॥ त्वं ज्ञानमयो विज्ञानमयोऽसि ॥
IIT Jodhpur

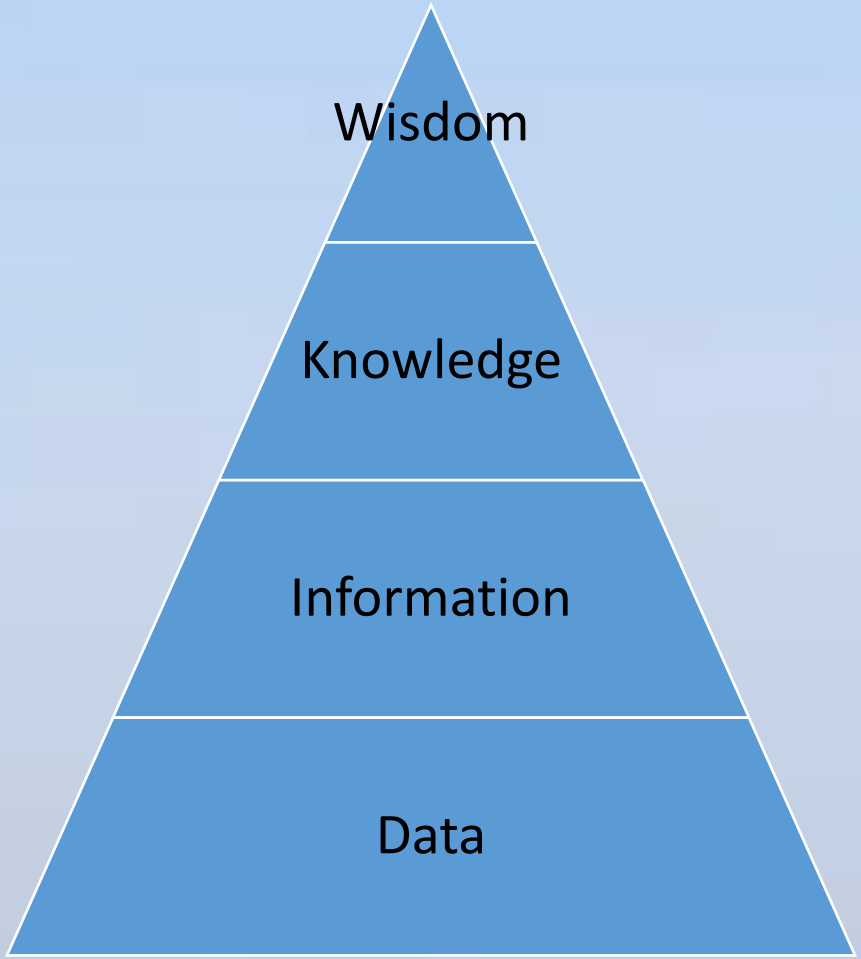
Excellence above all
SME

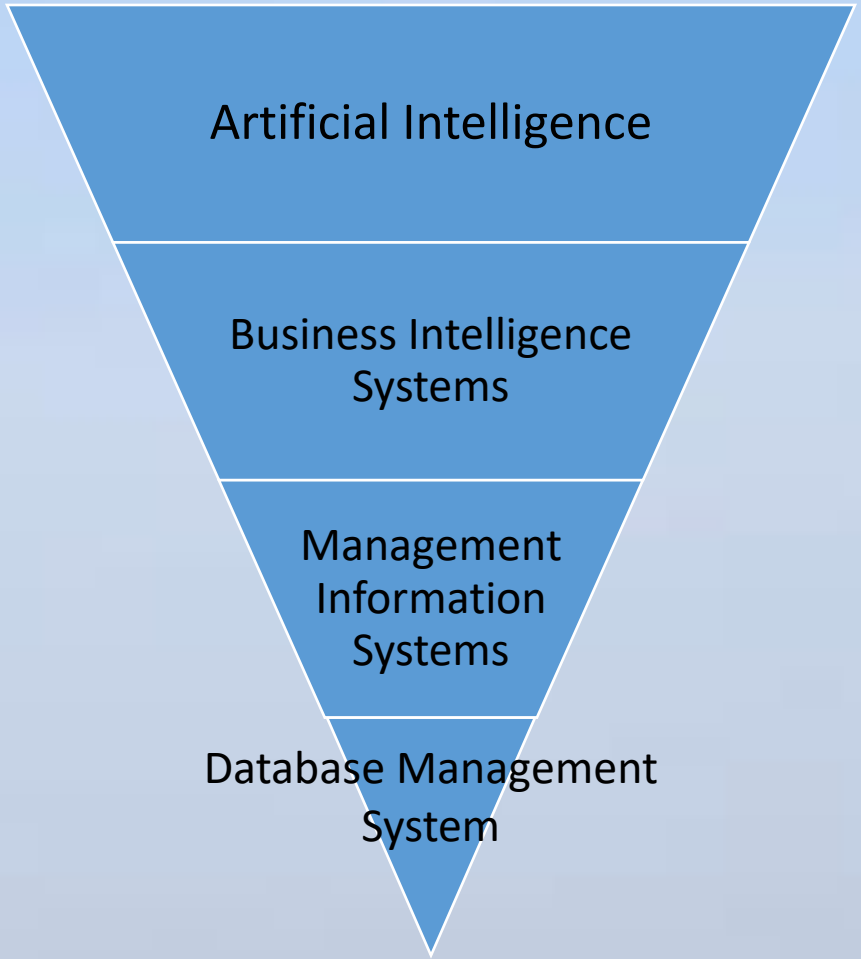
Technology • Innovation • Leadership

Data Science

Dr. Deepak Saxena, SME IIT Jodhpur

Remember this?





