

# Mastering Data Analytics

## Copyright Notice & Disclaimer

- *The content contained in this module is provided only for educational purposes of Mastering Data Analytics' training courses. You may not copy, reproduce, distribute, publish, display, perform, modify, create derivative works, transmit, or in any way exploit any such content, nor may you distribute any part of this content over any network, including a local area network, sell or offer it for sale, or use such content to construct any kind of database.*
- *For permission to use the content, please contact via email: [training@mastering-da.com](mailto:training@mastering-da.com)*



# PROFILE

- Founder & Trainer at **Mastering Data Analytics**
- Former Business Analytics Manager at **SIFT Analytics Group (HO @Singapore)**
- Consulting Advance Analytics Projects: PVCFC, DFS Global (Duty Free Store) ...
- Training Data Analytics for BIDV, Merck, HSC, AEON Vietnam, AON , P&G, Prudential, Generali, Coca-Cola ..., & many SMEs
- Familiar technologies: **Qlik Sense, Tableau, Alteryx, Power BI, SQL, SAS VA, Excel, XLSTAT, Palisade, Frontline Solver, Python...**
- Experience data analytics in **Banking, Financial Services (Top 1 in VN) & consulting projects in Retail Industry**
- Speaker for Qlik Sense, Power BI, Alteryx and other public events & Judge for big contest at RMIT/FTU/UFM/NEU/AIESEC...
- Qualified DA Certificates: DA100/PL300, Alteryx (Core + Advance), Business Analytics of Cambridge...
- Personal Page: Phuong Thao Analytics (+13K followers)





# MASTERING DATA ANALYTICS



## BUSINESS INTELLIGENCE

Module 1: Fundamental Business Intelligence Framework & Analytical Thinking

- 
- 1 Fundamental BI & Analytical Thinking
  - 2 End-to-End BI Workflow in Power BI
  - 3 Descriptive Statistics & Analytics
  - 4 Diagnostics Analytics
  - 5 Analytical Idea Presentation  
(Dashboard – Insight - Story)
  - 6 Business Intelligence Capstone



# BI FUNDAMENTALS

**PART 1: Business Intelligence Terminology**

**PART 2: Business Intelligence in Corporates**



# Business Intelligence Terminology

## Business Intelligence & Business Analytics



	Business Intelligence	Business Analytics
Collects, Analyzes and Visualizes Data Includes data mining, dashboards and various analytics capabilities	✓	✓
Identifies Pain Points Identifies and offers suggestions to optimize organization pain points discovered in the data	✓	✓
Reporting Presents and organizes data for visualization	✓	✓
Descriptive Analytics Creates a summary of historical data for visualization	✓	✗
Diagnostic Analytics Determines the source of issues discovered by descriptive analytics	✓	✗
Predictive Analytics Makes predictions based on collected data	✗	✓
Prescriptive Analytics Offers solutions for issues found by descriptive analytics and data discovery	✗	✓

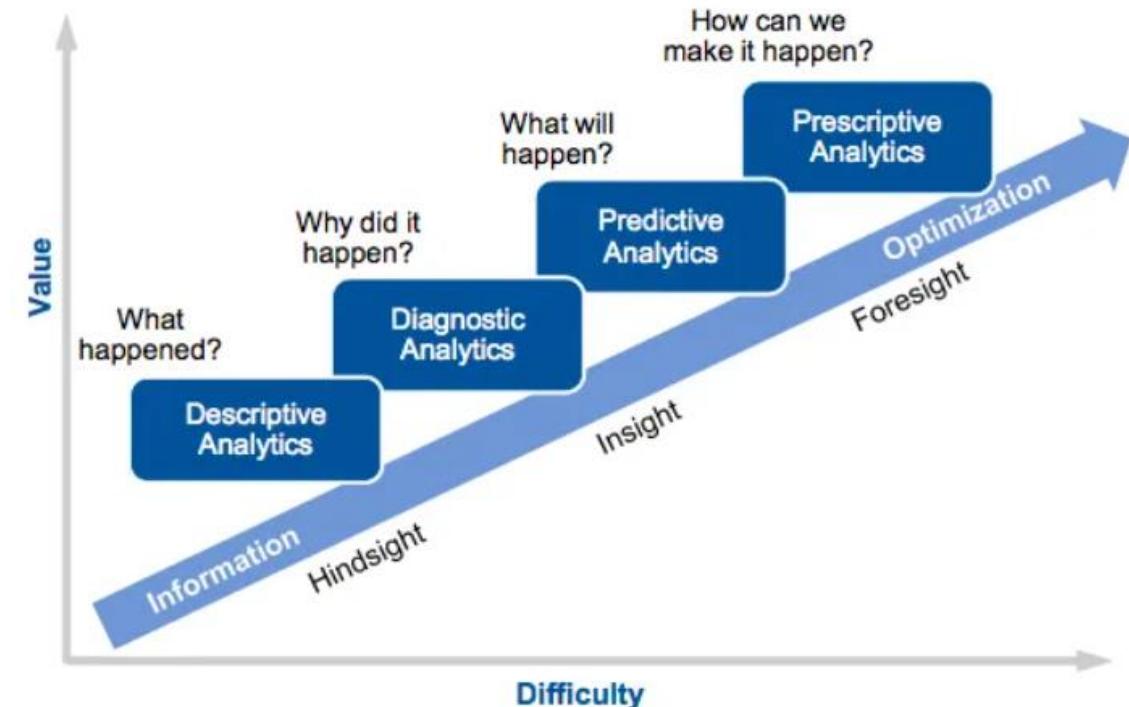


Figure 1: Gartner Analytic Ascendancy Model (Gartner, March 2012)

