

**INTERNATIONAL FORUM ON
PRODUCTIVITY
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**Big Data: Internet of Things and its Implications
to Sustainable Productivity Growth**

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Synopsis

In this session an overview of big data and the state of data science are presented. We will also be looking at the state of IOT and the sources of data available in this present time. The presentation goes on to look at the components of a high performance data driven digital enterprise; which is an essential business model to enhancing productivity and growth. Finally the presentation ends with the discussion on the emergence of machine learning in data analytics and its implications on sustainable productivity and growth.

Contents

- What is Big Data and Why the Need for Analytics?
- Data, Big Data and Small Data, what else?
- Building a Data Driven Digital Enterprise
- The emergence of machine learning in data analytics

What is Big Data and Why the Need for Analytics?

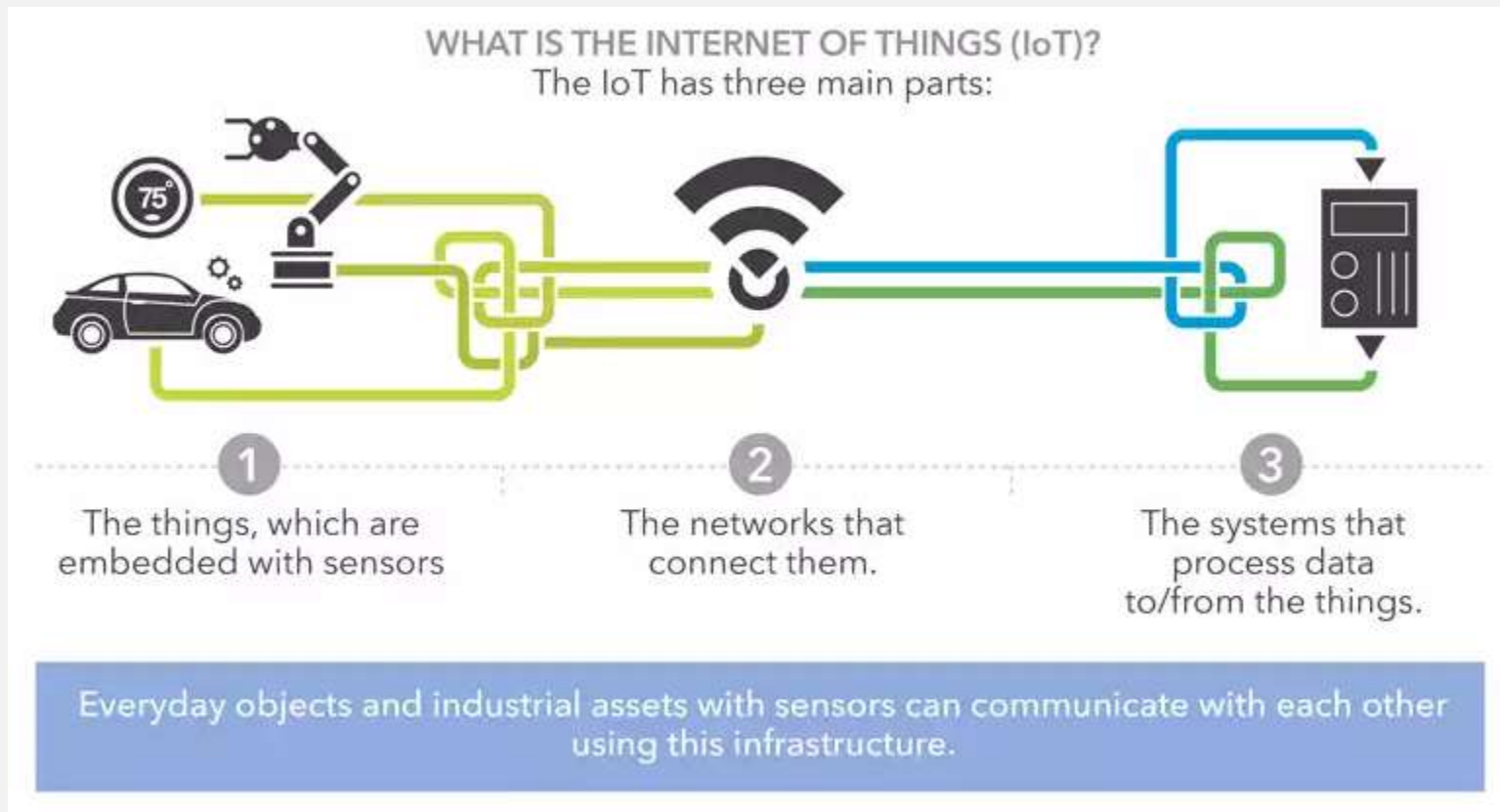
The Internet of Things (IoT)