Big Data and Cloud Computing in AI

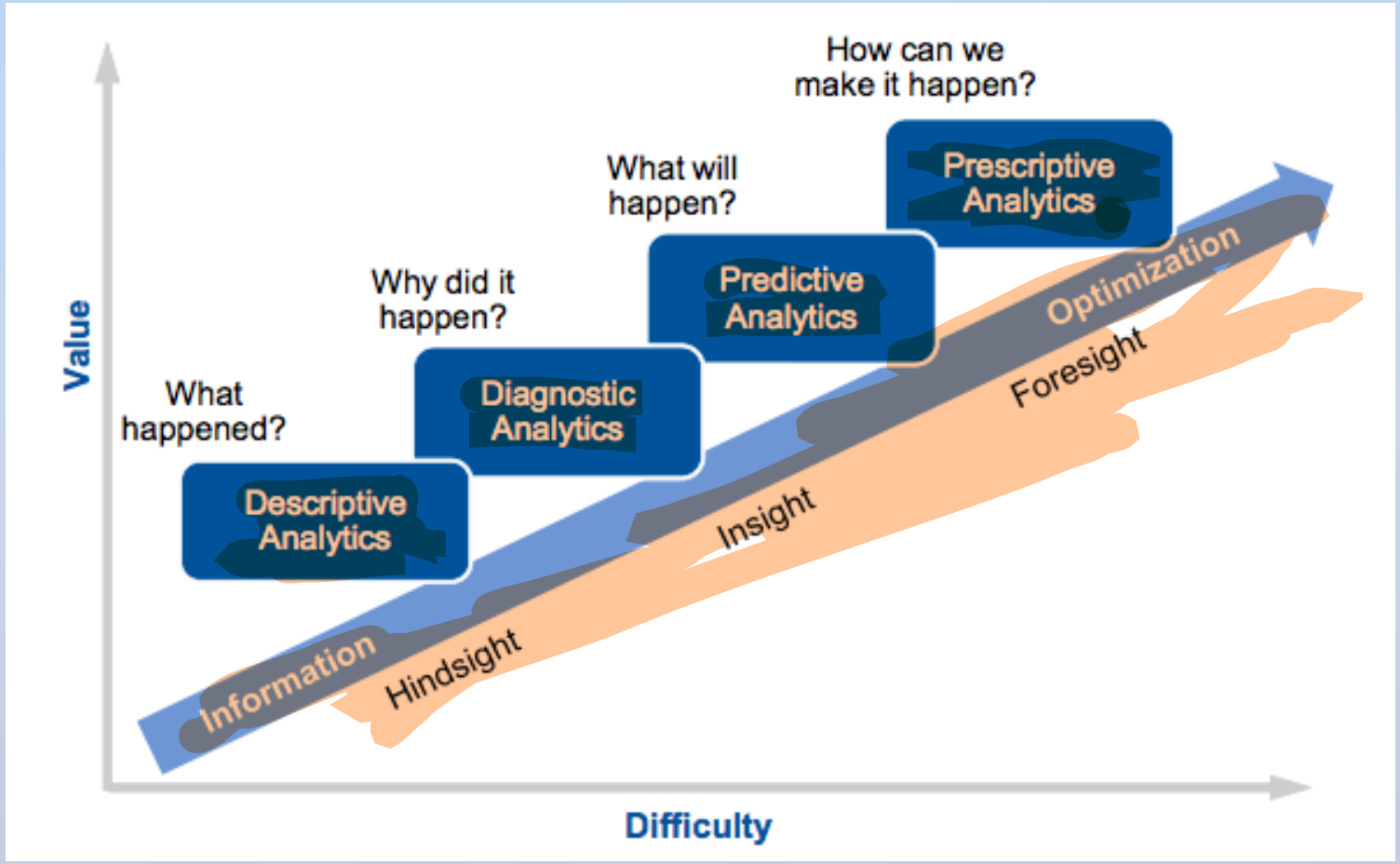
Big Data

- Training: We started amassing huge amounts of data that could be used for machine learning.

Cloud Computing

- We created software that would allow normal computers to work together with the power of a super-computer.