# Business Intelligence Terminology

## Understanding Data – Categories of Data



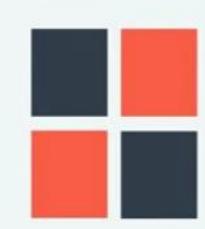
# Categories of Data



**Structured**



**Unstructured**



**Semi-Structured**

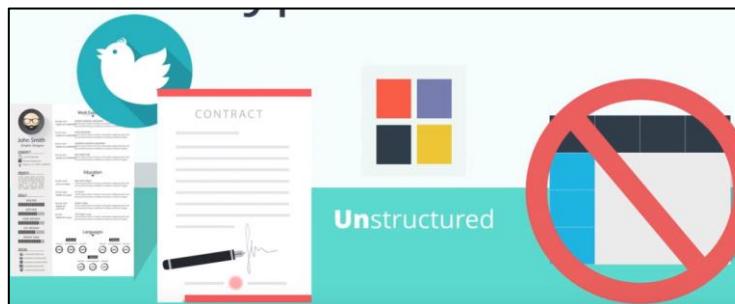


**Easily ACCESSIBLE**  
**Easy to USE**

**Columns (fields)**

**Rows  
(records)**

**Structured**



**Unstructured**



# Business Intelligence Terminology

## Understanding Data – Categories of Data

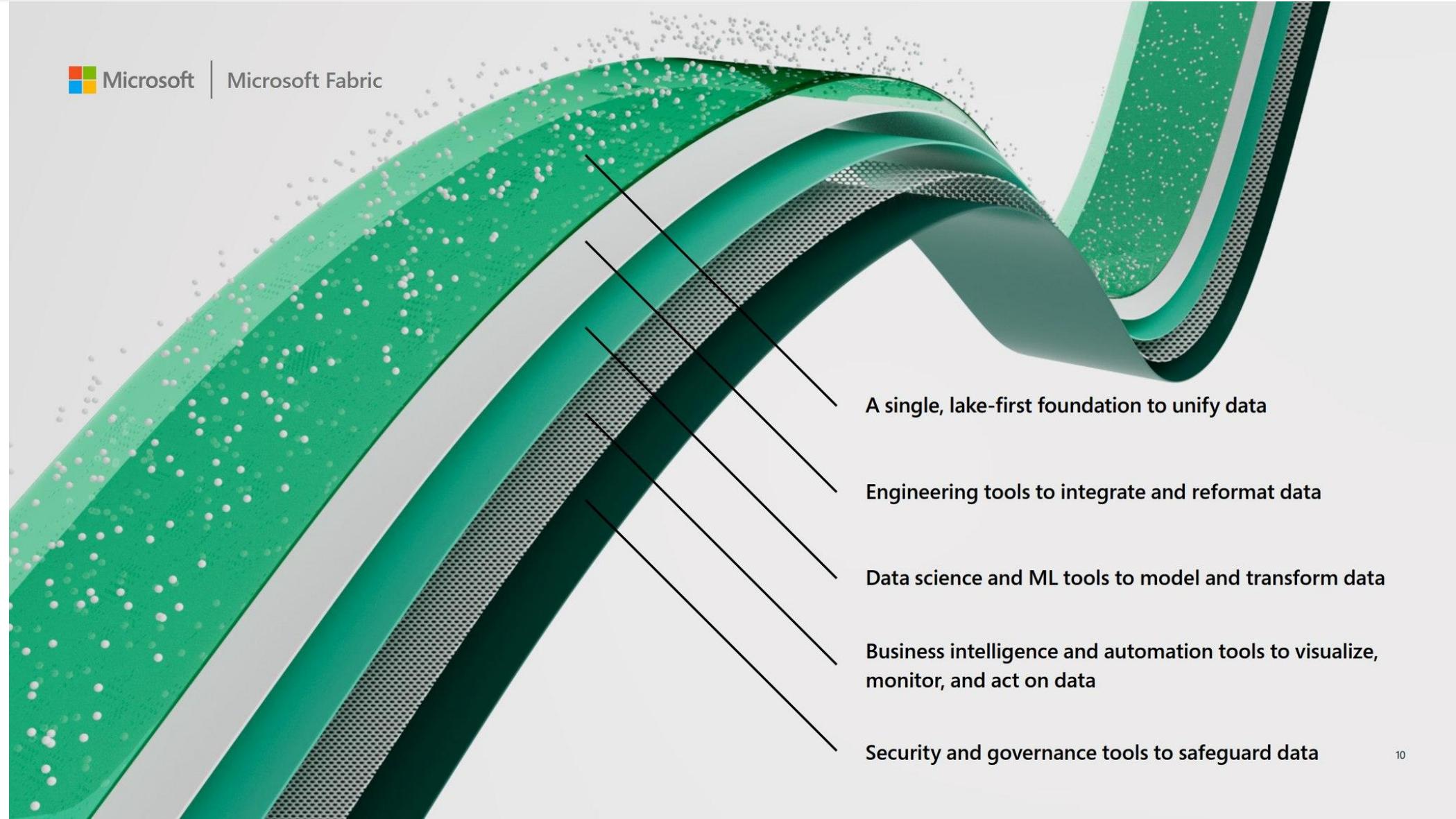


# Business Intelligence Terminology

## Microsoft Fabric



Microsoft | Microsoft Fabric

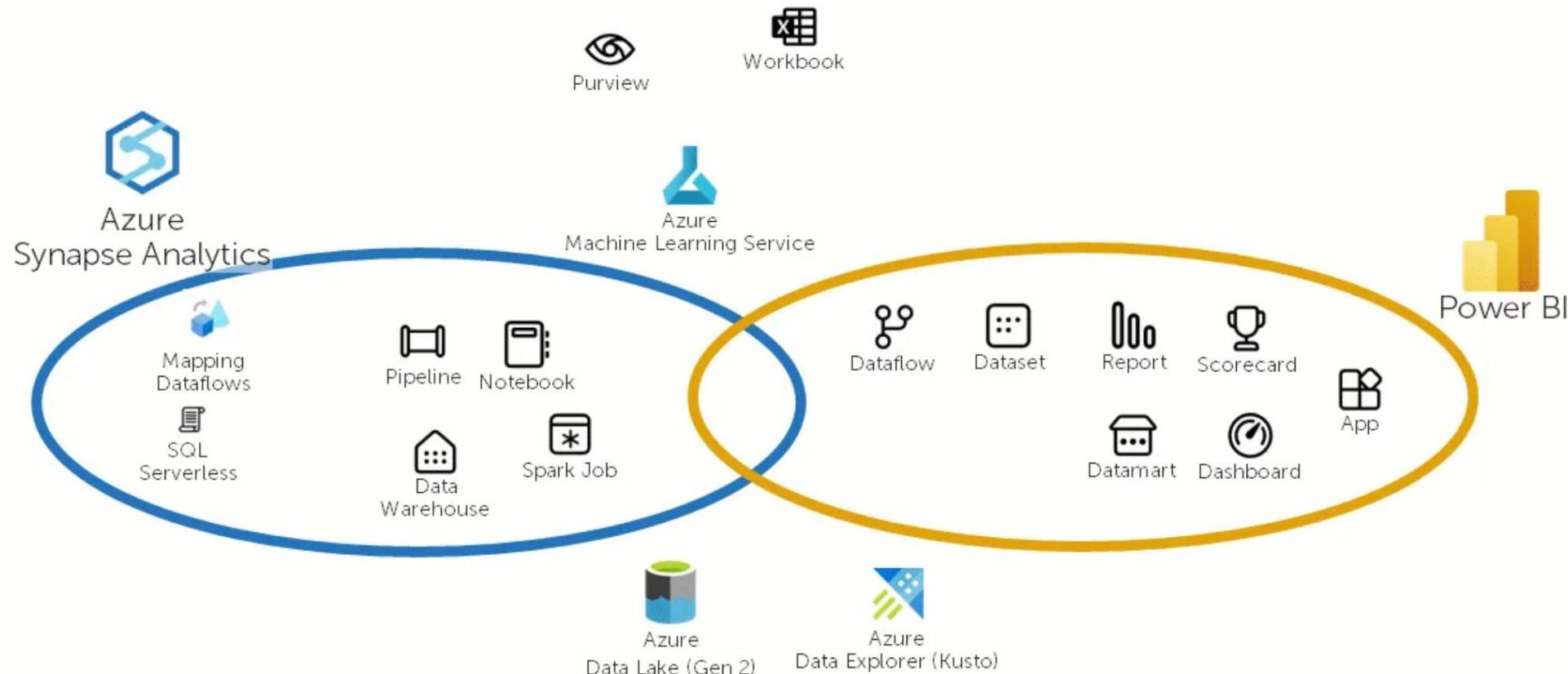


