

THE NEXT  
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THING

# Introductory Data Science and Analytics

Rick Bahague

Co-Founder, PyData Philippines

# HELLO!



Member  
Computer Professionals' Union

Co-Founder  
PyData Philippines



GITHUB.COM/RICKBAHAGUE



MEDIUM.COM/@RBAHAGUEJR

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A long time ago in a galaxy far,  
far away....

THEORETICAL PHYSICS GROUP  
NATIONAL INSTITUTE OF PHYSICS  
UP DILIMAN

*TIME PROBLEM IN QUANTUM  
MECHANICS, EIGENVALUE PROBLEMS,  
SCIENTIFIC COMPUTING*

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## PHYSICAL REVIEW LETTERS

Highlights Recent Accepted Collections Authors Referees Search Press About ⚡

### Confined Quantum Time of Arrivals

Eric A. Galapon, Roland F. Caballar, and Ricardo T. Bahague Jr  
Phys. Rev. Lett. **93**, 180406 – Published 29 October 2004; Erratum Phys. Rev. Lett. **101**, 169901 (2008)

[Article](#) [References](#) [Citing Articles \(35\)](#) [PDF](#) [HTML](#) [Export Citation](#)

## PHYSICAL REVIEW A

*covering atomic, molecular, and optical physics and quantum information*

Highlights Recent Accepted Authors Referees Search Press About ⚡

### Confined quantum time of arrival for the vanishing potential

Eric A. Galapon, Roland F. Caballar, and Ricardo Bahague  
Phys. Rev. A **72**, 062107 – Published 6 December 2005; Erratum Phys. Rev. A **78**, 049902 (2008)

[Article](#) [References](#) [Citing Articles \(19\)](#) [PDF](#) [HTML](#) [Export Citation](#)

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far away....

TECHNICAL SPECIALIST  
MODNET/PHCOLO (ISP)

DATABASE MANAGER  
BCD PINPOINT DM (ADVERTISING)

NON-PROFIT WORK / WEB &  
APPLICATION DEVELOPMENT

SENIOR "DATA SCIENTIST" (TELCO)

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STAR WARS



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BE FAMILIAR WITH DIVERSE DATA SETS

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STAR  
WARS



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# OUTLINE

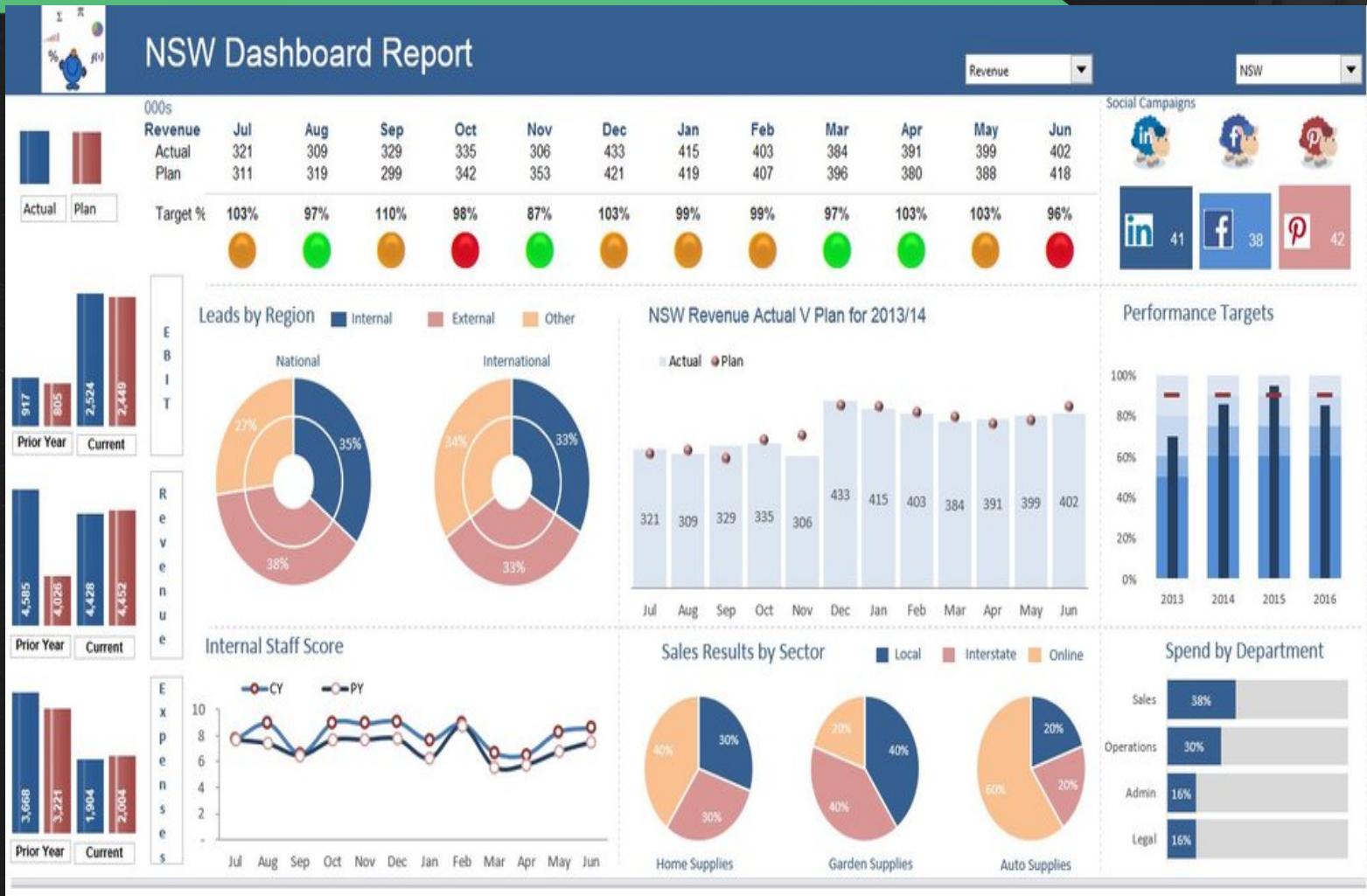
- Analytics, Big Data and Data Science
- Data Scientists
- Data Science and Big Data Applications
- Tools
- Development Track

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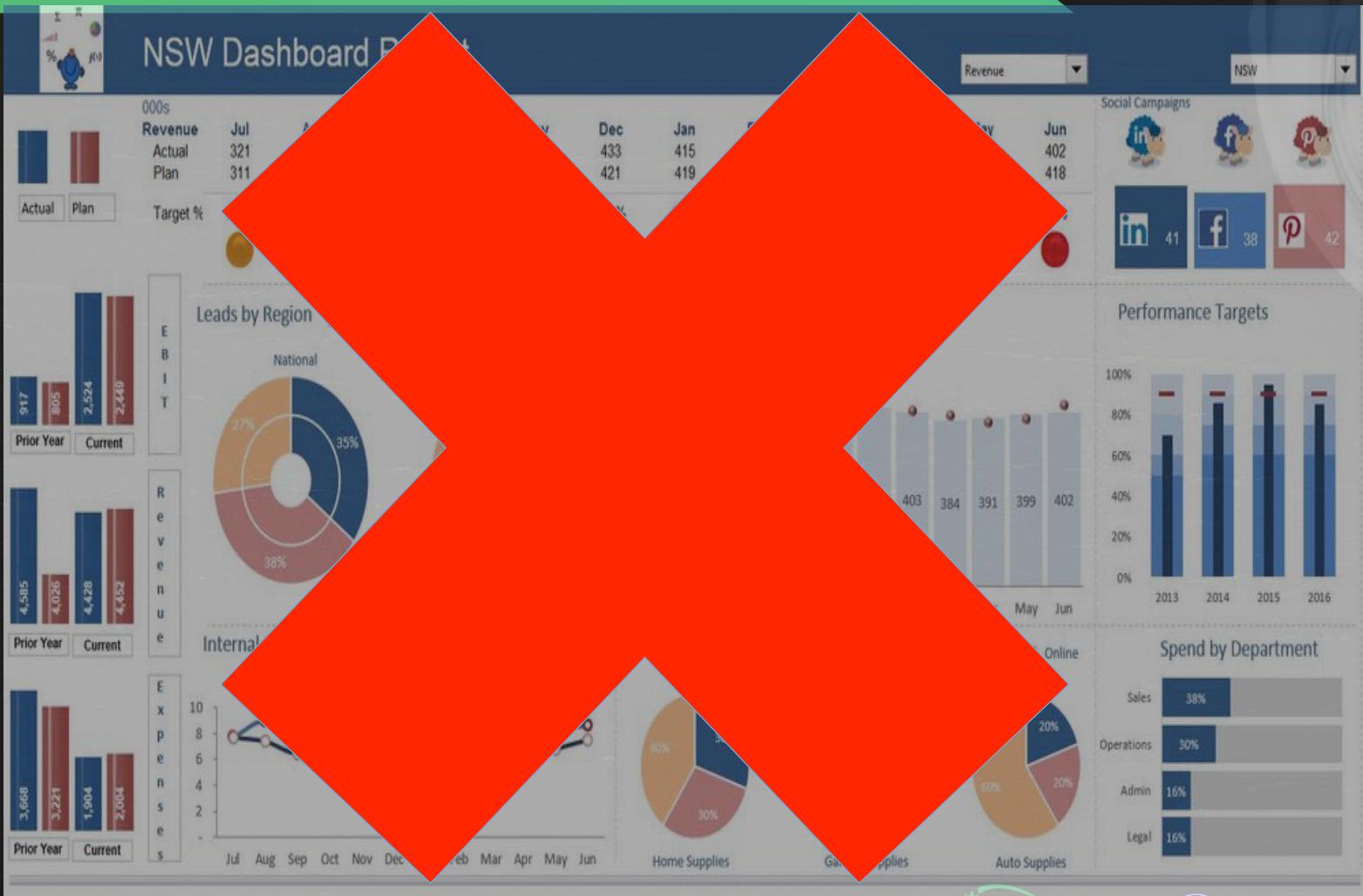
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# WHAT IS ANALYTICS ?



