

Bringing Sanity to Risk and Uncertainty: Charge of the Geoscientist*

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Abstract

It is often said that the Exploration and Production business is rife with Risk and Uncertainty. The capacity to recognize and to quantify these components is key to success. In many cases, the geoscientist bears the prime responsibility of casting these in the proper context and providing the insight required to drive the appropriate project decision. This presentation examines the various aspects of geoscientific application in progression of a notional E&P project from cradle to grave and how they relate to both risk and uncertainty.

Early in the evolution of a potential project, most notably in the exploratory/scoping phase, the estimation of Risk is commonly the focus of the geoscientist. Most certainly different aspects of geoscientific analysis take on greater focus depending on the nature of the opportunity, but a broad spectrum of skills is generally required to assist in understanding the overall opportunity – from geomodeling to geomechanics to geophysics, the geoscientist is squarely in the fray. Characterization of the different risk components is key to answering the fundamental question: What is the chance I will find something and how big will it be?

Post discovery, the geoscientist's role is no less pivotal. In the pre-appraisal stage, the geoscientist is a prominent member of an evaluation team, focusing on the Uncertainty associated with the various parameters used to estimate in-place volumes. The development of ranges for these parameters helps communicate the overall potential...and value. During appraisal activities, the geoscientist provides critical input into development of forward plans to help narrow ranges and provides critical information for facilities planning and optimizing development scenarios. As projects move through development and production, the geoscientist

focuses, among other things, on reviewing log results and production response to calibrate the overall geologic model. Optimizing well placement and completion intervals based on the interpretation of the evolving geologic model are critical to ensuring project efficiency and value.

As a critical team member, the geoscientist plays an important role in recognizing the natural envelopes which characterize an E&P opportunity. Extrapolating this recognition to successful implementation has rescued the sanity of many a project manager.

AAPG Geoscience Technology Workshop on the Geological Aspects of Estimating Resources and Reserves

**Houston, Texas
September 9-11, 2009**

Session 3: Role of the Geoscientist

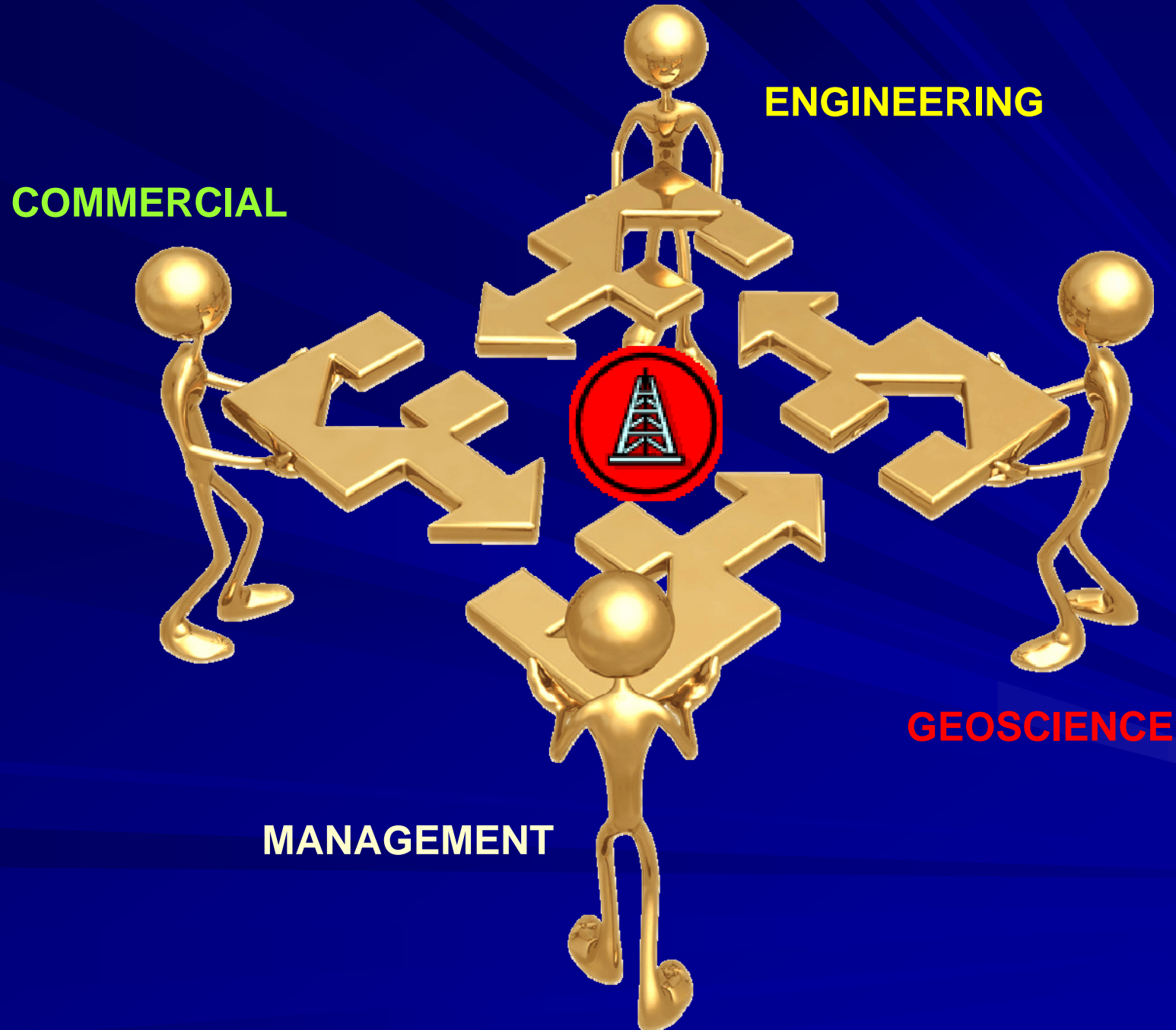
**Bringing Sanity to Risk and Uncertainty:
Charge of the Geoscientist**