Gartner's Analytics Maturity Model



Descriptive Analytics

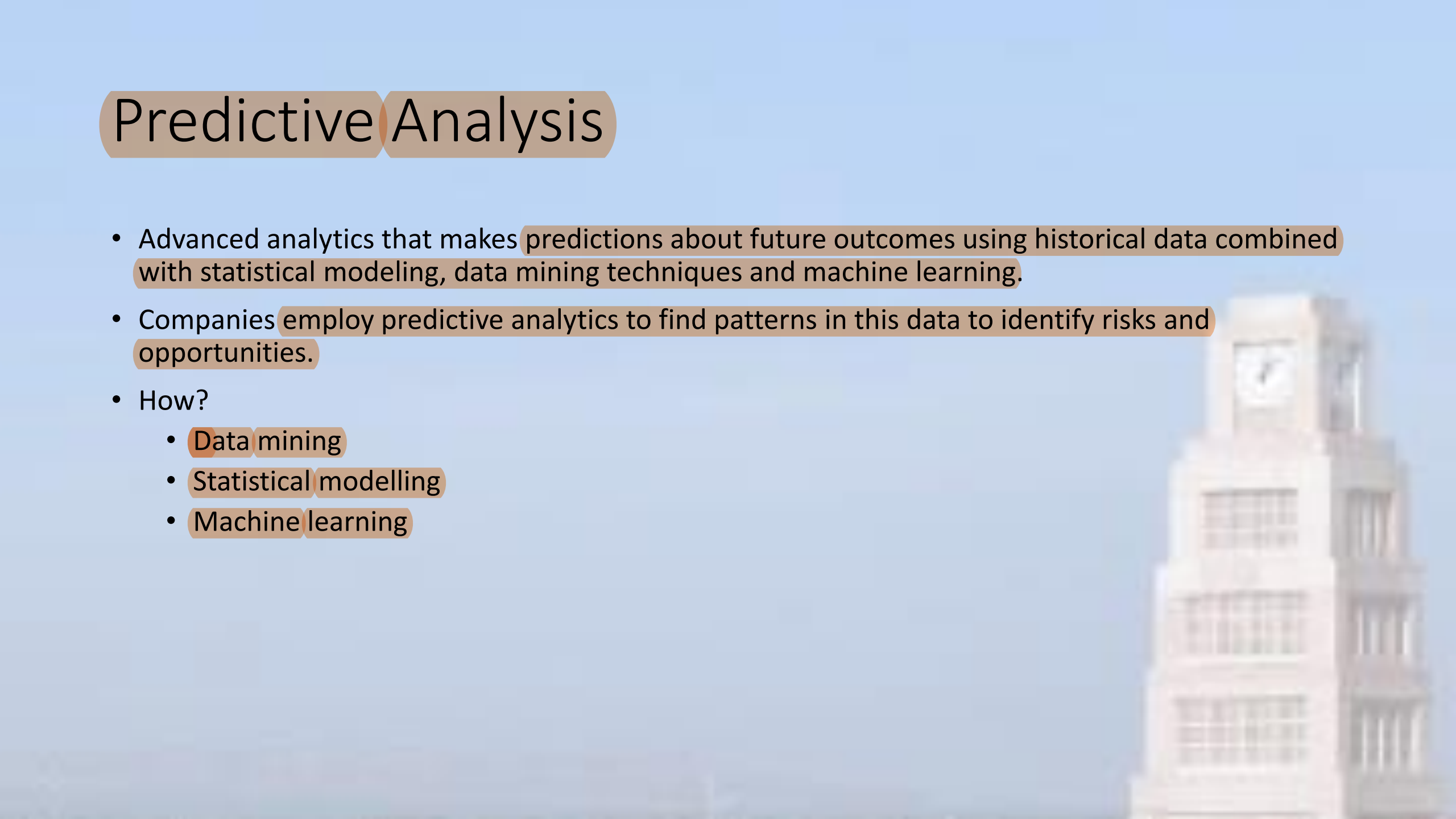
- Why?
  - Operational requirements
  - Data visibility
- How?
  - Excel would do
  - Relational databases (SQL)
  - Data Warehouse