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# DASHBOARD != ANALYTICS



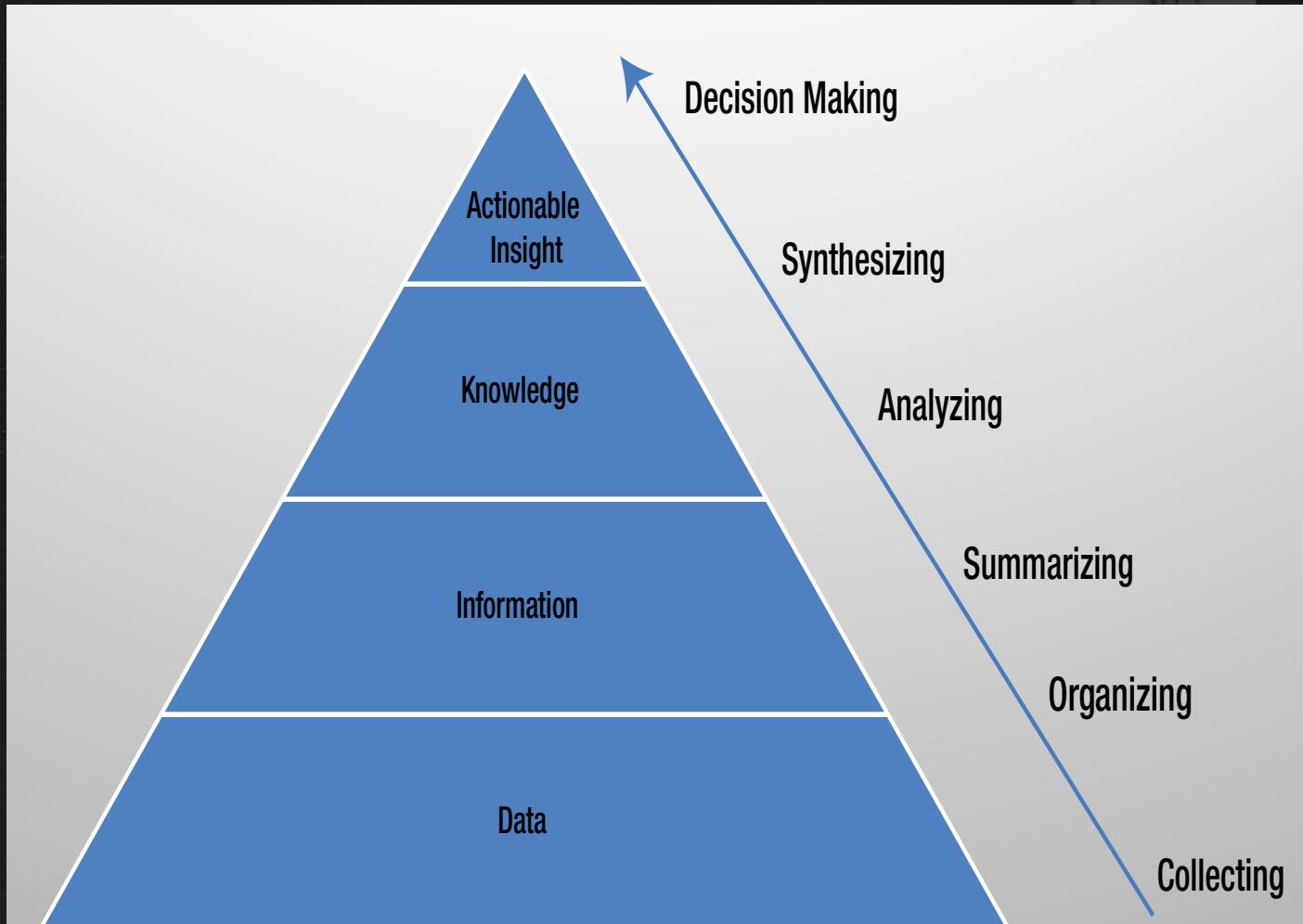
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# ANALYTICS