# Business Intelligence Terminology

## Microsoft Fabric



## Pre-Fabric

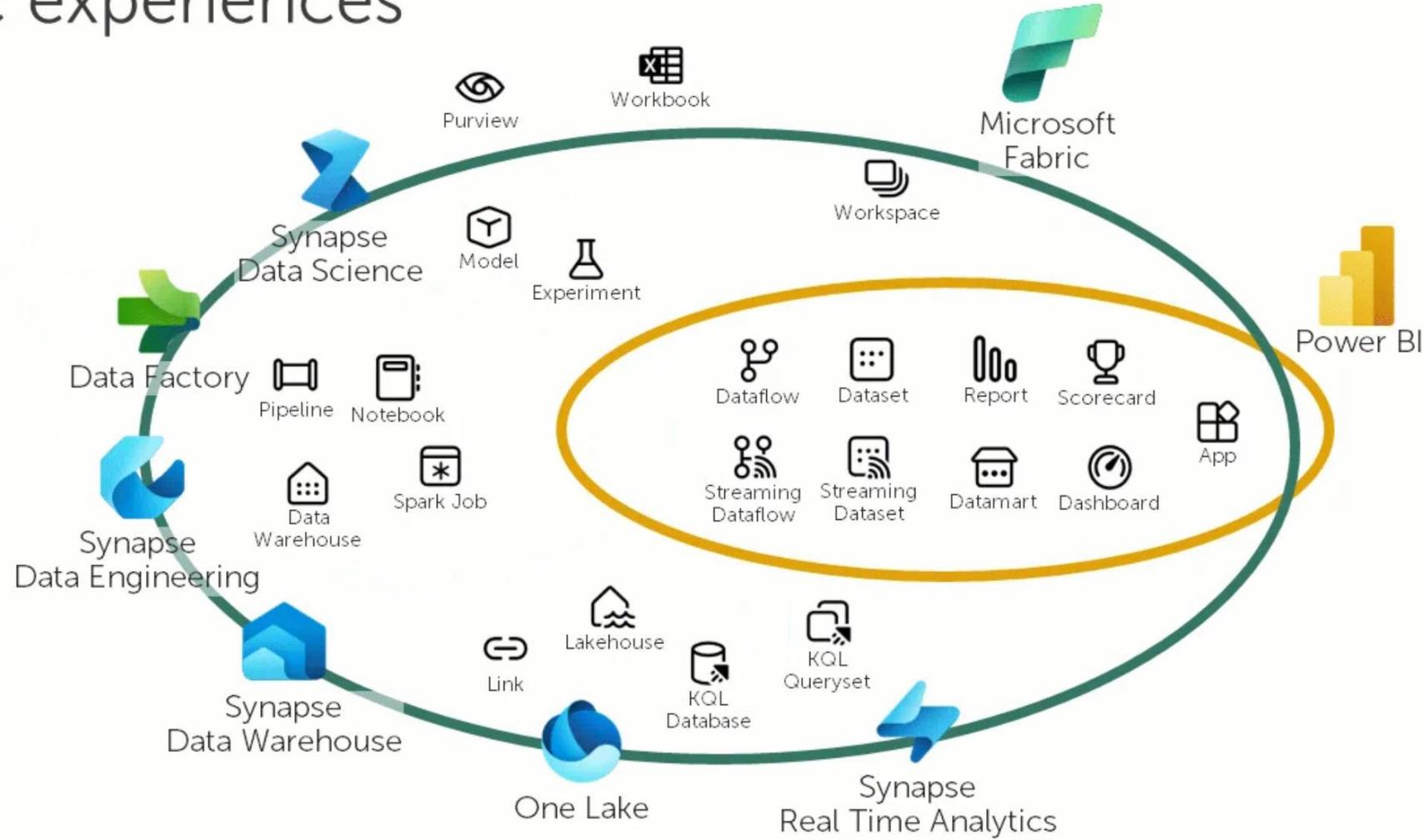


# Business Intelligence Terminology

## Microsoft Fabric



## Fabric experiences



# Business Intelligence Terminology

## Understanding Data – Structures of Data



MASTERING DATA ANALYTICS

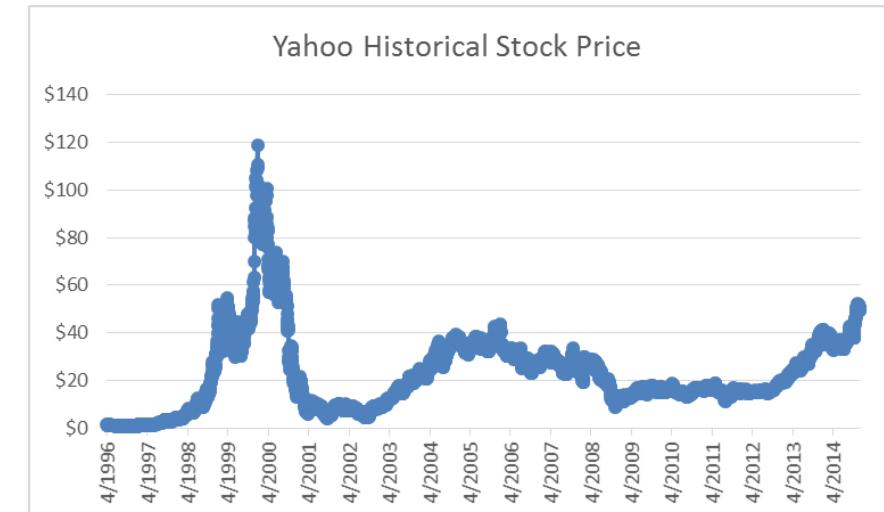
## Cross-sectional Data

- Data collected from several elements/entities at the same, or approximately the same, point in time.

Sep 22, 2015	GOOG	YHOO	FB	Industry
Market Cap:	426.88B	28.62B	261.91B	277.63M
Employees:	57148	12500	10955	355
Qtrly Rev Growth (yoY):	0.11	0.15	0.39	0.15
Revenue (ttm):	69.61B	4.87B	14.64B	132.20M
Gross Margin (ttm):	0.62	0.67	0.83	0.58
EBITDA (ttm):	22.62B	541.75M	6.38B	3.47M
Operating Margin (ttm):	0.26	0.02	0.32	0.01
Net Income (ttm):	14.39B	6.94B	2.72B	N/A
EPS (ttm):	21.22	7.2	0.98	0
P/E (ttm):	29.34	4.22	94.47	33.33
PEG (5 yr expected):	1.22	-2.38	1.59	1.07
P/S (ttm):	6.26	6.02	18.39	3.74

## Time Series Data

- Data collected over several time periods (Year, Month, Day, Hour...).
- Charts of time series data are common in business and economics.
- Help analysts understand what happened in the past, identify trends over time, and project future levels for the time series.