Diagnostic Analytics

- Digs deeper for a root cause analysis.
- Characterized by statistical techniques such as correlation, regression, and/or hypotheses testing.
- How?
  - Excel would do
  - Tableau, PowerBI
  - Data mining

Predictive Analysis

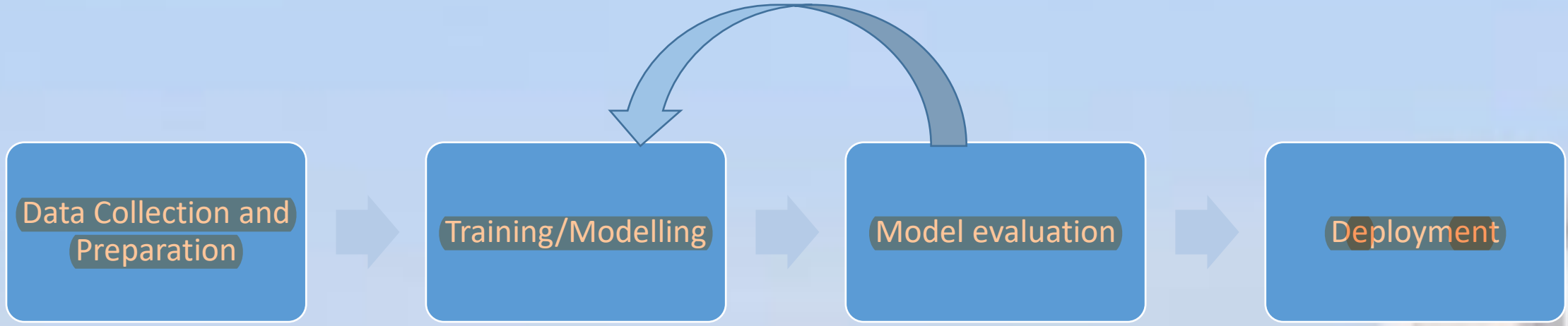
- Advanced analytics that makes predictions about future outcomes using historical data combined with statistical modeling, data mining techniques and machine learning.
- Companies employ predictive analytics to find patterns in this data to identify risks and opportunities.
- How?
  - Data mining
  - Statistical modelling
  - Machine learning



Prescriptive analytics

- Prescriptive analytics is a process that analyzes data and provides instant recommendations on how to optimize business practices to suit multiple predicted outcomes.
- In essence, prescriptive analytics takes the "what we know" (data), comprehensively understands that data to predict what could happen, and suggests the best steps forward based on informed simulations.
- How?
  - Machine Learning
  - Deep Learning

Analytic Modelling Process



- Correct and complete data
- Feature engineering (ML)