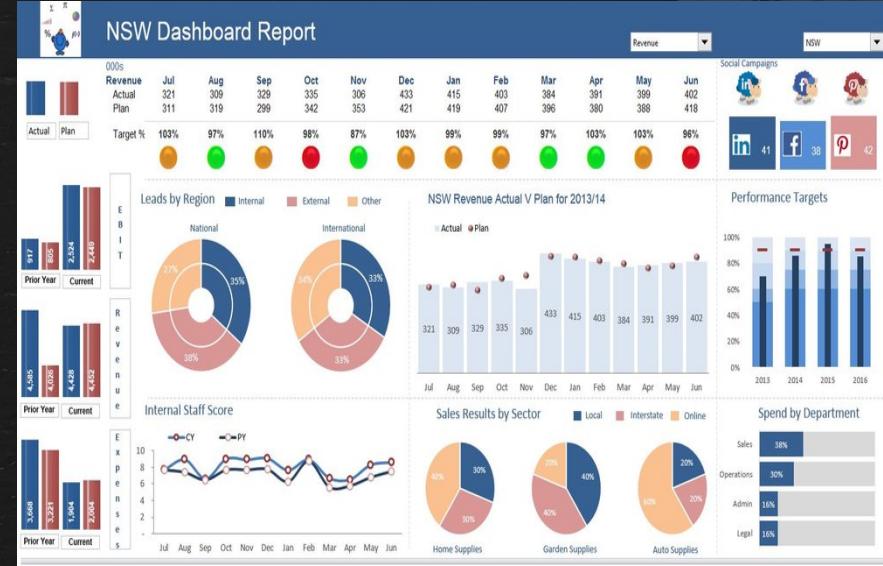


Source: Big Data Imperatives

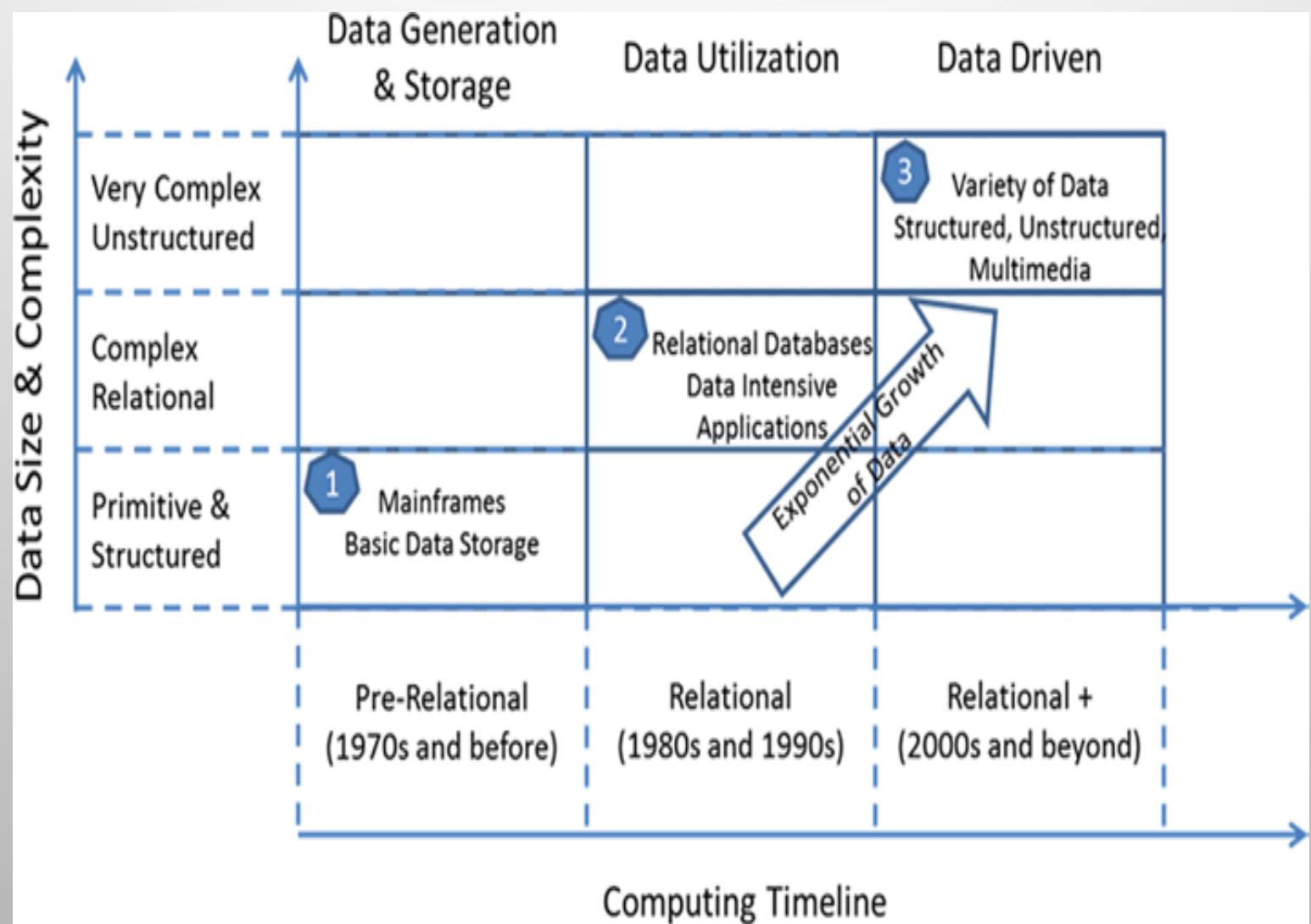
# DASHBOARD IS A TOOL

OPERATIONAL ANALYTICS OR  
EMBEDDED ANALYTIC

DATA DISCOVERY OR  
EXPLORATORY ANALYTICS



# Big Data



# Big Data Value Across Industries

	Volume of Data	Velocity of Data	Variety of Data	Under -Utilized Data ('Dark Data')	Big Data Value Potential
Banking and Securities	High	High	Low	Medium	High
Communications & Media Services	High	High	High	Medium	High
Education	Very Low	Very Low	Very Low	High	Medium
Government	High	Medium	High	High	High