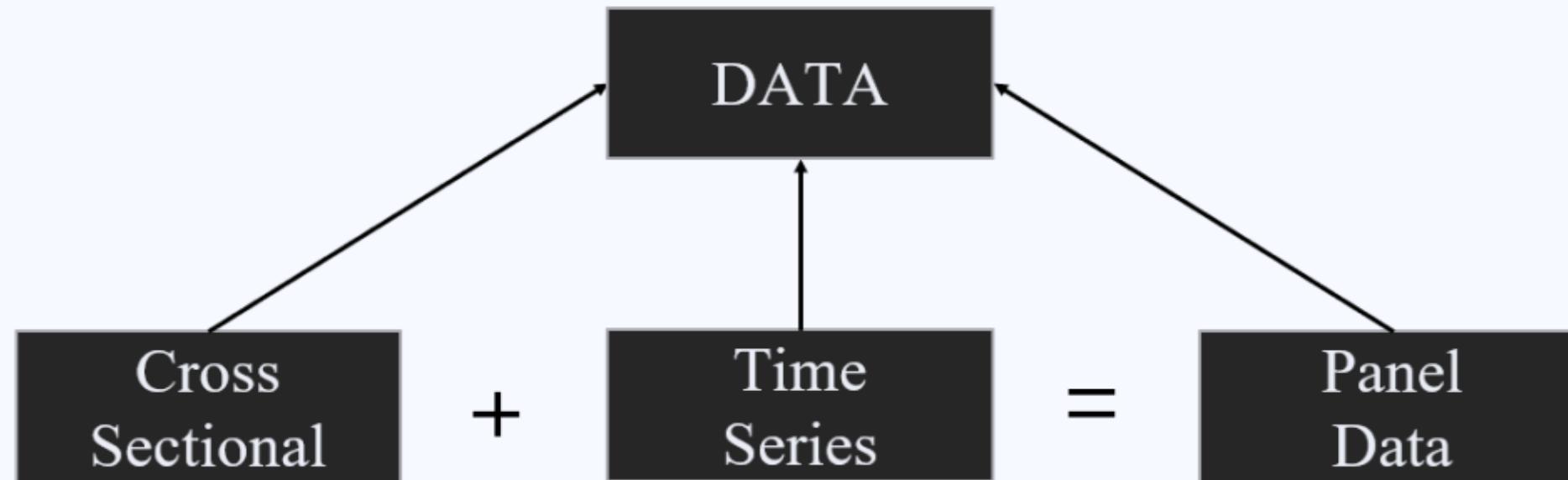


# Business Intelligence Terminology

## Understanding Data – Structures of Data



### STRUCTURES OF DATA: CROSS SECTIONAL, TIME SERIES, AND PANEL DATA



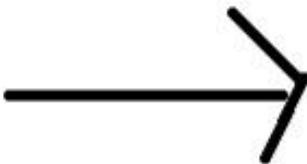
Same point in time  
for one or several  
subjects

Different points in time  
for one or several  
subjects

Combination of cross  
sectional and time series

# Business Intelligence Terminology

## Understanding Data – Structures of Data



	A	B	C	D
1		FIRM A	FIRM B	FIRM C
2	3/01/1995	0.191439	0.780436	0.329861
3	4/01/1995	-0.04008	0.332088	0.306904
4	5/01/1995	-0.14042	0.681645	0.820281
5	6/01/1995	-5.65741	0.272911	0.637198
6	9/01/1995	5.898009	0.212024	0.173159
7	10/01/1995	-3.1429	0.719781	0.078806
8	11/01/1995	-6.70905	0.230741	0.090504
9	12/01/1995	6.139131	0.201295	0.409763
10	13/01/1995	-3.19934	0.635427	0.561843
11	16/01/1995	3.282443	0.636448	0.43751
12	17/01/1995	-0.05193	0.655553	0.791657
13	18/01/1995	15.7144	0.013025	0.057594
14	19/01/1995	11.65196	0.535783	0.657062
15	20/01/1995	0.220995	0.65229	0.872535
16	23/01/1995	-14.755	0.092412	0.171942
17	24/01/1995	2.882044	0.68886	0.360246
18	25/01/1995	0.186261	0.544323	0.677453

	A	B	C	D
1		FIRM A	FIRM B	FIRM C
2	3/01/1995	FIRM A	0.821848	
3	4/01/1995	FIRM A	-0.04008	
4	5/01/1995	FIRM A	-0.14042	
5	6/01/1995	FIRM A	-5.65741	
6	9/01/1995	FIRM A	5.898009	
7	10/01/1995	FIRM A	-3.1429	
8	11/01/1995	FIRM A	-6.70905	
9	3/01/1995	FIRM B	6.139131	
10	4/01/1995	FIRM B	-3.19934	
11	5/01/1995	FIRM B	3.282443	
12	6/01/1995	FIRM B	-0.05193	
13	9/01/1995	FIRM B	15.7144	
14	10/01/1995	FIRM C	11.65196	
15	11/01/1995	FIRM C	0.220995	
16	23/01/1995	FIRM C	-14.755	
17	24/01/1995	FIRM C	2.882044	
18	25/01/1995	FIRM C	0.186261	

Original

Panel Data (Table)

# Business Intelligence Terminology

## Understanding Data – Structures of Data



Category	Type	2001	2002	2003	Grand total
Fruit	Apples	150	153	162	465
	Bananas	332	336	344	1012
	Pears	267	266	279	812
	Subtotal	749	755	785	2289
Vegetables	Cucumber	140	141	152	433
	Lettuce	246	245	258	749
	Tomatoes	156	161	168	485
	Subtotal	542	547	578	1667
Grand total		1291	1302	1363	3956



Year	Month	Category	Type	Sales
2001	January	Fruit	Apples	12
2001	January	Fruit	Pears	21
2001	January	Fruit	Bananas	29
2001	January	Vegetables	Cucumber	9
2001	January	Vegetables	Tomatoes	13
2001	January	Vegetables	Lettuce	22
2001	February	Fruit	Apples	11
2001	February	Fruit	Pears	21
2001	February	Fruit	Bananas	31
2001	February	Vegetables	Cucumber	8
2001	February	Vegetables	Tomatoes	12
2001	February	Vegetables	Lettuce	20
2001	March	Fruit	Apples	9
2001	March	Fruit	Pears	19
2001	March	Fruit	Bananas	32
2001	March	Vegetables	Cucumber	8
2001	March	Vegetables	Tomatoes	11
2001	March	Vegetables	Lettuce	21
2001	April	Fruit	Apples	9
2001	April	Fruit	Pears	18
2001	April	Fruit	Bananas	32
2001	April	Vegetables	Cucumber	10
2001	April	Vegetables	Tomatoes	12
2001	April	Vegetables	Lettuce	21
2001	May	Fruit	Apples	10
2001	May	Fruit	Pears	20

### Cross Table /Contingency Table / Pivot Table

A **cross table** is a two-way table (matrix) consisting of columns and rows. Also known as a pivot table or a multi-dimensional table.