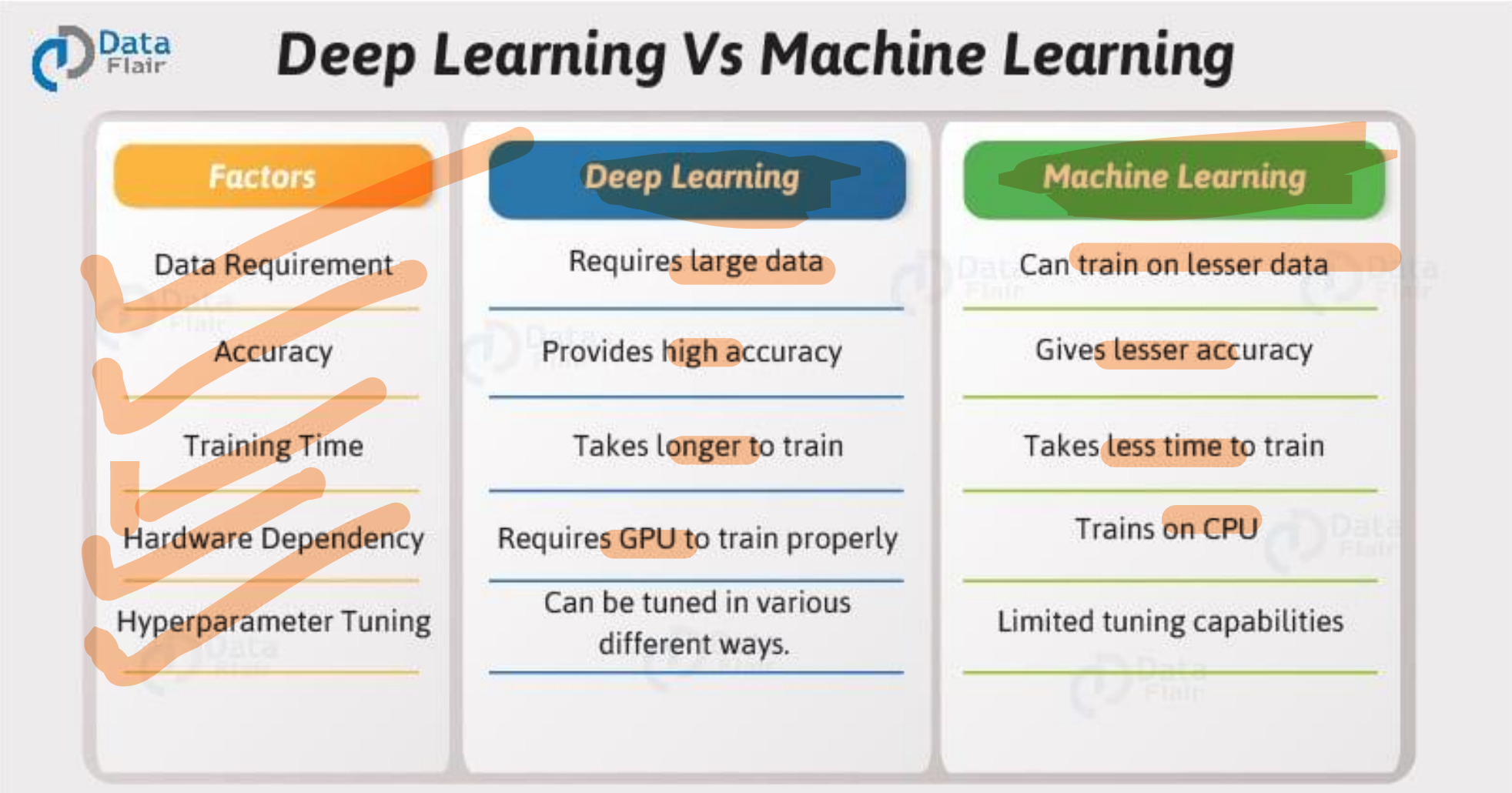
- Selecting Training data
- Applying algorithms for model building