# ANALYSTS & BIG DATA

INCREASING NEED FOR DATA ANALYSTS TO BE FAMILIAR AND SKILLED ON BIG DATA PROCESSING AND ANALYTICS



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# ANALYTICAL SKILLS

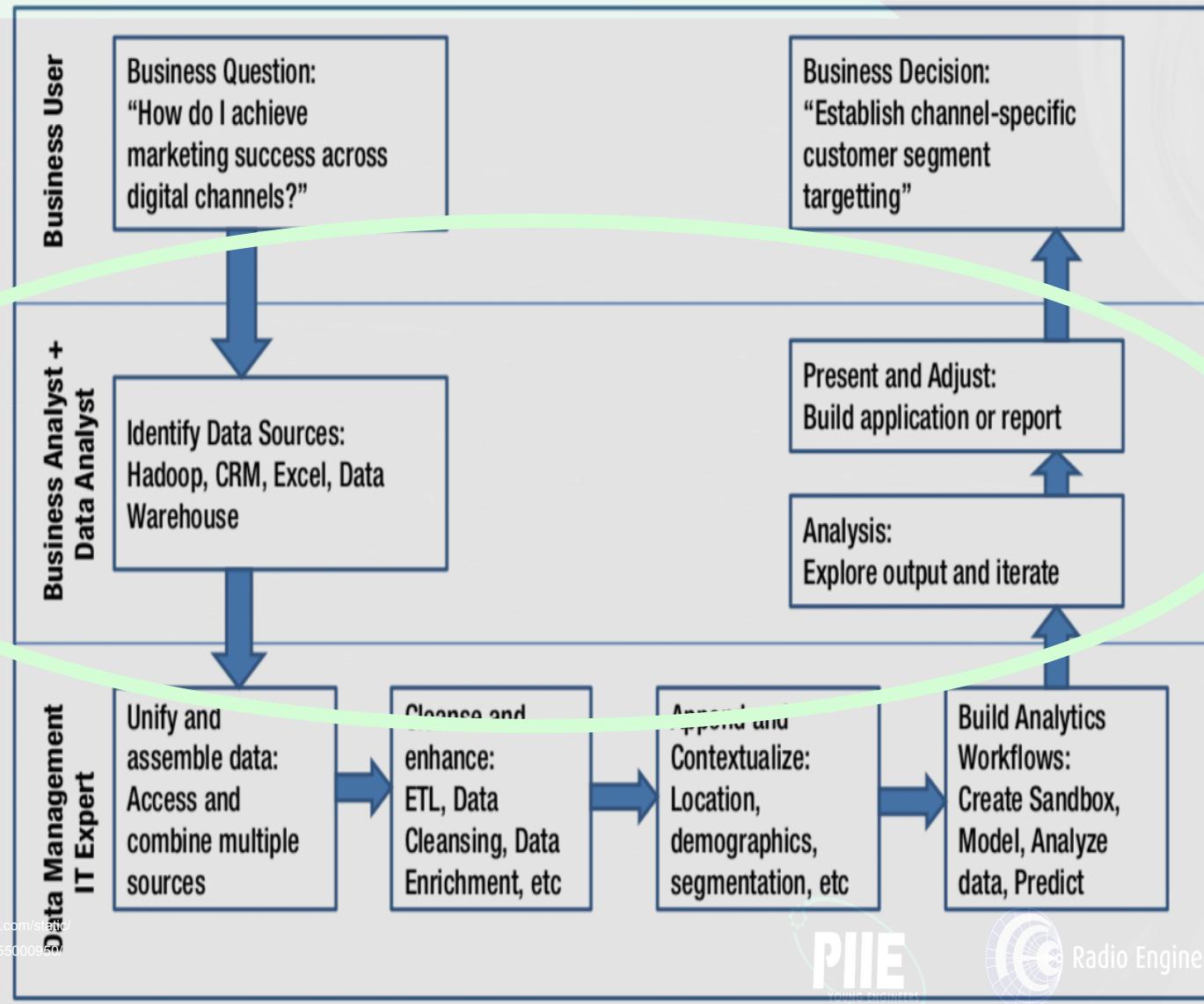
- CURIOSITY
- STATISTICS
- DATA CLEAN-UP OR CARPENTRY

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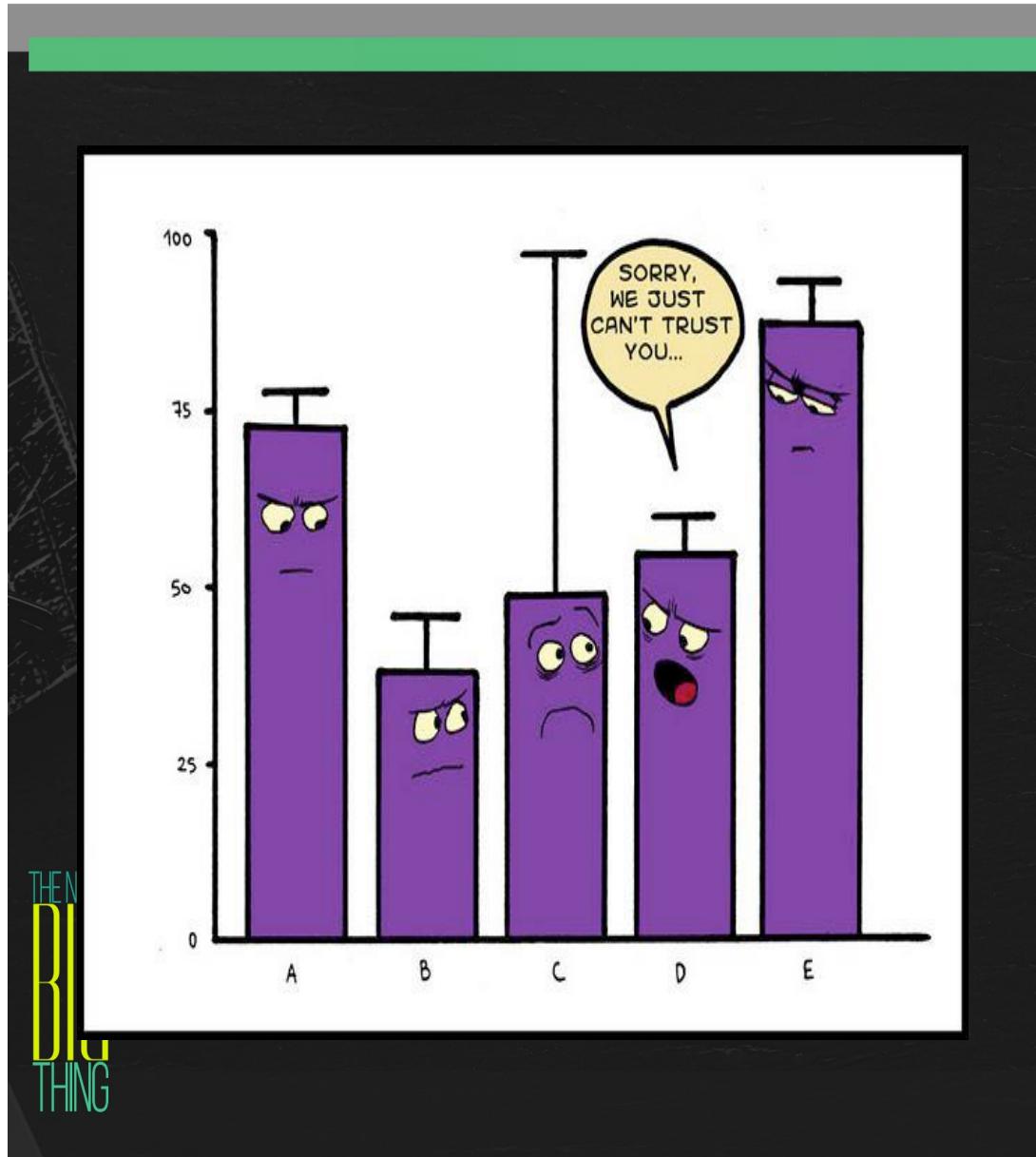
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<u>P-VALUE</u>	<u>INTERPRETATION</u>
0.001	HIGHLY SIGNIFICANT
0.01	HIGHLY SIGNIFICANT
0.02	HIGHLY SIGNIFICANT
0.03	HIGHLY SIGNIFICANT
0.04	SIGNIFICANT
0.049	SIGNIFICANT
0.050	OH CRAP. REDO CALCULATIONS.
0.051	ON THE EDGE OF SIGNIFICANCE
0.06	ON THE EDGE OF SIGNIFICANCE
0.07	HIGHLY SUGGESTIVE,
0.08	SIGNIFICANT AT THE P<0.10 LEVEL
0.09	SIGNIFICANT AT THE P<0.10 LEVEL
0.099	HEY, LOOK AT THIS INTERESTING SUBGROUP ANALYSIS
≥0.1	THIS INTERESTING SUBGROUP ANALYSIS

# TRADITIONALLY,



# DATA SCIENCE

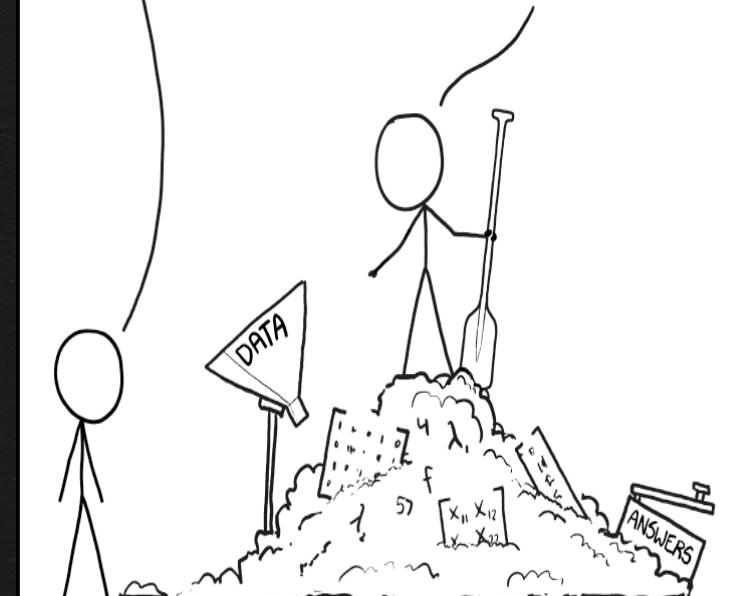


THIS IS YOUR MACHINE LEARNING SYSTEM?

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.



[https://imgs.xkcd.com/comics/machine\\_learning.png](https://imgs.xkcd.com/comics/machine_learning.png)



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# DATA SCIENCE

Science is a way of thinking much more than it is a body of knowledge

Carl Sagan.

Our perspective is that data science is the child of **statistics** and **computer science**. While it has inherited some of their methods and thinking, it also seeks to blend them, refocus them, and develop them to address the context and needs of modern scientific data analysis. This perspective is not new. Over 50 years ago, Tukey (7) defined “data analysis” as a broad endeavor, much broader than traditional mathematical statistics. In a sense, today’s data science, although set against a modern backdrop, is cast from Tukey’s original.

Biel & Smith, PNAS , <https://doi.org/10.1073/pnas.1702076114>



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# DATA SCIENCE

exploits the modern deluge of data for prediction, exploration, understanding, and intervention.

emphasizes the value and necessity of approximation and simplification.

values effective communication of the results of a data analysis and of the understanding about the world

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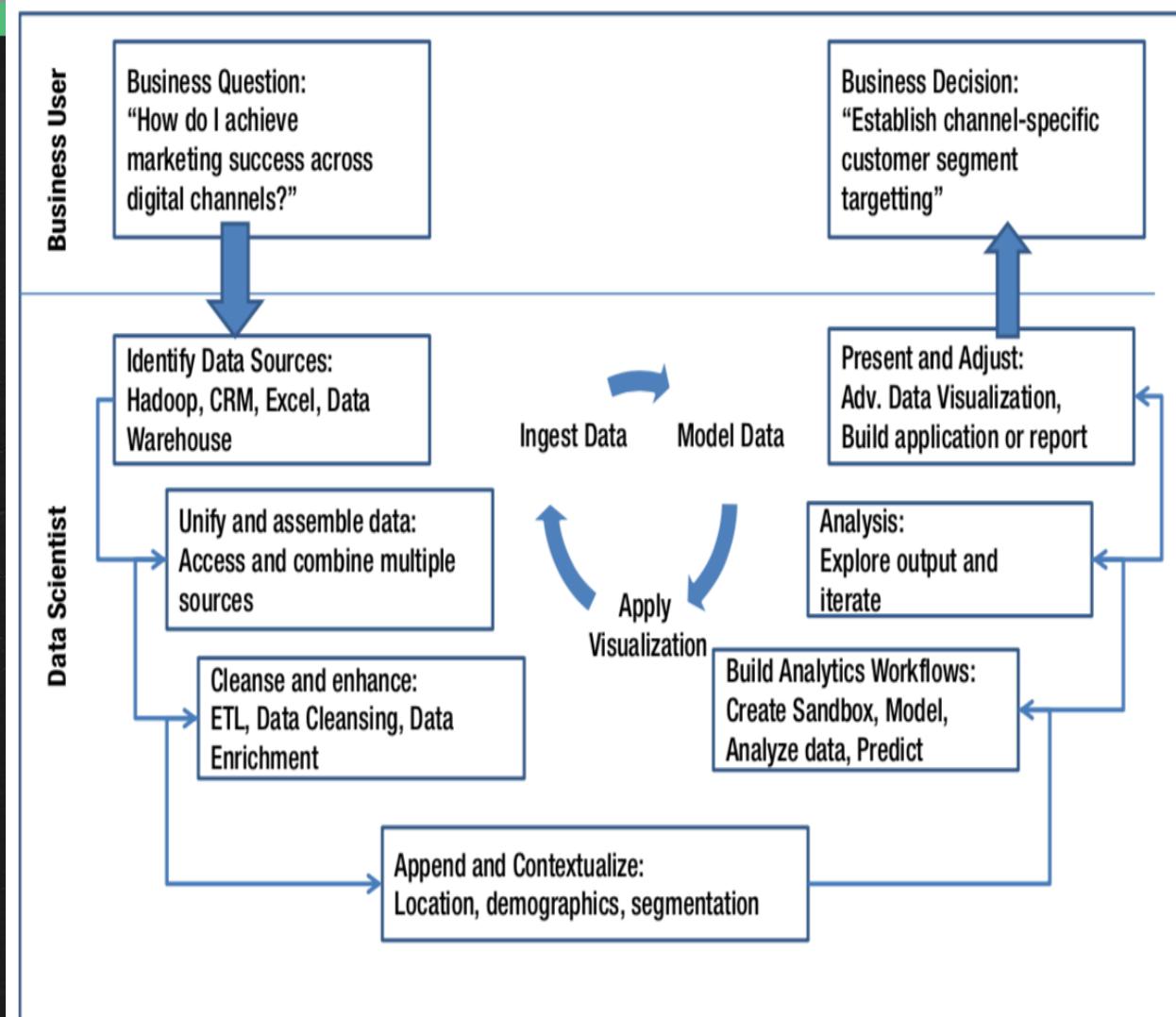
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# DATA SCIENCE

prioritizes an understanding of the optimization algorithms and transparently managing the inevitable tradeoff between accuracy and speed