Author: John Ritter

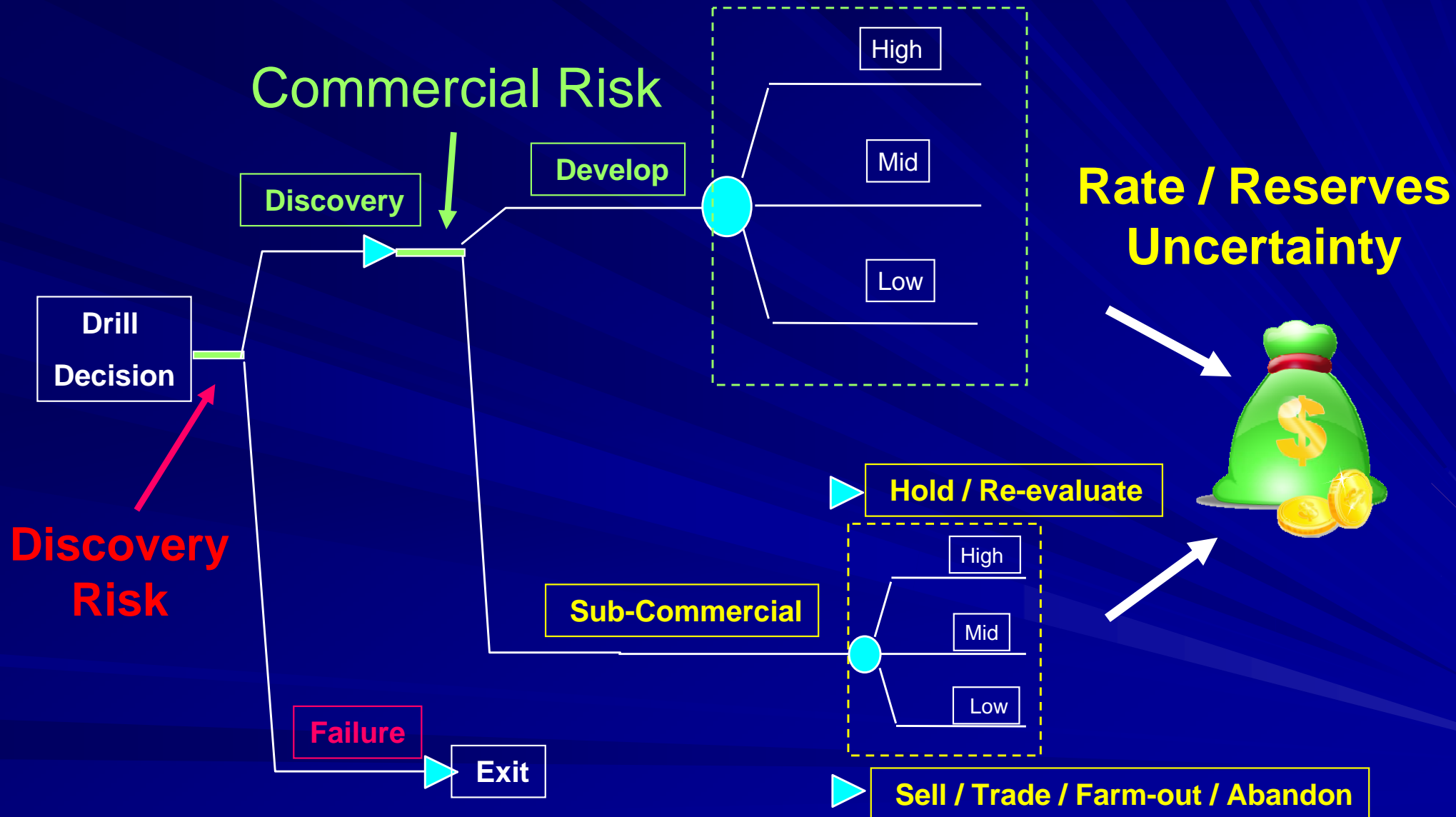
What is the Right Decision?