- Model accuracy
- Competing Models

- Usage in business decision-making

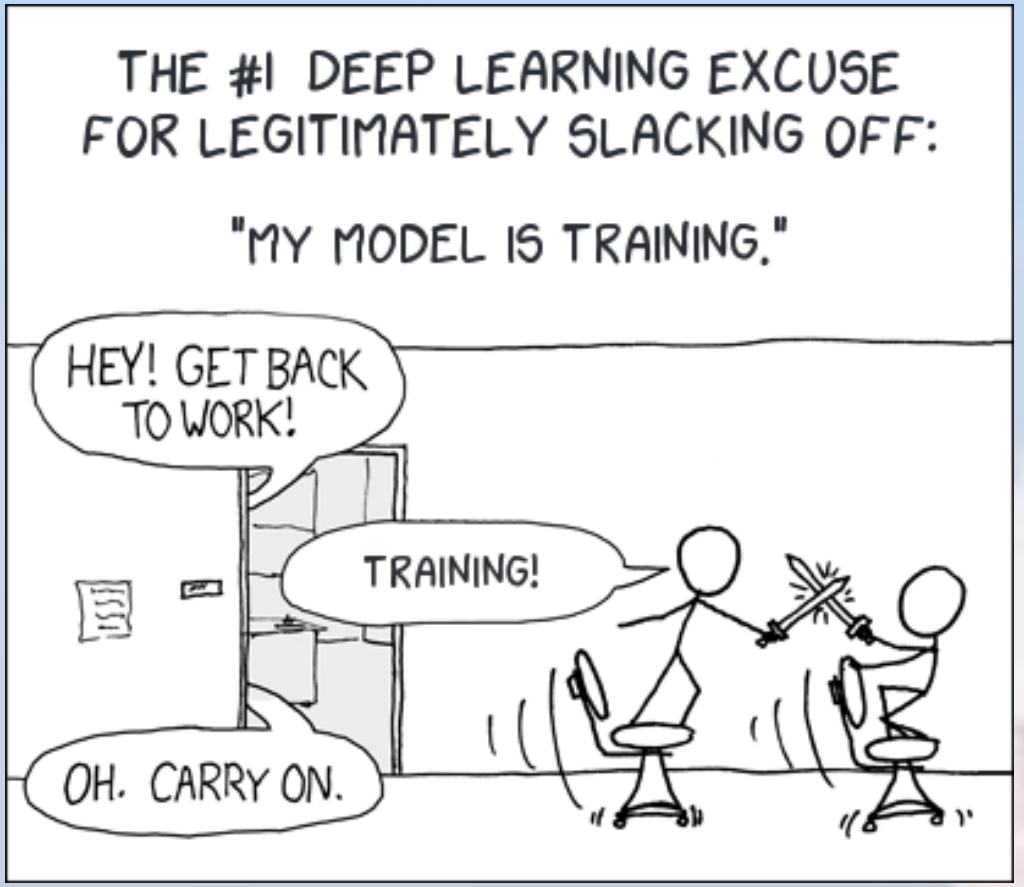
Model-fitting

ML vs DL?