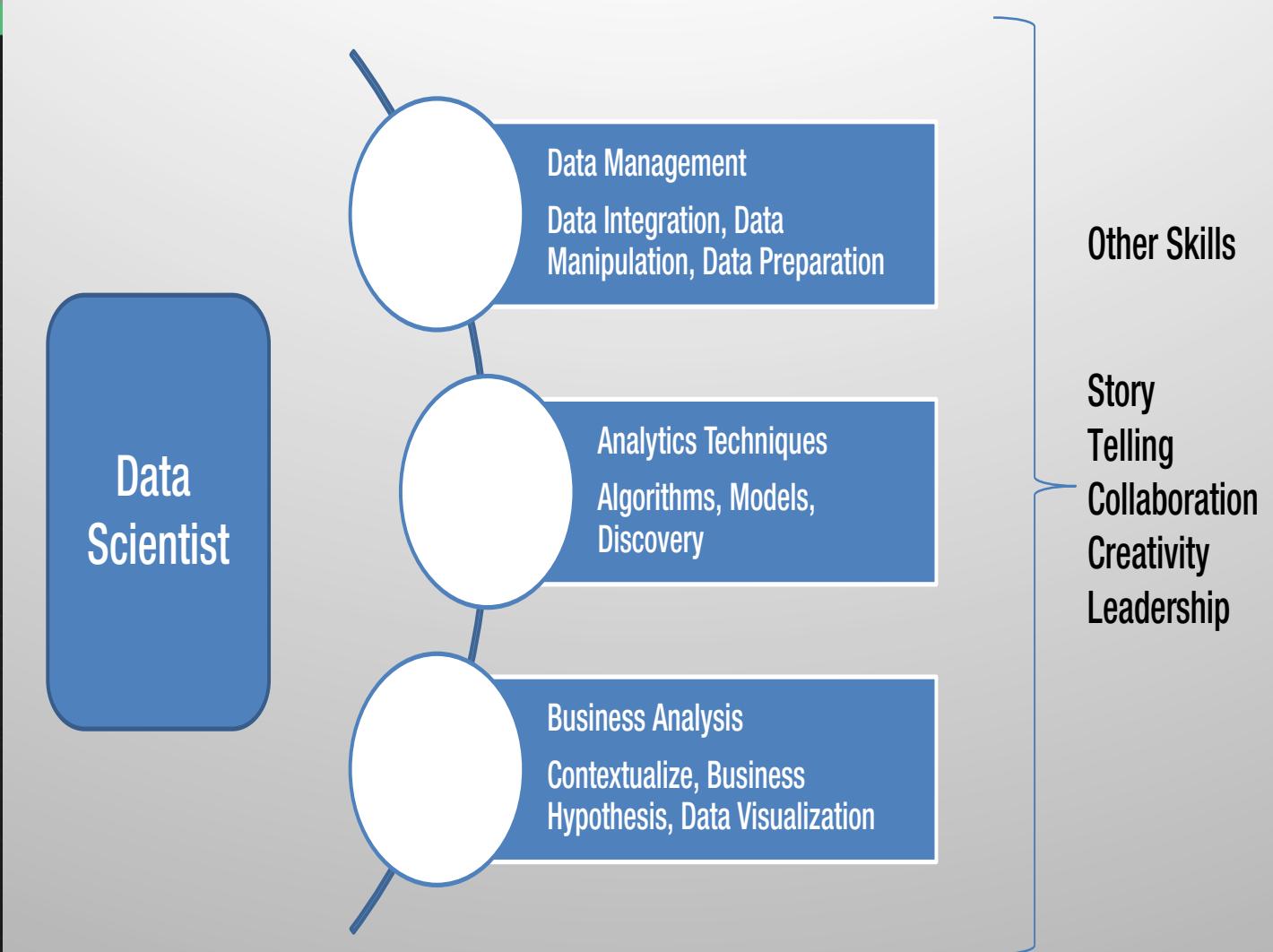
promotes domain-specific analyses, where data scientists and domain experts work together to balance appropriate assumptions with computationally efficient methods

# BIG DATA & DATA SCIENCE



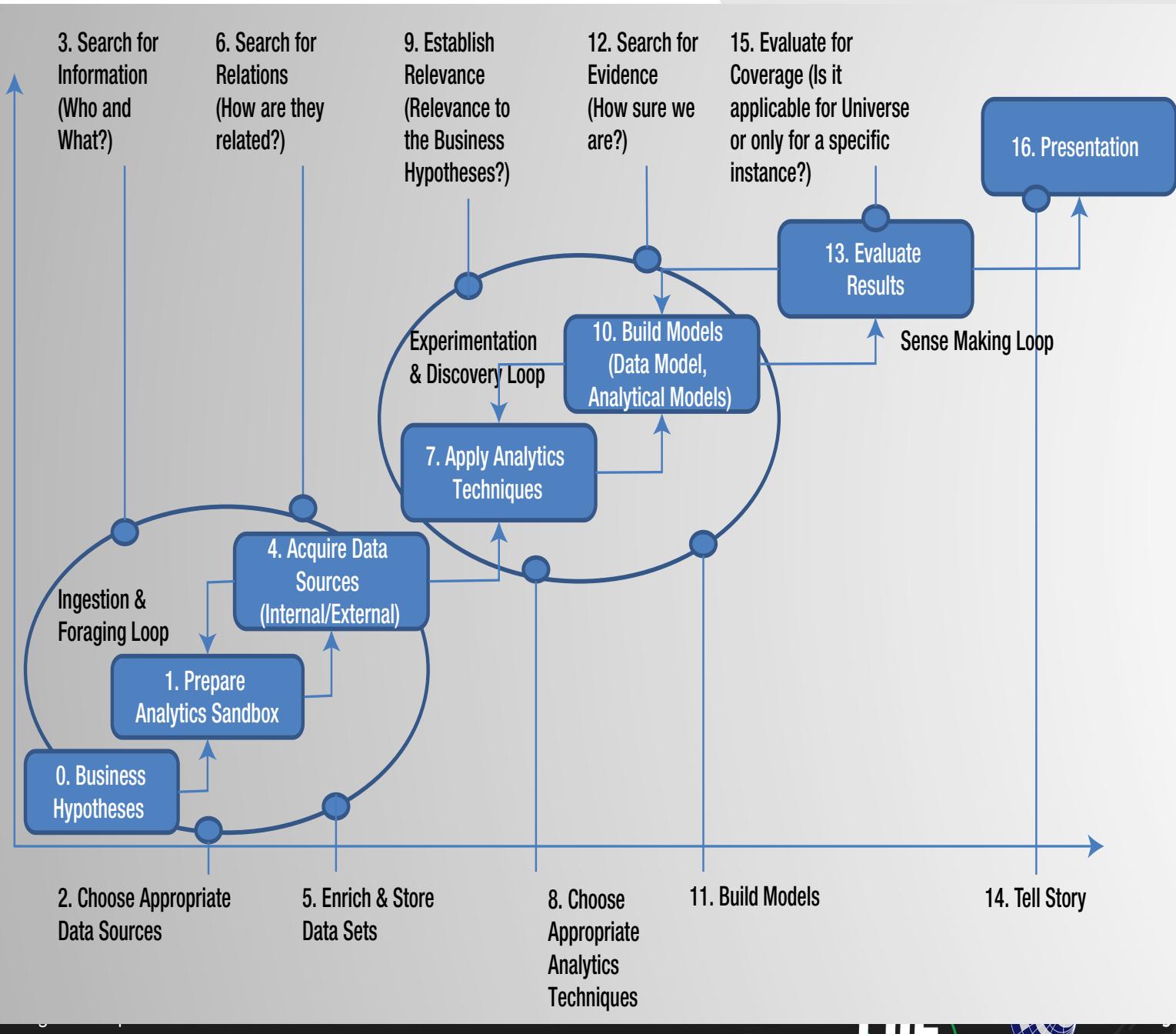
Source: Big Data Imperative

# DATA SCIENTISTS



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Source: Big Data Imperatives