What Does It Take?



Relationship Between Risk and Uncertainty



UNCERTAINTY

DISCOVERY AND COMMERCIAL RISK

PRE-DRILL

- Well bore design
- Alternate targets
- Geohazards
- Prospect size

POST DISCOVERY

- Appraisal
- Data collection
- Development options
- Facility design
- Economics

DEVELOPMENT

- Infill spacing
- Completions
- Modeling
- Simulation
- Performance
- Secondary
- EOR

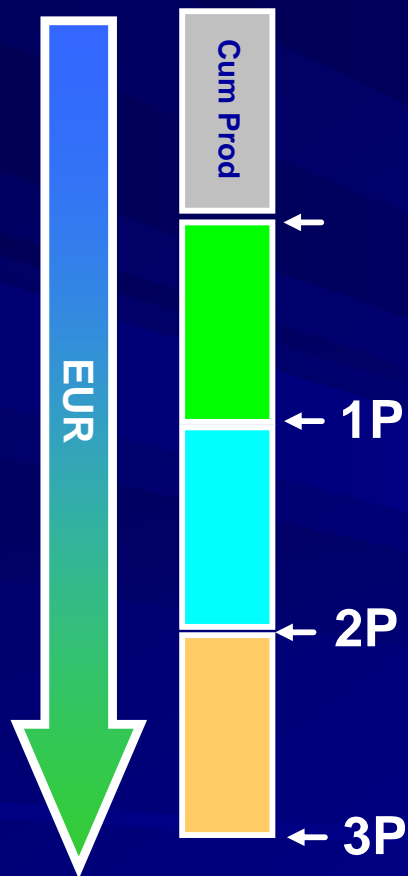
MATURE FIELD

- Optimization
- Mobilize residual oil
- Harvest
- Divest

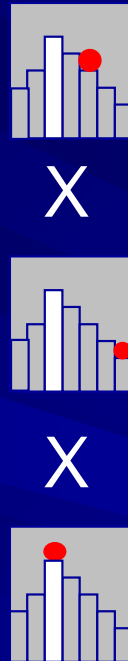


