

## Anatomy of Data Analytics, Machine Learning and Deep Learning -- Demystified – Part I

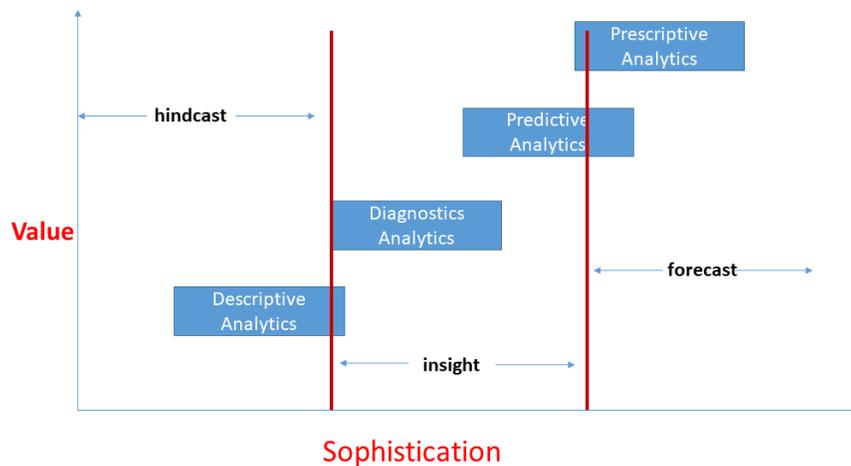
Over the last few years the promise of Big Data Analytics and associated boost from Artificial Intelligence and Machine Learning usher in elevated promise of increased efficiency, streamlined data analytics, improved decision making by combining conclusions from different facets of the business and in the end, improved business operations at a lower cost by reducing non-productive time and reduced fatal failures in equipment or interpretations. However, in the midst of this euphoria, as it always happens with a new technology, there is a flood of buzz words which are not only difficult to decipher or distinguish but also can be confusing and frustrating, especially in an attempt to adapt such technologies to our domains, which in my case is oil and gas. In a series of whitepapers (which will be published here in several parts), I'll try to demystify these abstractions and demonstrate the applicability by using relevant case studies, as appropriate.

### Segmentation of Data

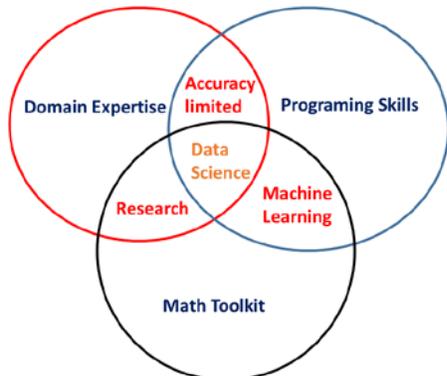
#### Analytics

#### Methodologies

As we move from SW to NE of the adjoining plot, both the sophistication and value-add of the methodologies improve. As we move from west to east of the plot, we move from hindcasting to forecasting. First and



foremost, Descriptive Analytics is a means to analyze *what has happened* in the data set. Secondly, Diagnostics Analytics enables a foray into future and deciphers *why it happened*. Typical ways to achieve the first two are by data mining, data visualization and dashboard representations. Thirdly, Predictive Analytics benefits from the insights gained in the first two steps and attempts to predict the future. This step is a measure of *what could happen* and is achieved using machine learning algorithms among other things. Finally, Prescriptive Analytics is the ultimate frontier where *what should we do* questions are answered, typically leveraging simulation and optimization techniques. This is what you see in the commercials where Watson tells you to take proactive measures to repair the elevator because it is about to fail in the next couple of days.



### A closer look into the skills needed

As is shown in the figure in the left, mathematical algorithms, programming skills and Domain knowledge are equally needed in this process. Leaving out any one of these lead to inadequate information processing. The goal is to leverage the optimal convergence of these skills without hesitation i.e. cross department communication in companies which leads to embracing Data Science.