After Albert Einstein’s discovery of The Theory of Relativity in 1915, the following 40 years of his life were devoted to formulating a Theory Of Everything (TOE theory). His contemporaries researched Quantum Theory, dealing with, among other things, mathematical expressions of probabilities and the existence of parallel universes. Einstein’s famous response was “God does not play with dice!” He died still searching for the answer!

As we move through this early 21st century, a peak oil crunch looms. And are we still playing dice in the way we look for oil and gas? Do we continue to take unnecessary risks with our exploration dollars? Can we hedge our bets using some kind of unified Geological Theory of Everything to find additional resources in ‘supposedly’ mature hydrocarbon provinces such as the Malay Basin?

One possible way, albeit subjective, is to combine mother nature and math – like using logarithmic dice. The method is to combine a deterministic fractal log distribution of ranked hydrocarbon field sizes with an integrated petroleum system analysis using seismic-sequence stratigraphic tools. This powerful method enables the geoscientist to figure out if large hydrocarbon discoveries remain to be discovered. It locates basins or hydrocarbon fairway trends with remaining or yet-to-find (YTF) resources and quantifies those resources within any trend.

With this objective in mind, Petronas Petroleum Management Unit (PMU) and several PSC study group partners recently commissioned PRSS to undertake a multidisciplinary regional study to identify new play types in the Malay Basin. This involved a sequence-stratigraphic analysis in conjunction with 3D burial history modeling, augmented by new biostratigraphic well calibrations, CO2 distribution studies, cap-rock integrity and section restoration work. The results of this study are exciting and in part are summarized in this keynote address – and prove the Malay Basin is by no means a mature hydrocarbon province.

Since the study is regional in nature and scope, we will be indicating in general terms where we might look for more oil and gas in the Malay Basin – the sweet spots, and suggest play types with potential YTF resources. The field sizes distributions from actual and implied fractal distributions are surprising. Basically this method gives the PSC operators a reserve target to hunt or identify.

Integrated burial history modeling in conjunction with regional seismic-sequence stratigraphic mapping of reservoir facies has identified that sweet spots for YTF liquid hydrocarbons will tend to be focused along the peripheral margins of the basin. Traps occur in a variety of plays ranging from lacustrine turbidites, incised valley fills, canyon deposits, synrift subcrops, fractured Pre-Tertiary basement and carbonate plays. Basin centered hydrocarbons or basin centered gas (BCG) plays will tend to be the main YTF hydrocarbon type in the basin depocentre and, as proven in many basins world wide, can be expected to extend onto the basin flanks – or the external ‘steer head’ portion of the basin margin.

The size and number of YTF fields within these plays in the Malay Basin could be significant, based upon fractal and creaming curve analysis, augmented by the sequence stratigraphy that has been applied. Estimates for HCIIP and YTF resource will be presented during the Address. The exact size of the HCIIP is open to conjecture being that it is dependent within the mathematically-constrained geometric shape of the distribution curve, especially when calibrated to existing field sizes.
As Niels Bohr, the Quantum Physicist, once said "It is very difficult to make an accurate prediction, especially about the future." In our business it is the same. Predicting YTF resources and where to find them is a challenge; and the challenge is met by the crystal ball of sequence-stratigraphy. If used correctly, sequence analysis in a stratigraphic context has, and can in the Malay Basin, prove up where fractal distribution YTF resources will be located. So throw your dice away.

It is pleasure to present this Keynote Address to you. And I hope the contents have suggested some ideas which will help you to discover large reserves.