### Regular Table

# Business Intelligence Terminology

## Understanding Data – Structures of Data



**Figure 3.5**  
Stacked Data

	A	B
1	Gender	Salary
2	Male	81600
3	Female	61600
4	Female	64300
5	Female	71900
6	Male	76300
7	Female	68200
8	Male	60900
9	Female	78600
10	Female	81700
11	Male	60200
12	Female	69200
13	Male	59000
14	Male	68600
15	Male	51900
16	Female	64100
17	Male	67600
18	Female	81100
19	Female	77000
20	Female	58800
21	Female	87800
22	Male	78900

**Figure 3.6**  
Unstacked Data

	A	B
1	Female Salary	Male Salary
2		81600
3		76300
4		60900
5		60200
6		59000
7		68600
8		51900
9		67600
10		78900
11		
12		
13		

# Business Intelligence Terminology

## Understanding Data – Structures of Data



A large grid table with a green header row and a yellow body. The grid has many columns and rows, illustrating a wide data format.

Wide format



A grid table with a green header row and a red body. The grid has fewer columns than the wide format table, illustrating a narrow data format.

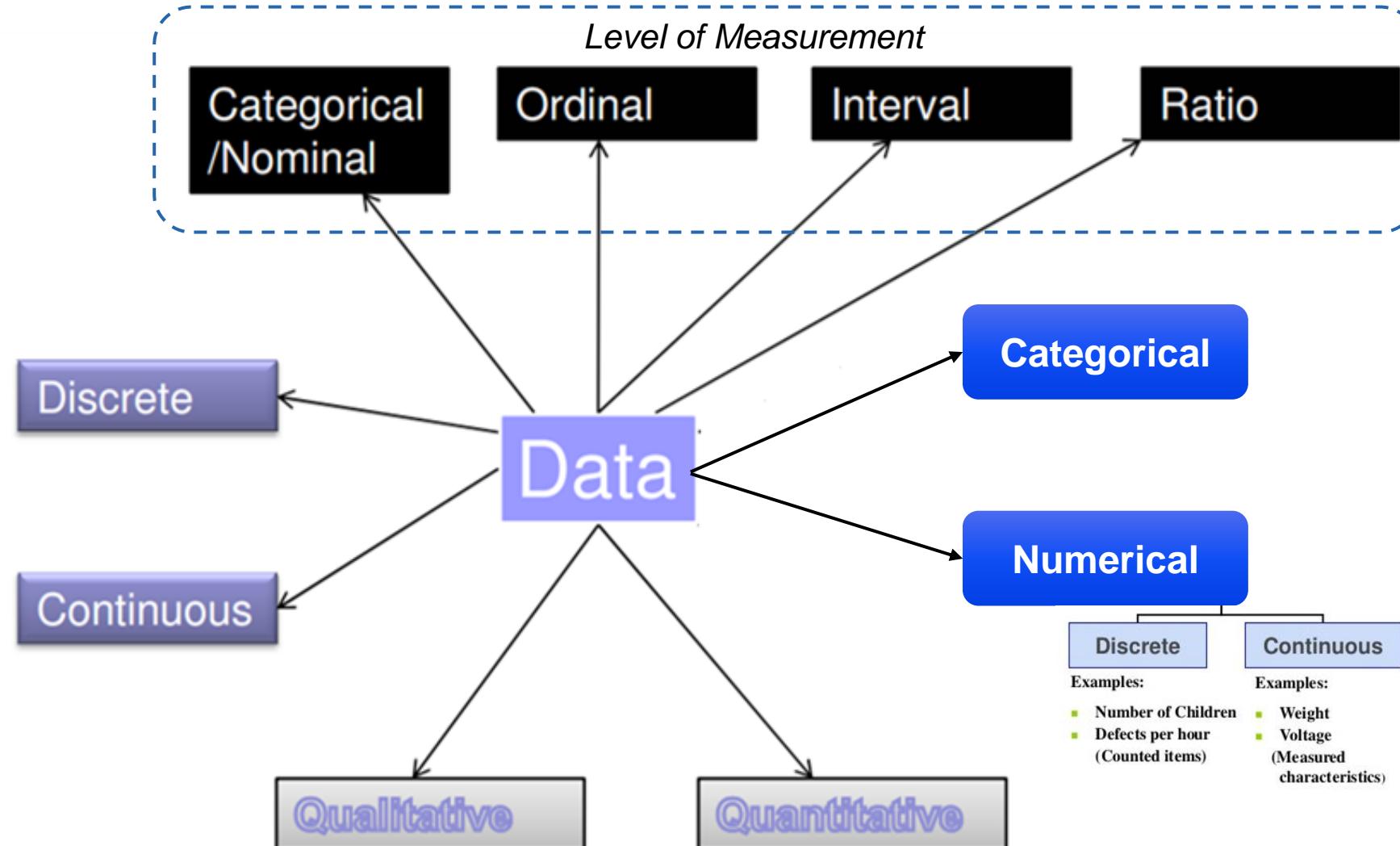
Narrow format

Team	KPI 1	KPI 2	KPI 3
A	88	12	22
B	91	17	28
C	99	24	30
D	94	28	31

Team	KPI Name	Value
A	KPI 1	88
A	KPI 2	12
A	KPI 3	22
B	KPI 1	91
B	KPI 2	17
B	KPI 3	28
C	KPI 1	99
C	KPI 2	24
C	KPI 3	30
D	KPI 1	94
D	KPI 2	28
D	KPI 3	31