Big Data Overview

State of Data Science

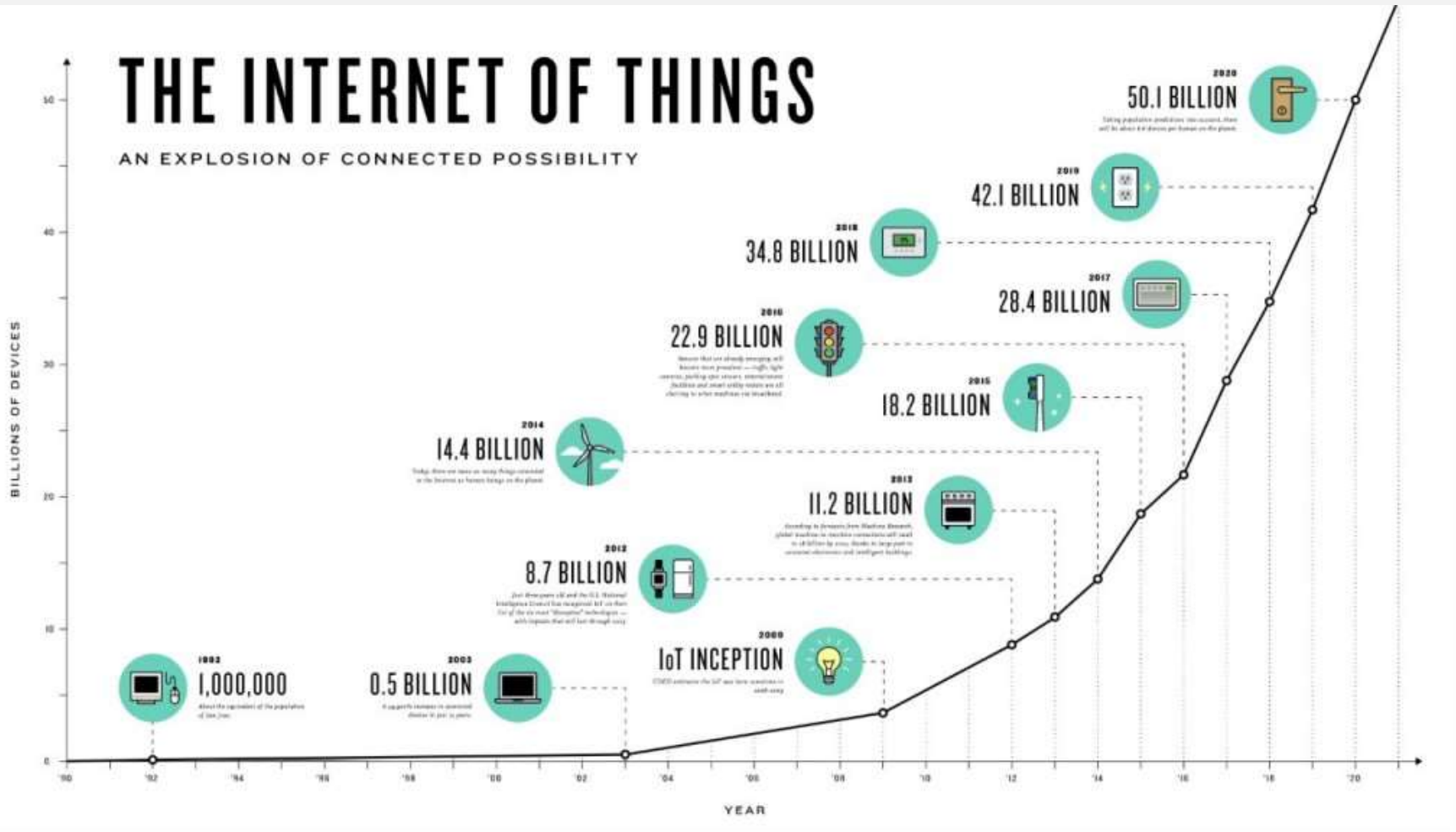
Big Data Analytics in the Industry

The Internet of Things (IoT)



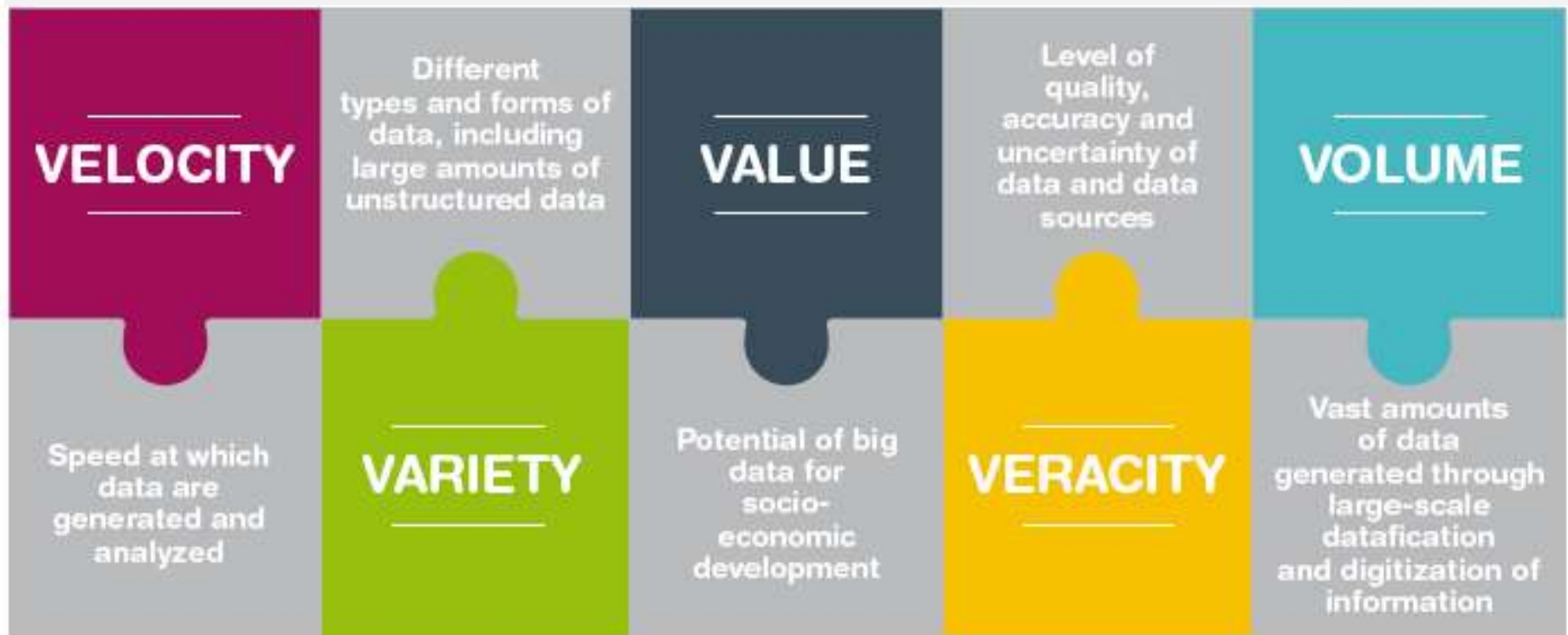
THE INTERNET OF THINGS

AN EXPLOSION OF CONNECTED POSSIBILITY



source: Singh, T. (2014)

Big Data Overview - Characteristics



THE STATE OF DATA SCIENCE

Accel



Growth

The number of data scientists has doubled over the last 4 years.



Whereabouts

6,300, or 55%, of identified data scientists are located in the United States, with the United Kingdom, India, France, Canada, the Netherlands, Germany, Spain, Australia and Israel closing out the top 10.



Top Industry

The Information Technology and Services industry employs the largest number of data scientists.



Top Skills

The top five skills listed by data scientists are: Data Analysis, R, Python, Data Mining, and Machine Learning.



Education Level

Over 79% of data scientists that list their education have earned a graduate degree, and 38% have earned a PhD.



