***

Lessons From Life Science: Instability



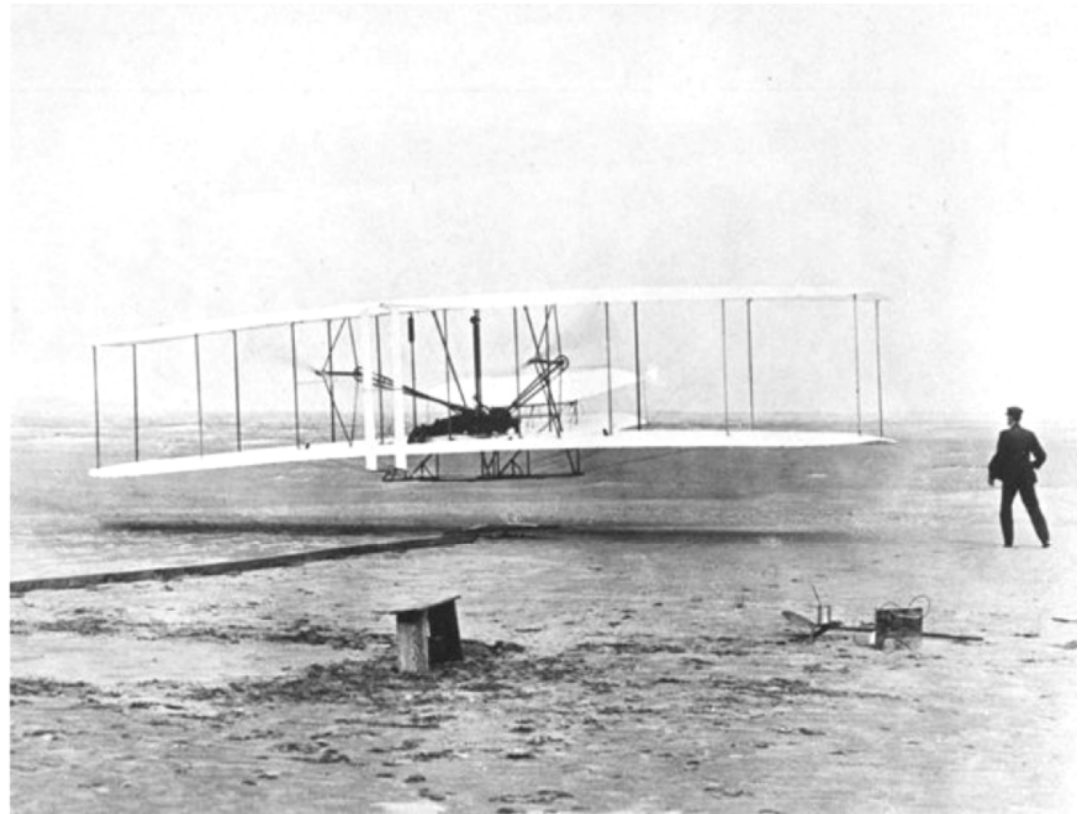
Lessons From Life Science: Instability



Lessons From Technology: Translation



Lessons From Technology: Instability & Translation



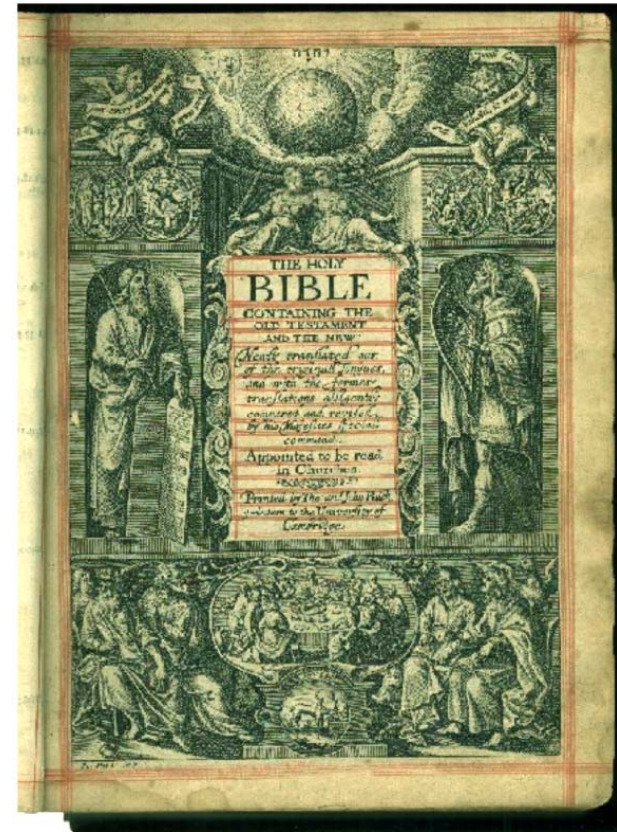
"Eighteen years after the modern bicycle took its form, Orville and Wilbur Wright took the concept of instability to Kitty Hawk, North Carolina. There, in the coastal dunes, they finally removed the flawed concept of stability from the airplane. They created an unstable airplane whose motion had to be controlled in flight. Only then did they succeed where everyone else had failed."

--John Lienhard

*Lessons From History:
Leaderless Committees...with a clearly defined objective*



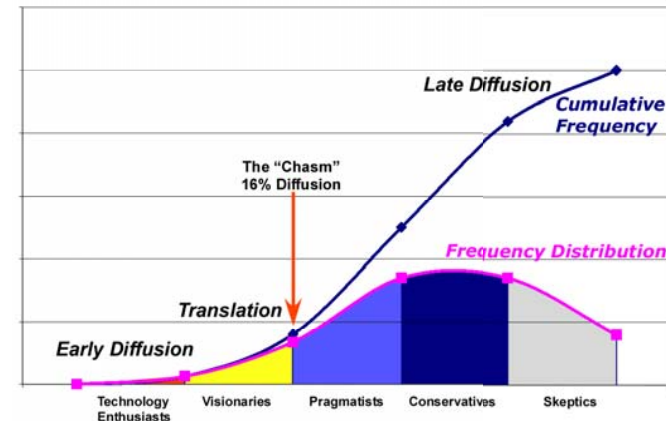
**United States Constitution written by 39 men,
1774-1789**



**King James Bible translated by a
committee of 47 men, 1604-1611**

The Future for Petroleum E&P Companies

- Managers must learn to embrace instability; risk committees may add stability but prevent flight
- Technical staff must learn to translate
- Organization should foster "leaderless" teams with clear goals
- Strategy should acknowledge that seismic attributes & deep water expertise are in advanced stage of adoption and will produce correlative results
- Better use of geological analysis may create better map to success
- Strategies should acknowledge need to expand into state oil company territory
- Risk process is good for some things, not for others: risk vs. reward
- Executives should be rewarded on reserve replacement



E&P companies, if they are to survive, must re-establish new ideas and the inventive people who conceive them as the core capability of their organizations...Senior management must re-involve themselves in the world of technical ideas...and abandon the absurd notion that they are business people who can afford to leave science to technical risk committees.

--A. E. Berman (2004)