# ARE WE THIS GUY?

DATA SCIENCE TEAM

STATISTICS  
COMPUTER SCIENCE  
NATURAL SCIENCES  
ENGINEERING

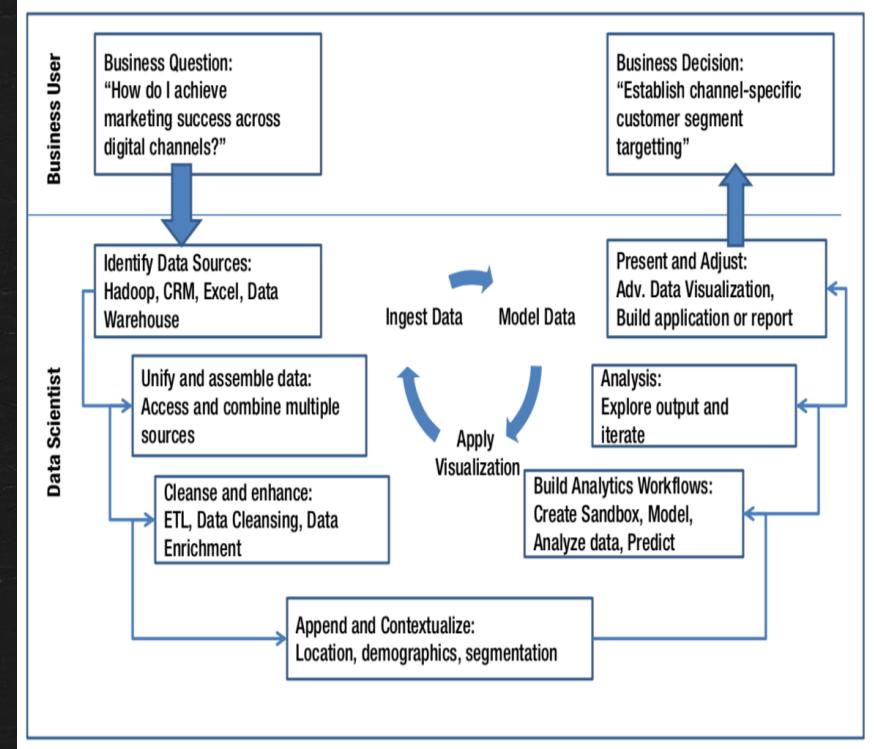
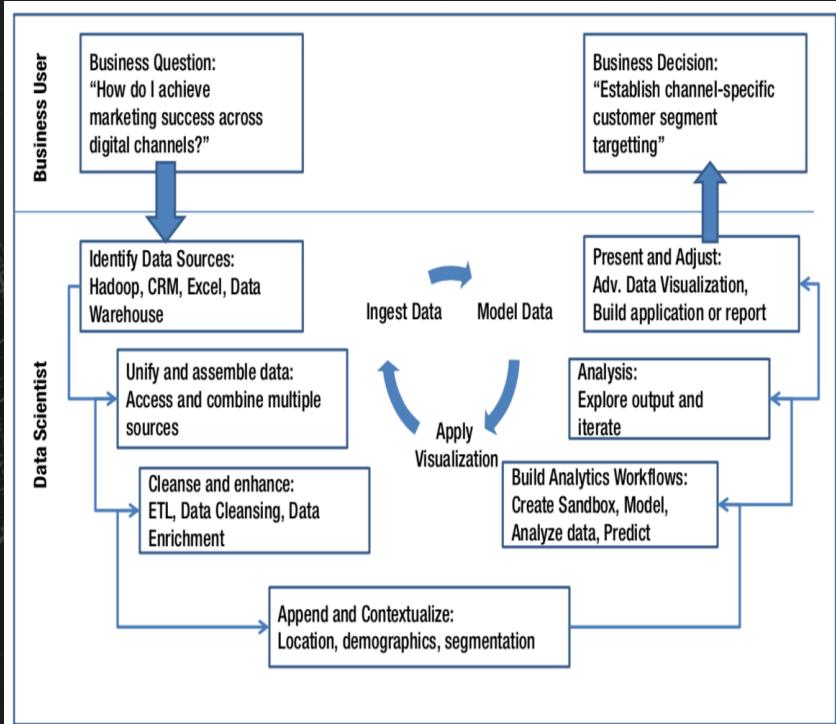
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Source: Big Data Imperatives



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# DATA SCIENTISTS & ANALYSTS



# Data Science and Big Data Applications

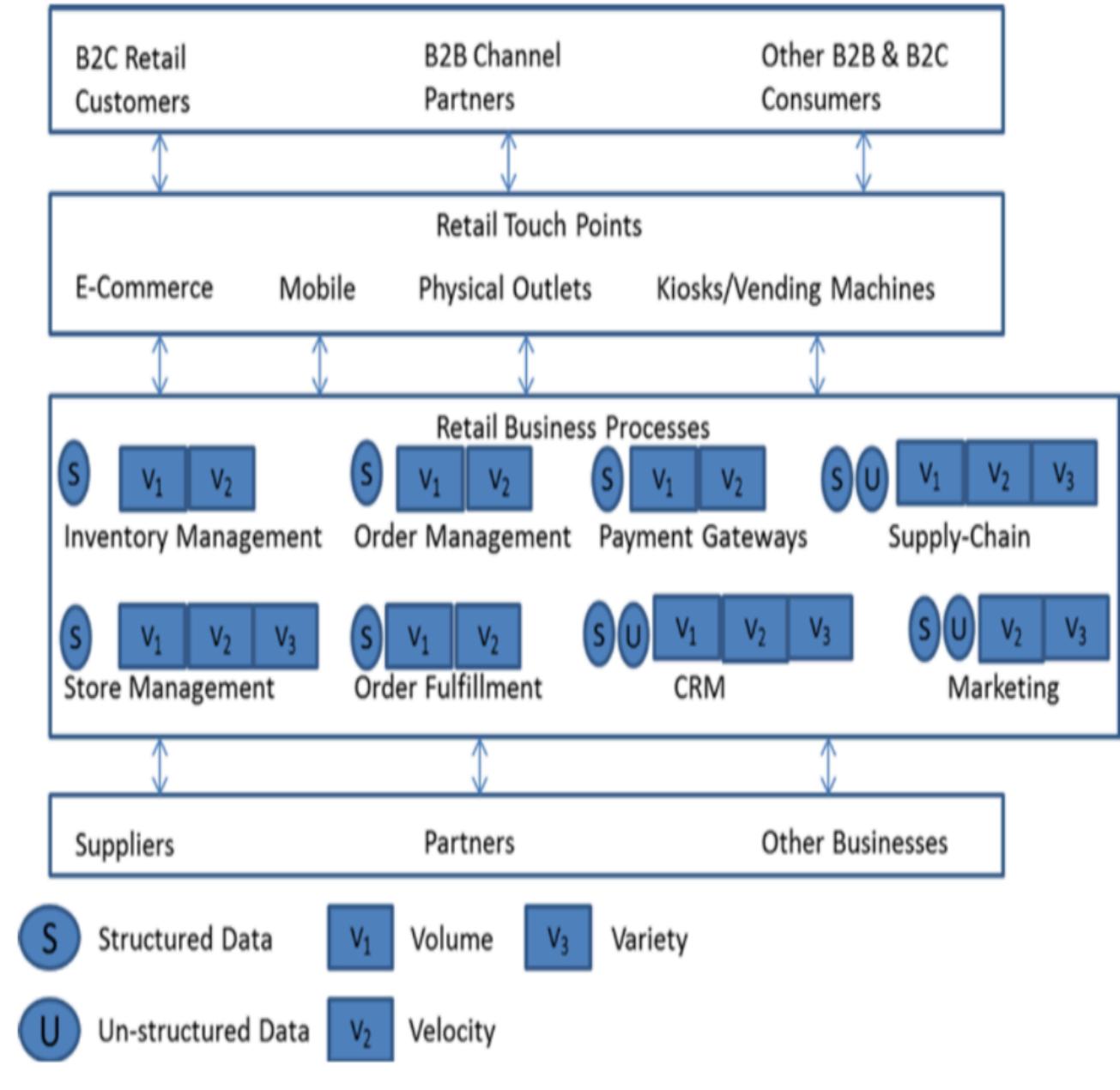
Retail	Manufacturing		
✓ Customer Relationship Management ✓ Store Location & Layout	✓ Fraud Detection & Prevention ✓ Supply-Chain optimization ✓ Dynamic Pricing	✓ Product Research ✓ Engineering Analysis ✓ Predictive Maintenance	✓ Process & Quality Metrics ✓ Distribution Optimization
Financial Services		Media & Telecommunications	
✓ Algorithmic Trading ✓ Risk Analysis	✓ Fraud Detection ✓ Portfolio Analysis	✓ Network Optimization ✓ Customer Scoring	✓ Churn Prevention ✓ Fraud Prevention
Advertising & Public Relations		Energy	
✓ Demand Signaling ✓ Targeted Advertising	✓ Sentiment Analysis ✓ Customer Acquisition	✓ Smart Grid ✓ Exploration	✓ Operational Modeling ✓ Power-Line Sensors
Government		Healthcare & Life Sciences	
✓ Market Governance ✓ Weapon Systems & Counter Terrorism	✓ Econometrics ✓ Health Informatics	✓ Pharmacogenomics ✓ Bioinformatics	✓ Pharmaceutical Research ✓ Clinical Outcomes Research