Top Backgrounds

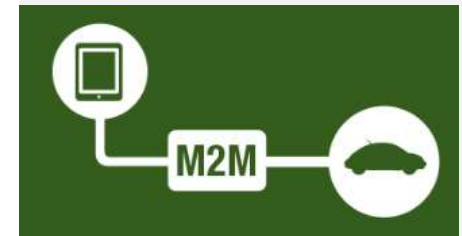
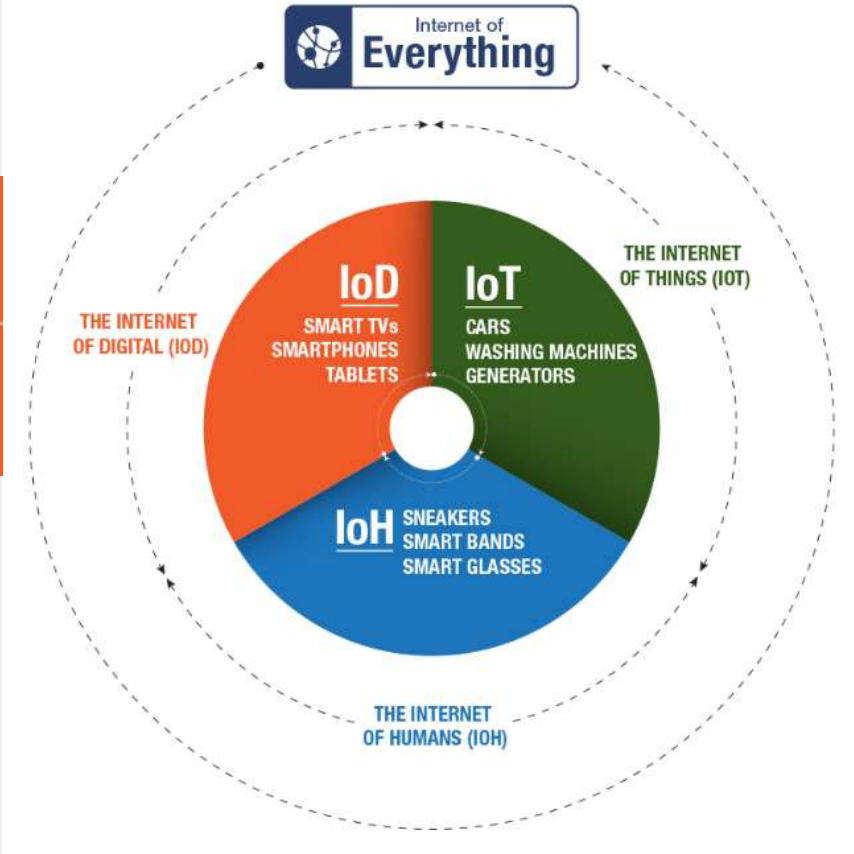
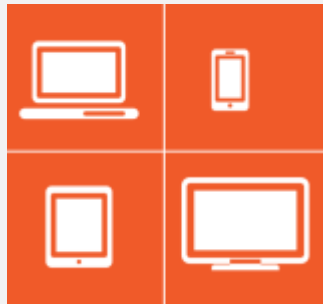
The majority of data scientists come from STEM graduate-level backgrounds, with Computer Science, Statistics, Mathematics and Physics leading the way. However, there are significant differences at the Master's and PhD levels.

A complex data visualization background. It features a central, glowing blue sphere composed of interconnected nodes and lines, resembling a network or a molecular structure. The sphere is surrounded by various numerical data points, percentages, and mathematical symbols like plus and minus signs, all in shades of blue and white. The overall aesthetic is futuristic and high-tech.

From the **INTERNET OF THINGS**
to the **INTERNET OF EVERYTHING**

Data, Big Data and Small Data, what else?

The Internet of Things/Everything and Sources of Data



Big Data vs Small Data

	Big Data	Small Data
Data Condition	Always unstructured, not ready for analysis, many relational database tables that need merged	Ready for analysis, flat file, no need for merging tables.
Location	Cloud, Offshore, SQL Server, etc.	Database, local PC
Data Size	Over 50K Variables, over 50K individuals, random samples, unstructured	File that is in a spreadsheet, that can be viewed on a few sheets of paper
Data Purpose	No intended purpose	Intended purpose for Data Collection

Building a Data Driven Digital Enterprise

The Components of a high performance data driven digital enterprise

- o Strategy and Innovation
- o Profiling Customer
- o Process Automation
- o Organisation
- o Technology
- o Data and Data Analytics

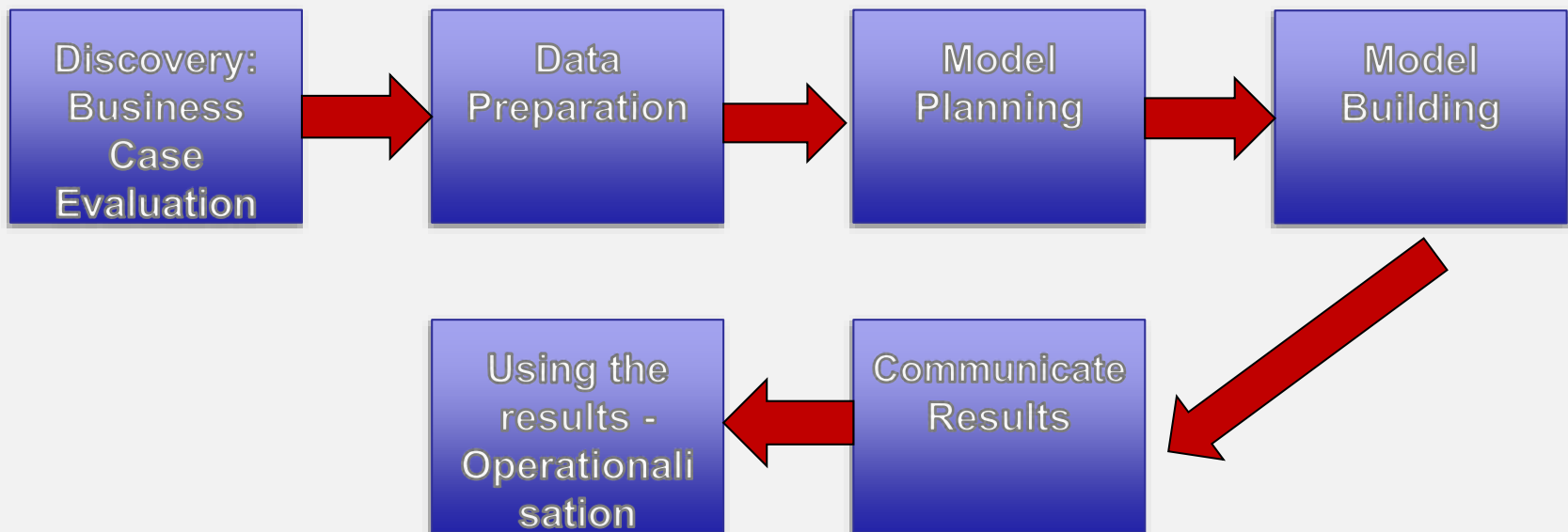
LEADING ENTERPRISES USE SIX BUILDING BLOCKS TO DEVELOP DIGITAL CAPABILITIES.