Two Views of Uncertainty

Deterministic View

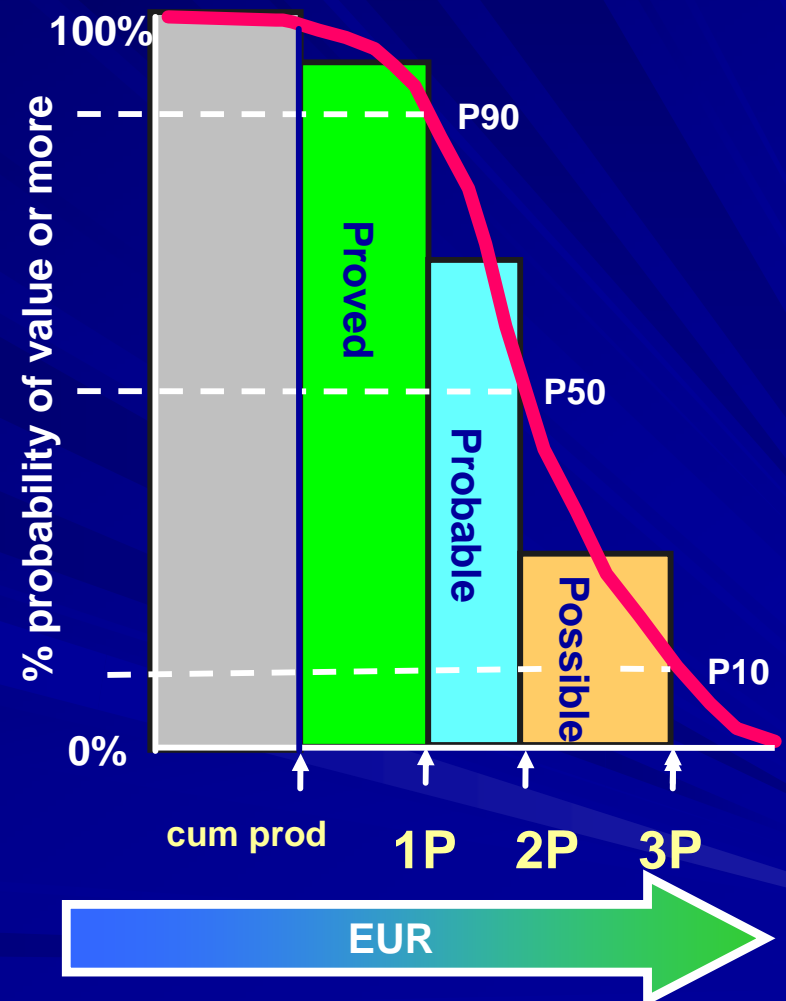


Discrete Scenarios



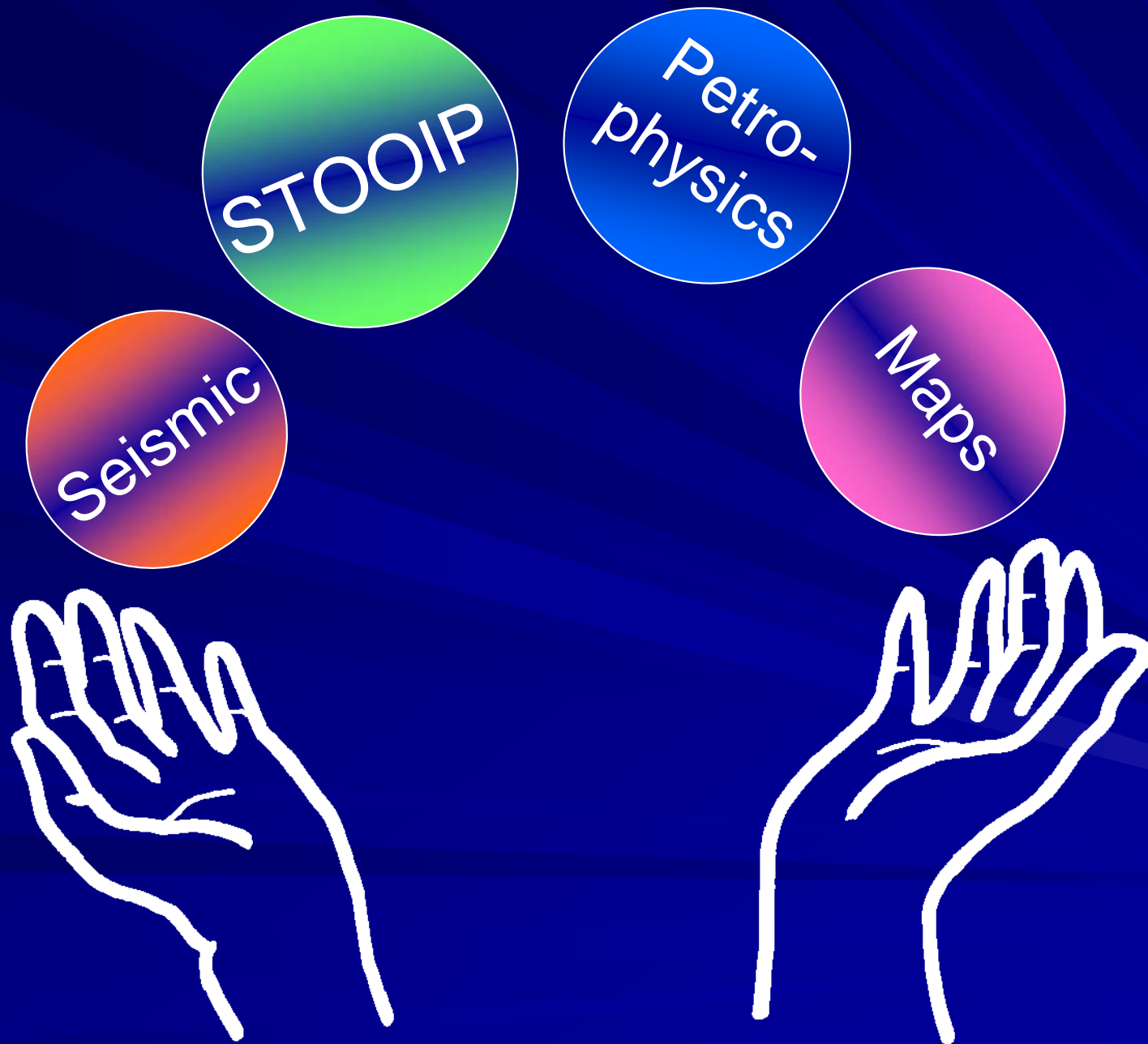
Monte Carlo Simulation

Probabilistic View



do both **(hybrid)** where it makes sense!

Building the Model





**Certainty is the mother of quiet and repose, and uncertainty
the cause of variance and contentions.**

Edward Coke

English jurist, he defended common law and wrote The Petition of Right (1628)

Sanity and Happiness are an Impossible Combination

Mark Twain