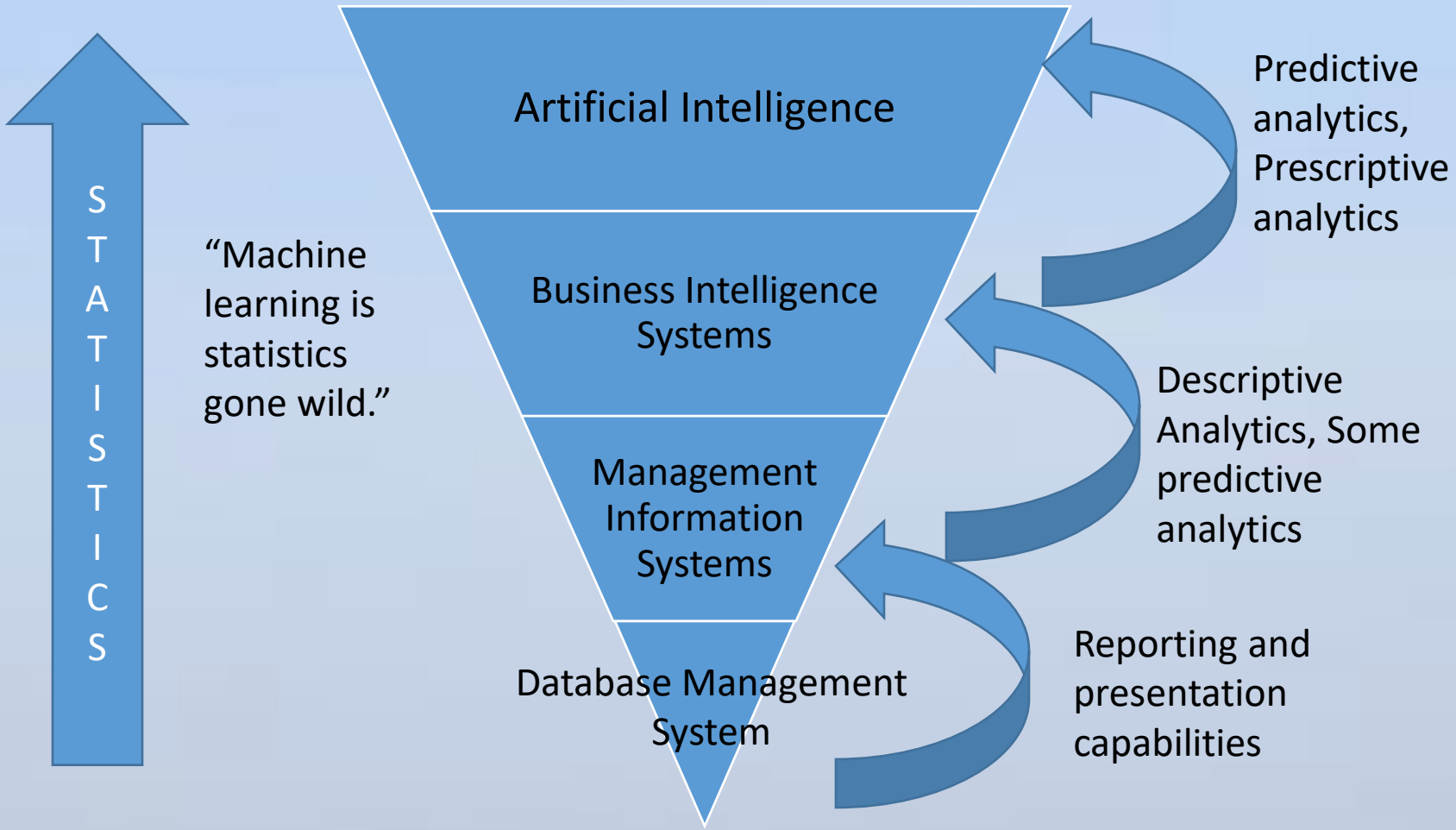

Data Flair
Deep Learning Vs Machine Learning
Factors
Deep Learning
Machine Learning
Data Requirement
Requires large data
Can train on lesser data
Accuracy
Provides high accuracy
Gives lesser accuracy
Training Time
Takes longer to train
Takes less time to train
Hardware Dependency
Requires GPU to train properly
Trains on CPU
Hyperparameter Tuning
Can be tuned in various different ways.
Limited tuning capabilities

ML vs DL?


THIS IS YOUR MACHINE LEARNING SYSTEM?
YUP! YOU POUR THE DATA INTO THIS BIG PILE OF LINEAR ALGEBRA, THEN COLLECT THE ANSWERS ON THE OTHER SIDE.
WHAT IF THE ANSWERS ARE WRONG?
JUST STIR THE PILE UNTIL THEY START LOOKING RIGHT.
DATA
ANSWERS


THE #1 DEEP LEARNING EXCUSE FOR LEGITIMATELY SLACKING OFF:
"MY MODEL IS TRAINING."
HEY! GET BACK TO WORK!
TRAINING!
OH. CARRY ON.

Making Sense



"Machine learning is statistics gone wild."

It all may be applicable together

- Descriptive analytics would flag a revenue shortfall;
- Diagnostic analytics might reveal that it was caused by a shortage of key inventory;
- Predictive analytics could forecast future supply and demand; and
- Prescriptive analytics could optimize pricing, based on the balance of supply and demand, as well as on the price elasticity of the customer base.

Points to ponder

1. You start at the bottom, advancing through the levels in sequence
2. Each higher level brings more value than the lower level before it
3. The way you manage these capabilities lie on the same spectrum

- There is no need to ‘complete’ building out descriptive analytics before moving on to advanced analytics.
- There is no certainty that higher levels of analytics bring more value.
- The different types of work described thrive under starkly different management methods.

How some people see it?