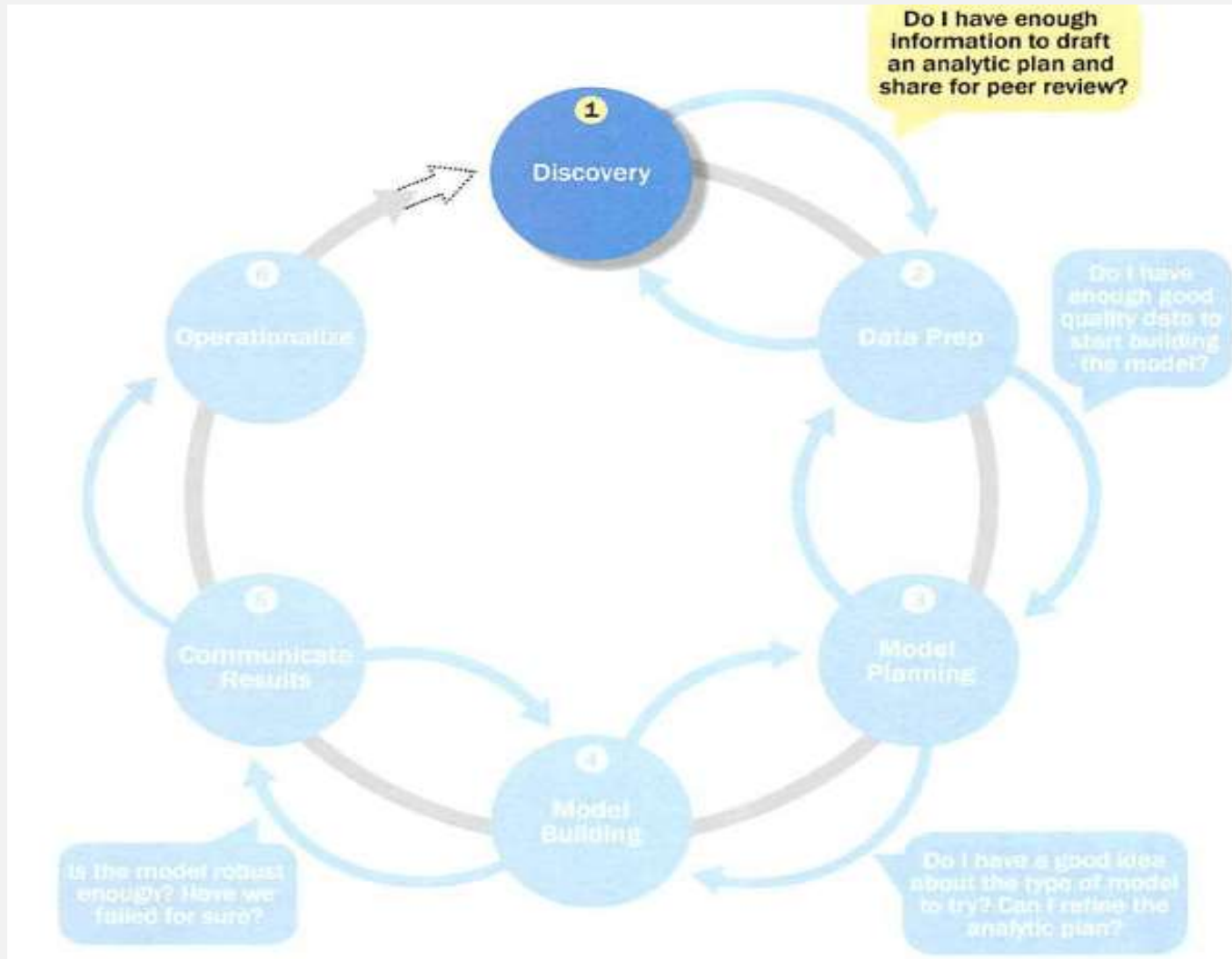


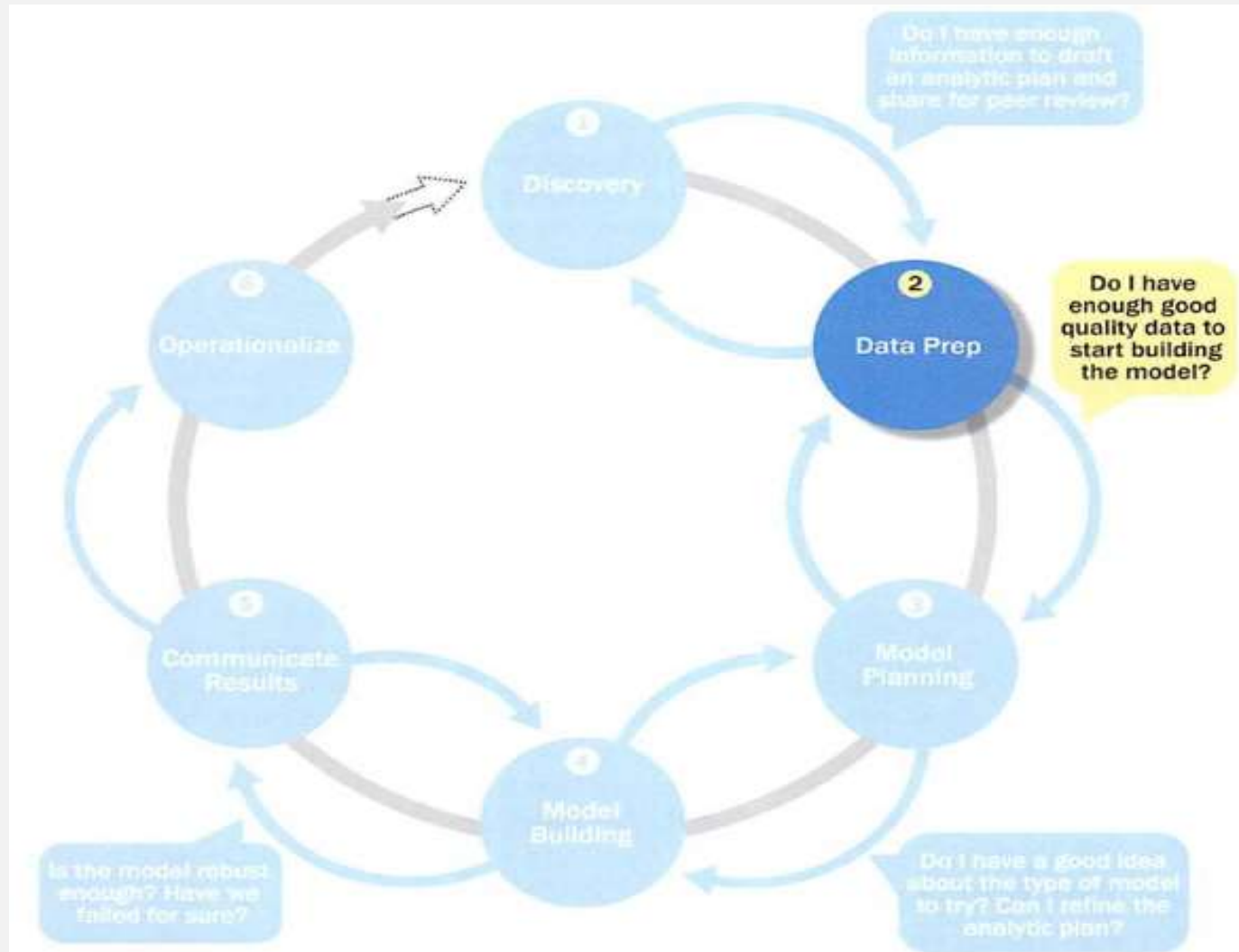
Data Analytics Process and Lifecycle

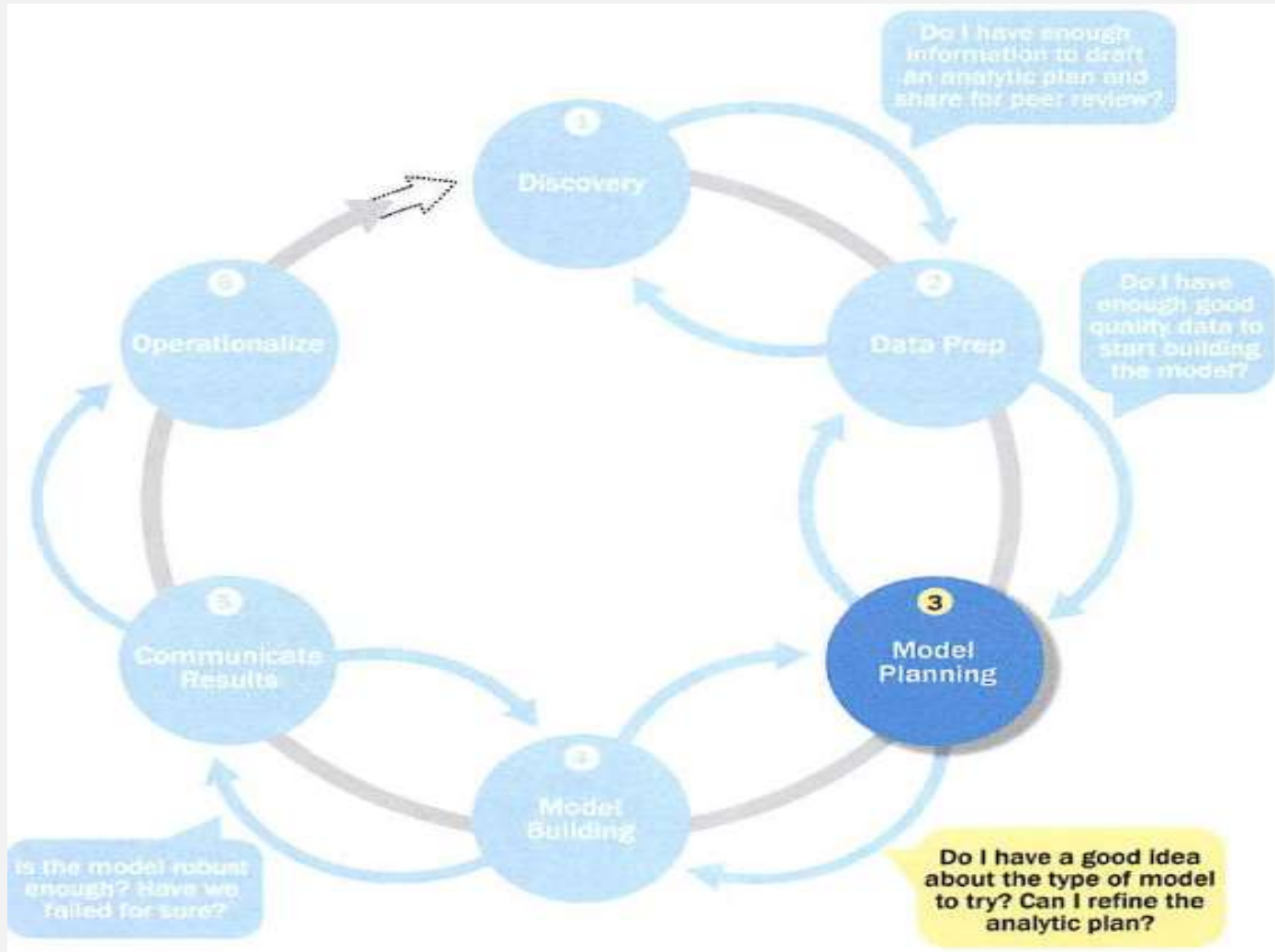
1. Learning the Business Domain
2. Resources
3. Framing the Problem
4. Identifying Key Stakeholders
5. Interviewing the Analytics Sponsor
6. Developing Initial Hypotheses
7. Identifying Potential Data Sources

