Evaluating the Unconventional Play:

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Summary
The “play” is a foundational concept in the exploration for oil and gas. Equipped with a play perspective, we can identify and characterize the key drivers that control the productive potential, the associated risks, and ultimately evaluate the potential for a commercial play. A focused, screening approach is offered that relies on properly characterizing the play’s resource, productivity, and risks that results in technically-viable areas.

Introduction
The utility and effectiveness of geologic play concepts in conventional exploration is well-established, yet the geologic framework of the unconventional play is often secondary to the focus on drilling and completion practices. In the past decade, unconventional exploration and appraisal efforts tended to frame the geology into simple criteria and lead to the impression of minimal geologic impacts and risks to the success of a program’s completion strategy. We have since learned that the experience in North America amply demonstrates that there are indeed variable geology within these plays that impact operational practices resulting in a large range of outcomes. Play-based approach to unconventional resources serves as the foundation in the evaluation of unconventional resources regardless of the maturity of operations. An understanding of the play type, the fairway extent as well as key drivers and risks establishes the framework for all future evaluations.

Theory and/or Method
Play-based exploration has been the cornerstone of our successful efforts in the global search for conventional oil and gas. At its essence, the play concept provides a framework for appropriate expectations on the viability and value of an exploration program that includes:

- Target identification (leads/prospects)
- Risk characterization (based on previous occurrences)
- Potential Yet to Find Resource (expectation of new additions)
- Potential Value (based on previous successes/failures)

It will be no different for unconventional oil and gas as we expand our exploration globally. A clear understanding of the unconventional play emerges by employing an classification approach similar to one described by Harry Doust (2010). We can classify unconventional plays in a tiered, hierarchal manner which will allow us to understand the common aspects of play types as well as primary drivers and risks unique to each play.

What we need is a geologic framework that describes the unconventional play. In building the proper The conventional play definition can be constructed on a tiered, hierarchical framework based on the petroleum system. Conventional components include source-charge, the reservoir-seal, and the trap type. There are many similarities to draw upon for constructing the unconventional play framework using the petroleum systems approach. At its broadest level, the charge arising from a specific source rock is the heart of the petroleum system. This is no different for the unconventional play. Key to this level is the source type, maturity, age and basin setting. At the next level, the reservoir and its relationship to the source is the focal point. For unconventional resources, the reservoir and source may be the same (e.g., shale gas) although
many are not (e.g., tight oil such as the middle Bakken of North Dakota). The reservoir characteristics form the geologic model that helps determine the resource density of the unconventional play. Finally, there is the local specific tier of the trap type in conventional plays. The trap often defines the size of the resource in conventional plays. At this level we must deviate for unconventional resources. Rather a focus on the ability to stimulate the reservoir in order to access the resource becomes paramount. The reservoir and seal’s geomechanical properties can be used to describe the ability to stimulate the reservoir. We use the term geomechanical in its most inclusive sense that includes natural fractures, reservoir pressures, rock elastic properties, etc.

An important part of play characterization must be about analogue definition. Defining similar petroleum systems is important for helping to fill in the void of information so we can build answers to important questions on geologic indicator criteria, production expectations, cost structures, key risk or key factors. Selecting analogues is best accomplished via the play concept as well. Too often unconventional analogues are picked on just a few reservoir characteristics or by age rather than play. Play characterization informs us on depositional environments, basin history and tectonic settings, all of which is provides the proper play context rather than a range of variables. Finally, the successes and/or failures within a proper analogue will inform us on the appropriate risks associated the targeted unconventional play.

After gaining insight into a play through characterization, analogue and risk assessments, the next stage in the evaluation process to identify the key drivers that can be mapped regionally in order to locate technically-viable areas within the play fairway of a petroleum system. A frequently applied method towards this end is to construct a series of regional maps as the basis to analyze the variability of various elements of the petroleum system. It often takes many combinations of these regional maps to locate where the appropriate attributes co-exist, highlighting an area that may have the resource materiality, productive capability as well as operational access for a technically successful play. Typically, numerous technically-viable areas may be segregated by play areas and ranked by various value metrics associated with these play areas including geologic risk, relative costs, fiscals, market price points, etc. The end product is a series of ranked areas for further evaluation to assess the commercial potential of the play.

Examples
High-grading the Devonian Shale of the Western Canadian Sedimentary Basin will provided as a simple yet illustrative example of the method and results.

Conclusions
There are numerous advantages for characterizing unconventional resources first into the play types, followed by an understanding of the key resource, and productive drivers. A more disciplined approach allows for identification of the appropriate geologic setting of a play as well as aligning the key geologic controls that drive production with risk. Additionally, a more systematically describing unconventional plays allows for a more reliable analogue comparison and forecasting of potential in a new area. Given that the play concept has proven to foundational for evaluating conventional exploration endeavours, a more fully developed play concept for unconventional resources will provide us with a robust geologic context for characterising the resource, managing the risks and assessing the value of an exploration venture.

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References