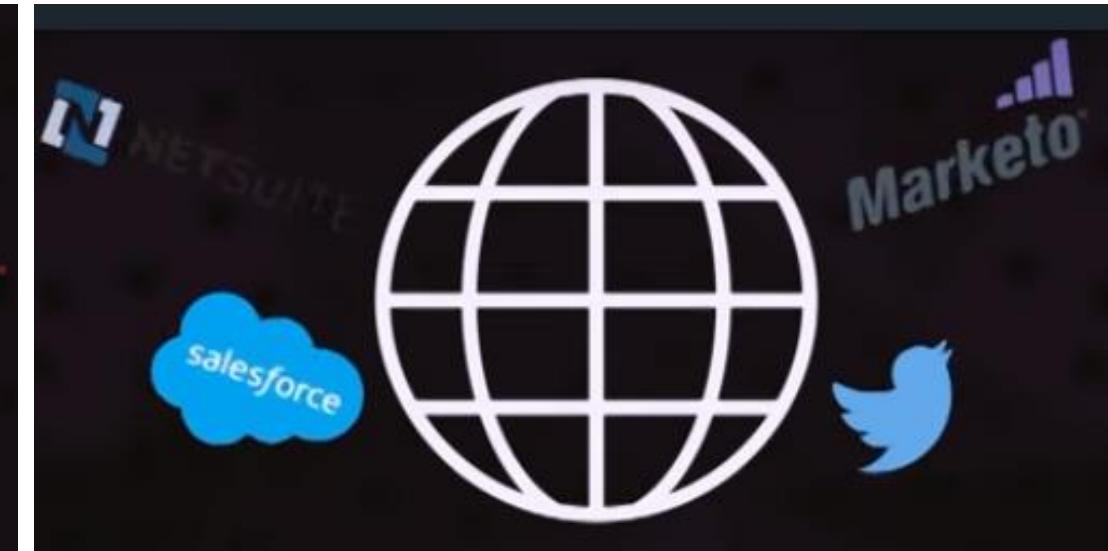
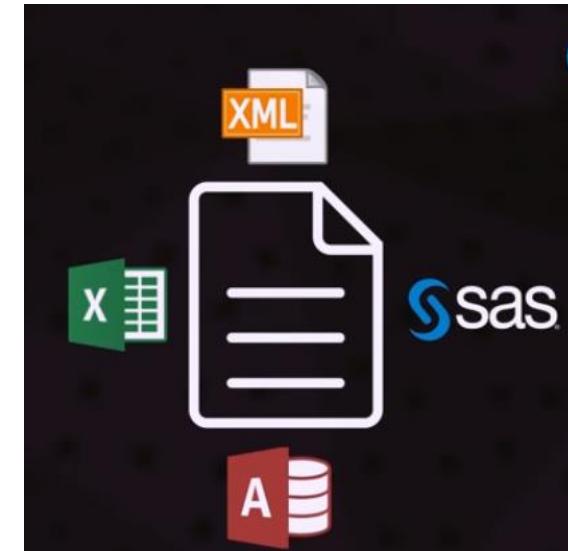
# Business Intelligence Terminology

## Understanding Data – Data Face



# Business Intelligence Terminology

## Understanding Data – Data Source



**Computer files**

**Database**

**Web-based**



## Importance of Data Types



Calculations



Data Blending

**2 x 2**



**Numeric**

### Customer

CustomerID  
(string)

'1'

Name

Maureen

### Transaction

CustomerID  
(string)

Transactions

'1'

15

CustomerID  
(string) Name Transactions

'1'

Maureen

15



## COMMON FIELD TYPES

Strings	Numeric	Date/Time	Boolean	Special Objects
<p>String data can be declared in a number of different ways depending on the character set required and the anticipated length of the string:</p> <p><b>any kind of characters, alphanumeric, including symbols.</b></p>	<p>Numeric data are numbers which can be <b>whole numbers</b>, such as Integers or numbers with decimal places</p> <p><b>Byte</b> <b>Integer</b> <b>Fixed Decimal</b> <b>Float</b> <b>Double</b></p>	<p>Date/time contains a <b>specific date</b>, or a combination of both <b>date and time</b></p>	<p>The Boolean type is sometimes also called a <b>logical type</b> and is a conditional flag representing either true or false</p>	<p>Images Maps Report objects Sound</p>

# Business Intelligence Terminology

## Understanding Data – Data Types Exercise



Look at the dataset below. Identify the appropriate data type that fits with these fields:

Employee  
Address  
Distance  
Telecommuter

Employee	Address	City	ZIP Code	Distance	Telecommuter
Jane Doe	230 Commerce	Irvine	92602	34.5	TRUE
John Lee	190 S Glassell	Orange	92866	10.4	FALSE
Marcy Smith	1313 Disneyland Dr	Anaheim	92802	5	FALSE
Sandra Singh	3333 Bristol St	Costa Mesa	92626	25	TRUE
Steve Tran	1900 Associated Rd	Fullerton	92831	12.7	FALSE

### Quiz:

Employee, Address, City, ZIP Code, Distance, Telecommuter

### Data Types ?

# Business Intelligence Terminology

## Understanding Data – Data Types vs Data Format



### Power Query

A screenshot of the Microsoft Power Query ribbon. The 'Column1' dropdown menu is open, showing various data type options: Decimal Number, Currency, Whole Number, Percentage, Date/Time, Date, Time, Date/Time/Timezone, Duration, Text, True/False, and Binary. The 'Text' option is selected.