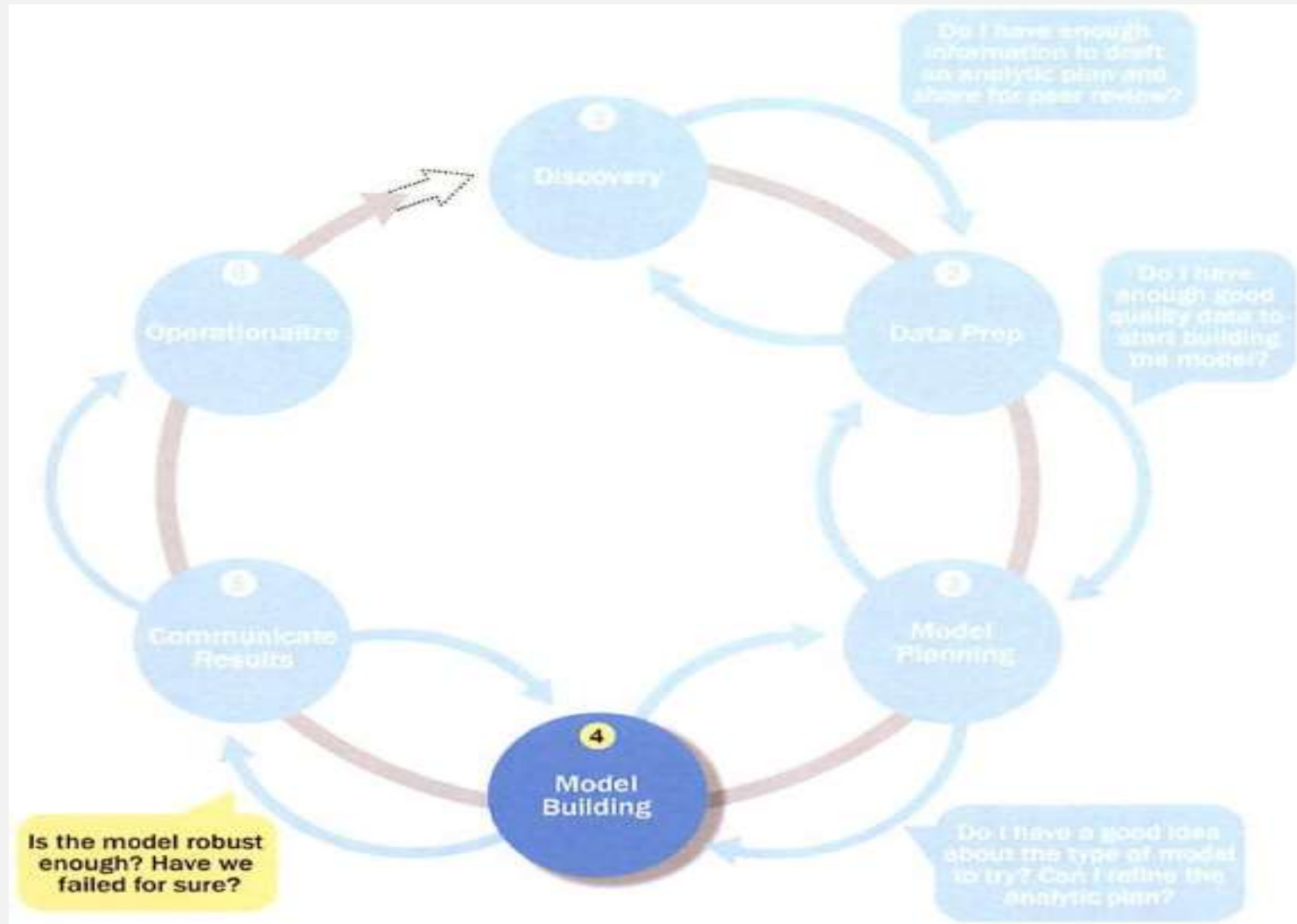
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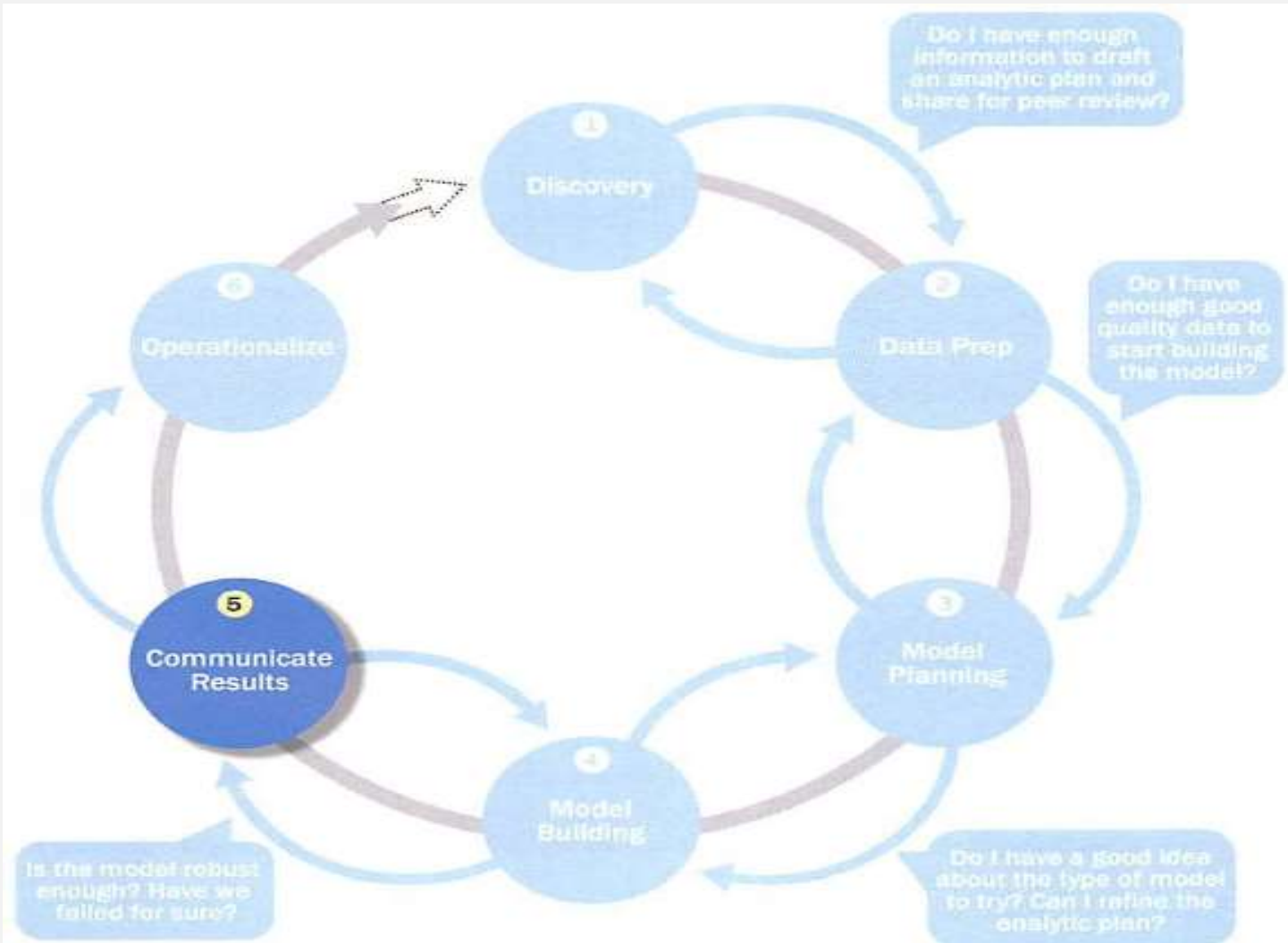