Source: Big Data Imperative

# Application in Retail Industry

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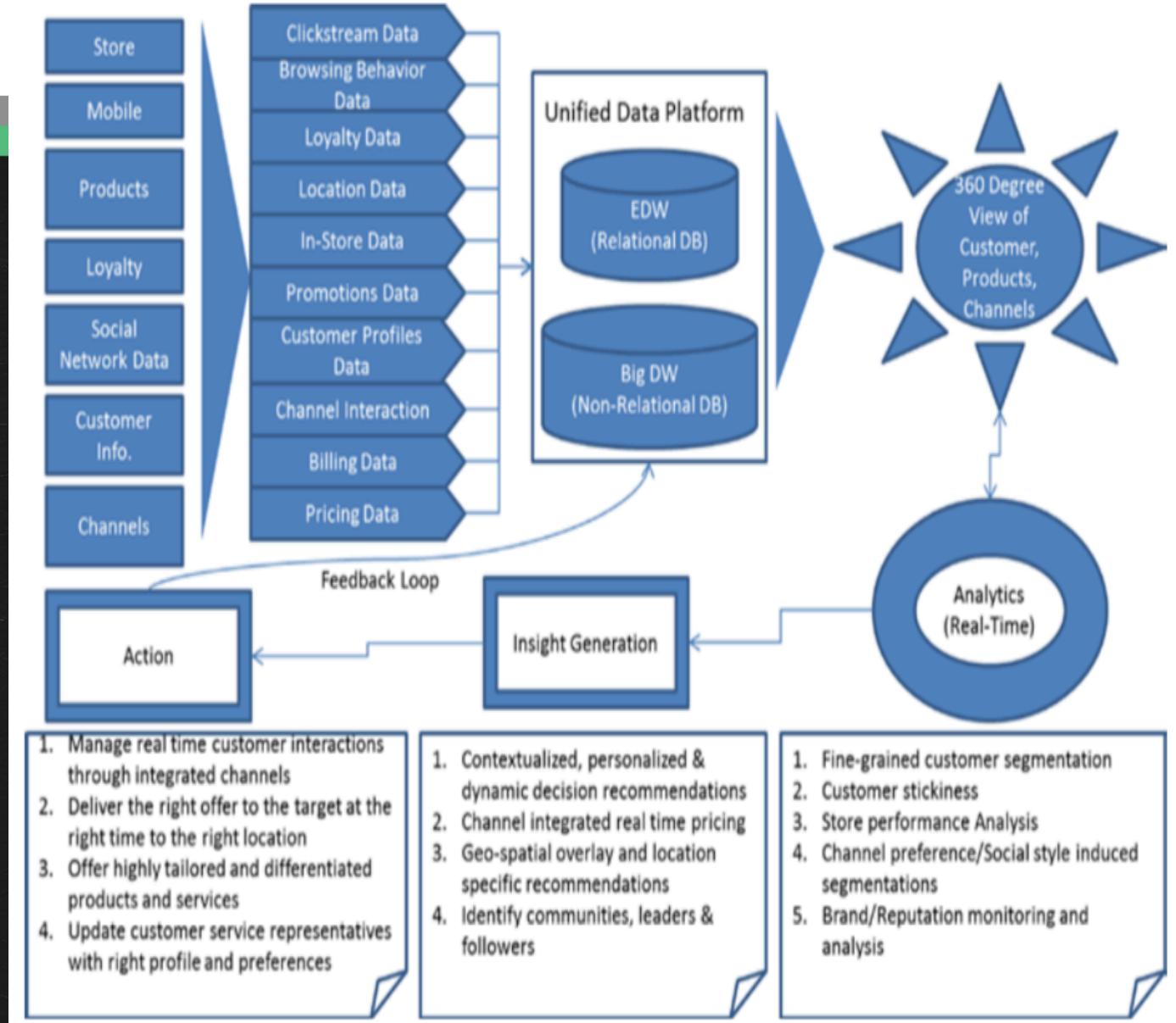
Source: Big Data Imperatives



# Application in Retail Industry

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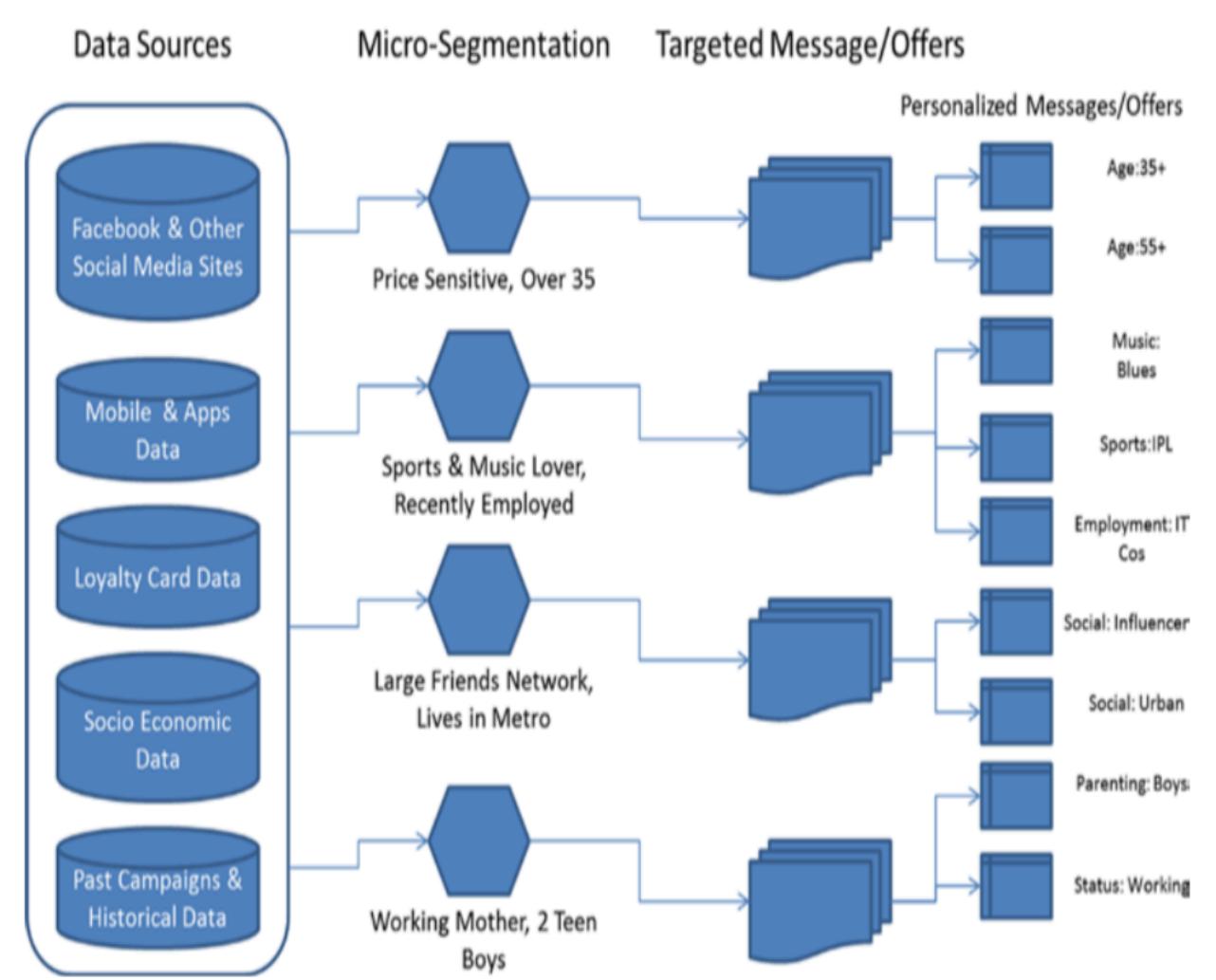
Source: Big Data Imperatives