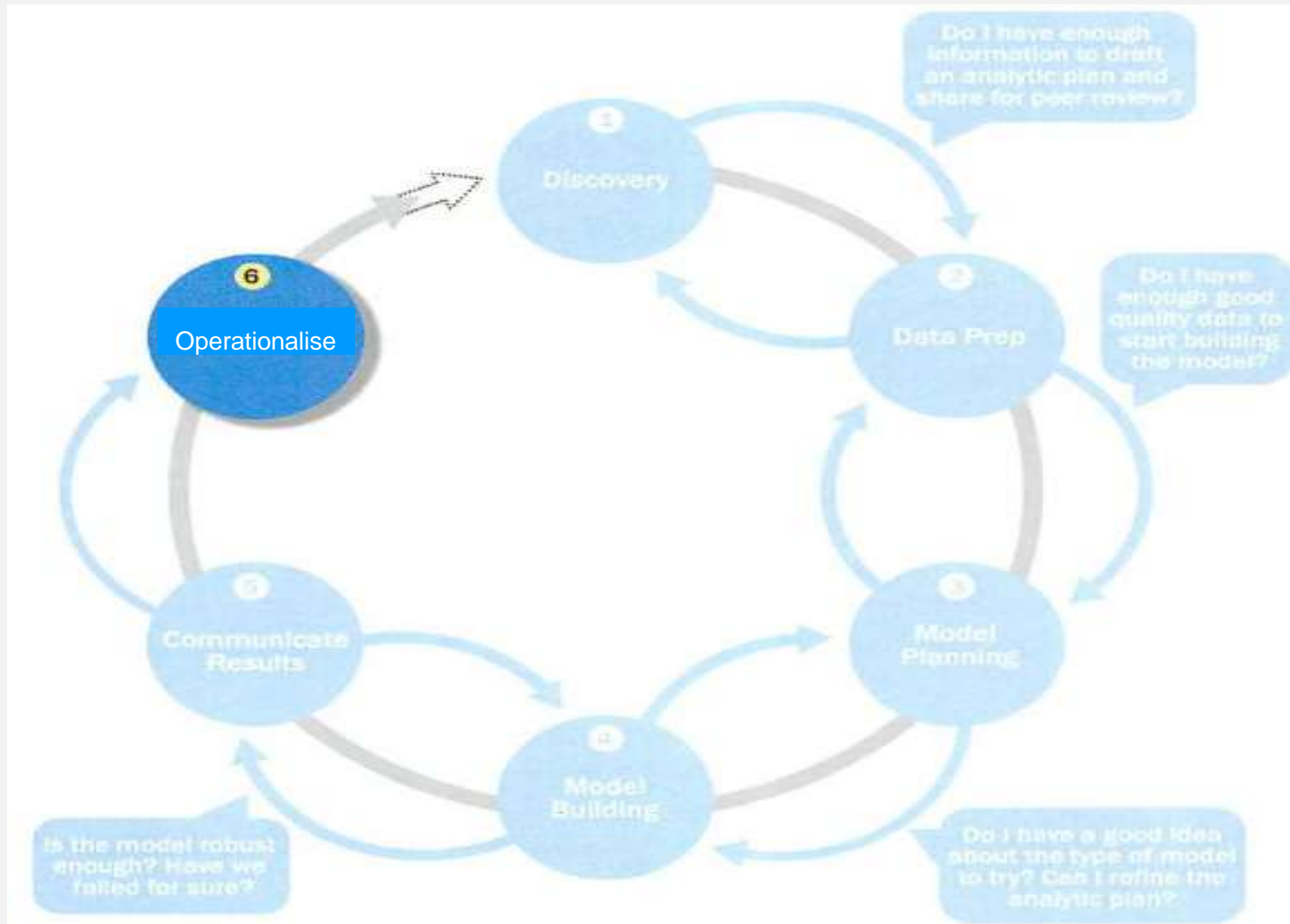




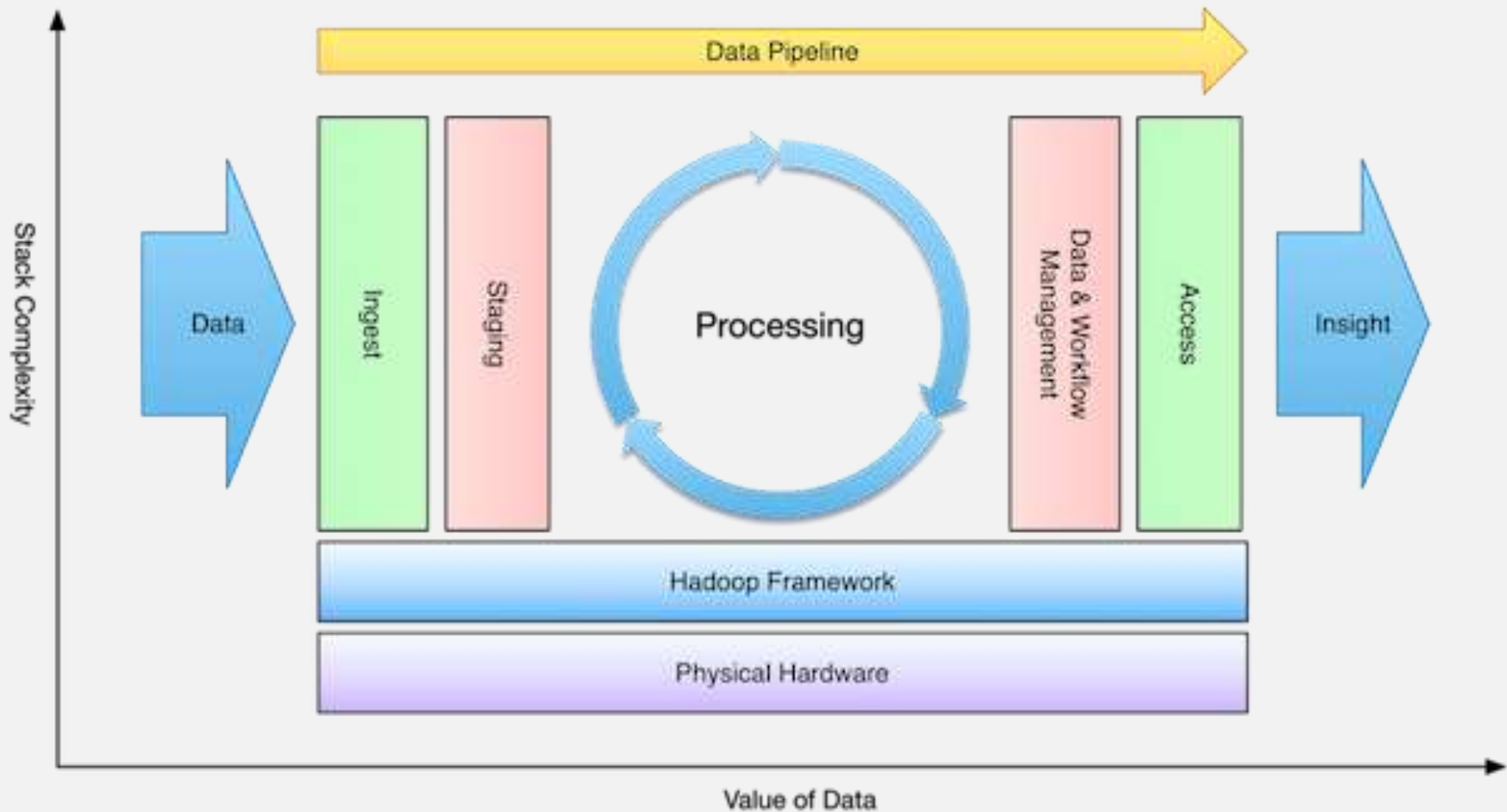




Phase 6: Operationalisation



Big Data Architecture



The Data Science Team: where do you fit?



The Handyman



The Open Source Guru



The Data Modeller



The Deep Diver



The Story Teller



The Snoop



The Privacy Wonk

Bonus eighth member: The Cat Herder (you!)

- The one person we haven't really covered is the person who needs to keep all of the other seven working effectively together. This is you, of course – The Cat Herder. If you are assembling a big data team, you'll be well on the way to unlocking a ton of value from the data in your organization.



The emergence of machine learning in data analytics

Explaining machine learning to a 7 year old kid

So what are the basic things we should know in machine learning?

Machine learning – The general idea

How do I explain machine learning to a 7 year old kid?

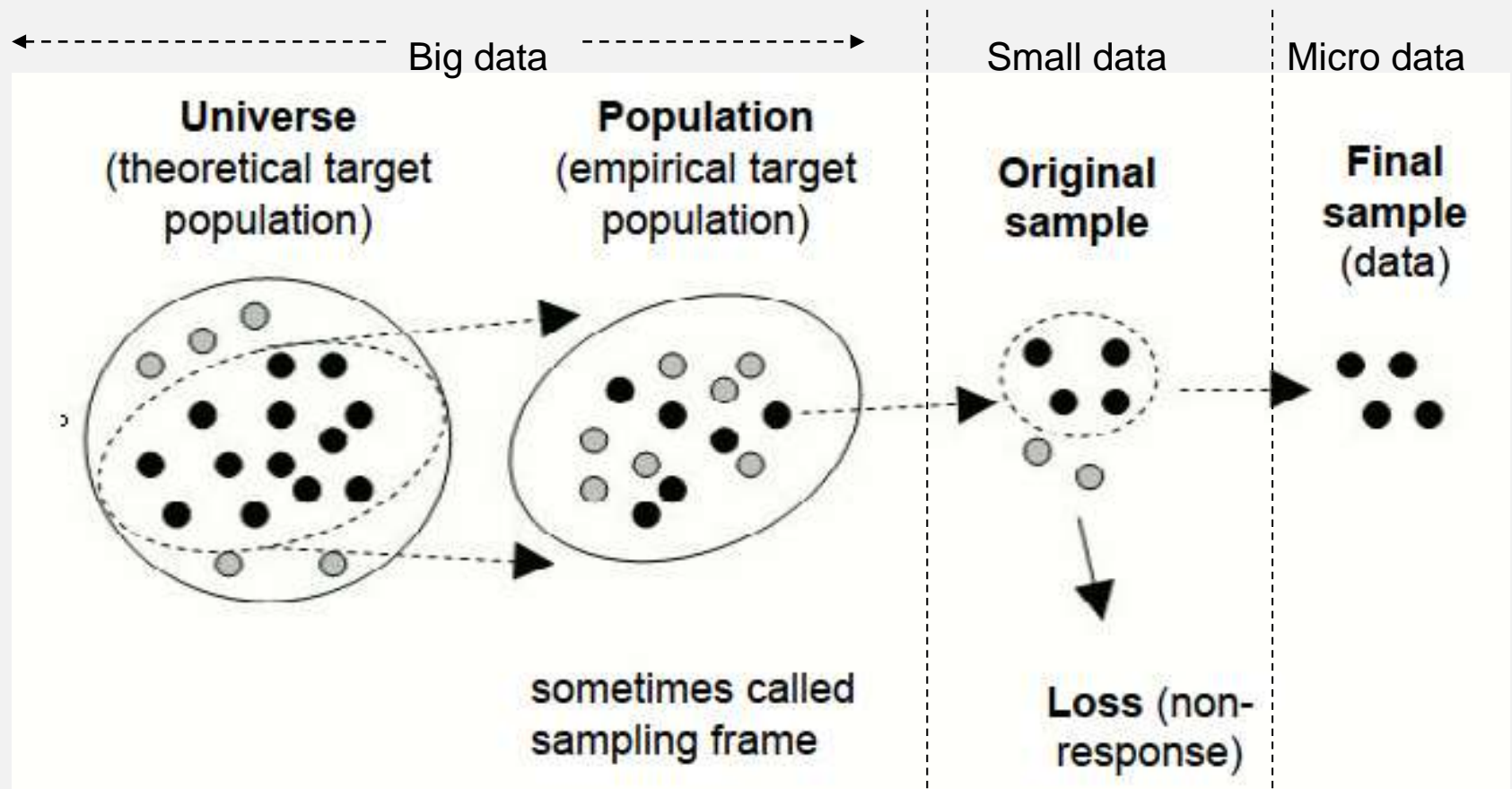
- Learning:
 - Learning from what others do in the same situation
 - Learning from similar situations
 - Combination of the above, i.e. learning from the mistakes and successes of others in similar situations
- Supervised, Unsupervised and Reinforcement learning
- What about Deep learning? What are the insights?
- At the end of the learning, you (as humans) make a decision

So what are the basic things we should know in machine learning?

- Learning = representation + evaluation + optimization

Representation	Evaluation	Optimization
Classifiers <ul style="list-style-type: none">- Instances- Hyperplanes- Decision trees- Neural Networks- Bayesian Networks	Accuracy / Precision <ul style="list-style-type: none">- Posterior probability- Squared error- Likelihood- Precision and Recall	Combinatorial and Continuous optimisation <ul style="list-style-type: none">- Greedy and beam search- Linear programming- Quadratic programming- Quasi-Newton methods

Machine learning – The general idea





Thank You