# Application in Retail Industry

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Source: Big Data Imperatives

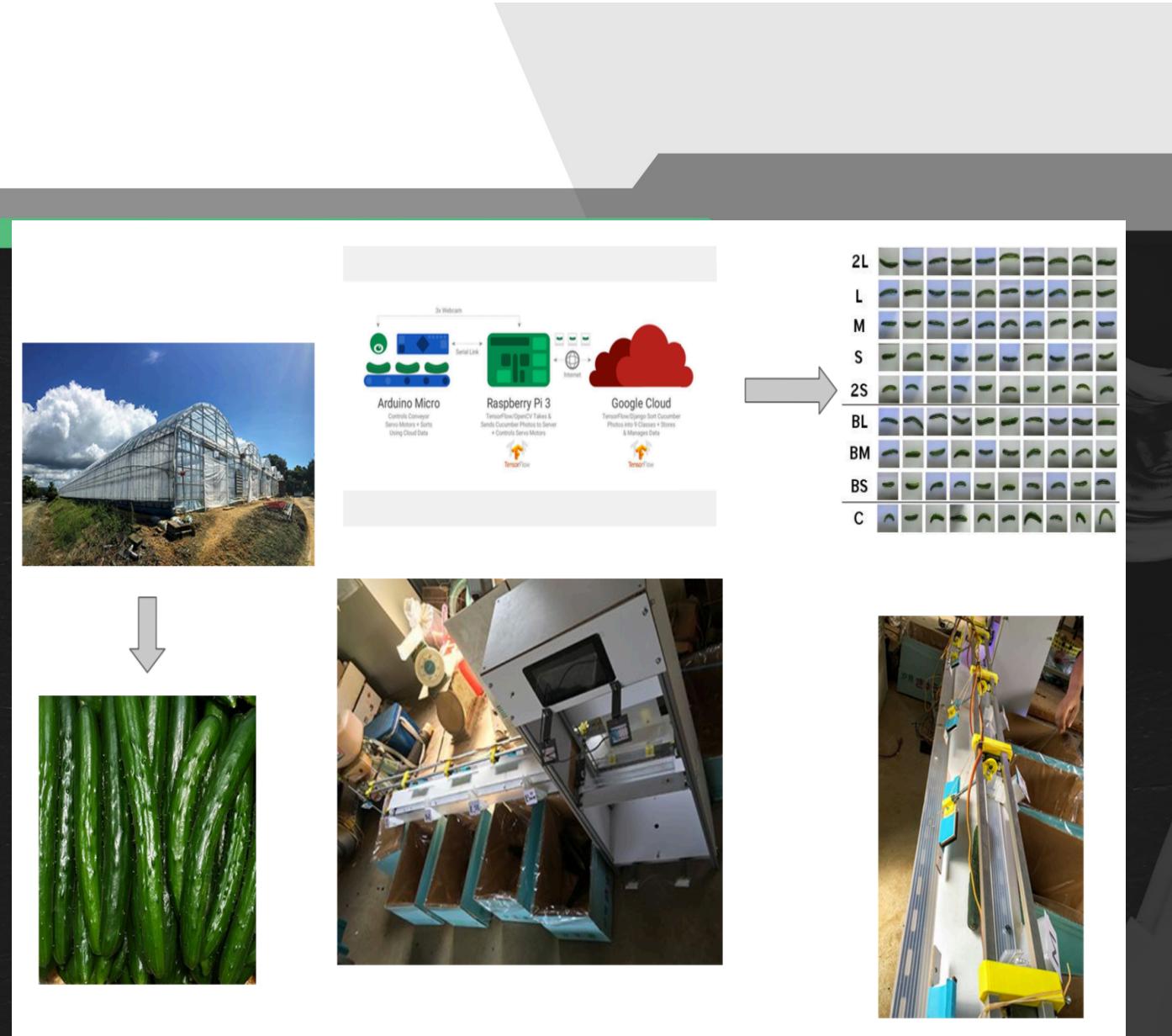


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# Machine Learning Application

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Source: Big Data Imperatives



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# TOOLS



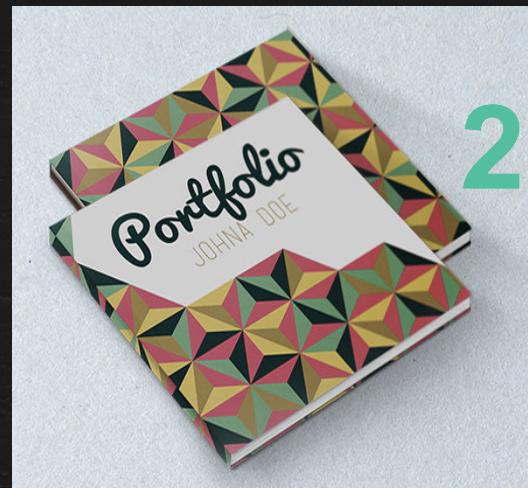
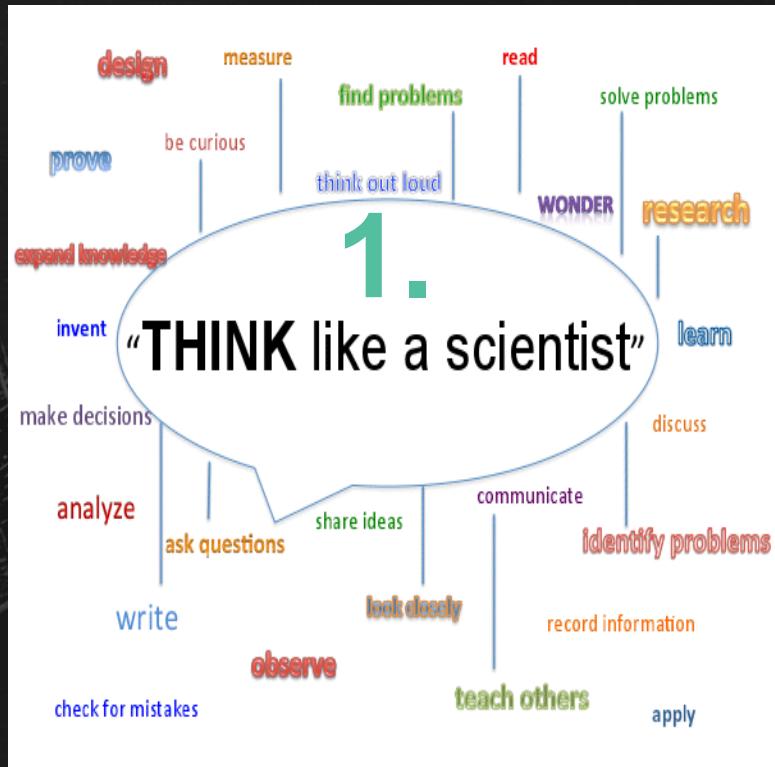
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# DEVELOPMENT TRACK



2.

STATISTICS  
DATA CLEAN-UP  
A BIT OF LINEAR ALGEBRA  
WORK WITH REAL WORLD PROBLEMS  
BLOG

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# DEVELOPMENT TRACK

**Medium**

rbahaguejr Nov 11, 2016 · 3 min read

## How-to Declutter Your Data Science Workspace

Working on a data science project is almost always equivalent to an amazing clutter in the working directory. Data scientists would most likely have the following materials dumped in their project working directory:

Read more...

4

rbahaguejr Nov 6, 2016 · 4 min read

## Exploring AirBnB's Knowledge Repo: A Curated Knowledge Sharing Platform

### Why is it needed?

Data Science researches and studies should have the following aims (From Scaling Knowledge at Airbnb):

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RickBahague

Overview Repositories 38 Stars 12 Followers 8 Following 2

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**NEP2017**  
Exploration and Analysis of 2017 NEP  
Jupyter Notebook GPL-3.0 Updated on Sep 7, 2016

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**IPredict**  
Forked from tedgueniche/IPredict  
Sequence Prediction Framework  
Java 10 Updated on Aug 13, 2016

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**dspop**  
Data Science Popularization  
Jupyter Notebook ★1 2 GPL-3.0 Updated on Aug 13, 2016

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**PHAutomatedElection2016**  
On the issue of lack of basic safeguard of PH's Automated Election System for 2016  
Updated on May 29, 2016

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# Questions



[GITHUB.COM/RICKBAHAGUE](https://github.com/rickbahague)



[MEDIUM.COM/@RBAHAGUEJR](https://medium.com/@rbaahaguejr)

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