### Power BI

A screenshot of the Microsoft Power BI ribbon. The 'Column tools' tab is selected. A dropdown menu is open under the 'Data type' section, showing options: State name (selected), Text, Whole number, Decimal number, Fixed decimal number, Date/time, Date, Time, Text, True/false, and Binary. The 'Text' option is highlighted with a red box.

### Power BI (Format Data Type)

A screenshot of the Microsoft Power BI ribbon. The 'Formatting' tab is selected. A callout arrow points from the 'Sort by Column' button in the ribbon to a detailed view of the 'Formatting' dropdown menu. The menu shows 'Data type: Date/Time' and 'Format: \*3/14/2001 1:30:55 PM (G)'. The 'Formatting' tab in the ribbon is also highlighted with a red box.

Date	Call Duration	Cost
8/5/2019 9:41:00 AM	12/31/1899 8:48:53 PM	247
8/9/2018 7:59:02 PM	12/31/1899 3:45:41 PM	488
5/25/2019 9:35:51 AM	12/31/1899 9:28:01 AM	407
4/11/2019 11:31:51 PM	12/31/1899 10:59:32 PM	208
8/23/2019 9:52:30 AM	12/31/1899 8:53:56 PM	473
7/31/2018 8:56:07 PM	12/31/1899 1:35:39 PM	384
8/25/2018 1:29:57 AM	12/31/1899 10:21:06 PM	387
9/5/2018 7:34:19 PM	12/31/1899 8:46:15 AM	430

# Business Intelligence Terminology

## Summary



- Business Intelligence vs Business Analytics
- 4 Type of Analytics
- Understanding Data Structure for Analysis
- Data Source (Files, Database, Cloud..etc)
- Data Face (Numerical vs Categorical Variables)
- Importance of Data Type



# BI FUNDAMENTALS

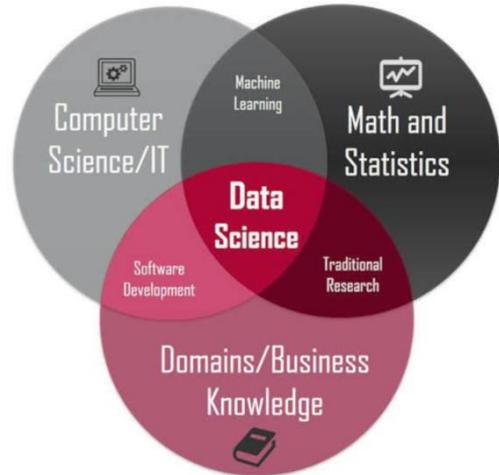
PART 1: Business Intelligence Terminology

PART 2: Business Intelligence in Corporates



# Business Intelligence in Corporates

## Self-service BI & Analytics

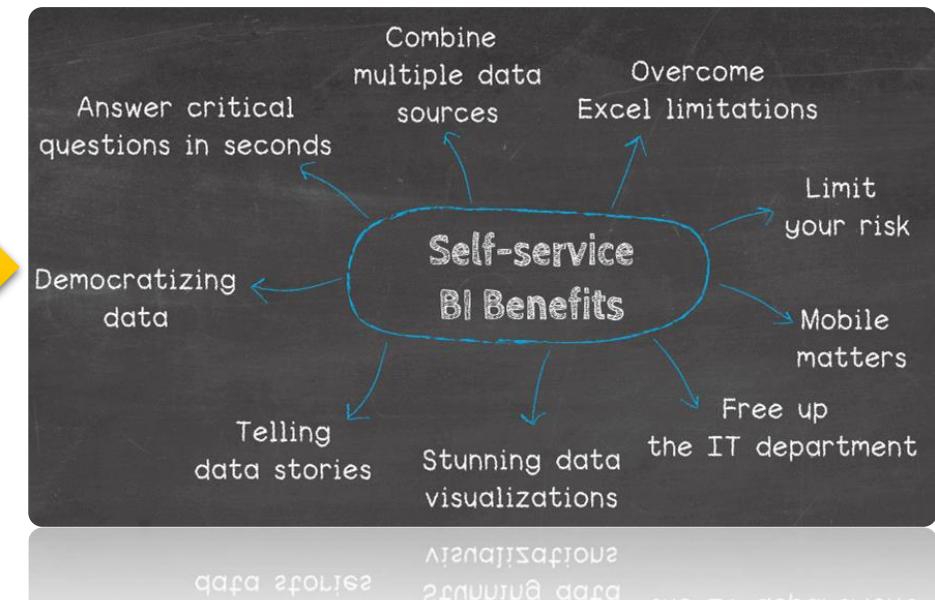


### The Hardest Thing In Data Science

Math & IT isn't the hardest thing in Data Science. Since it's so mature, and documented, and well-known, it's quite possibly *the easiest thing* to conquer in the skillset. The hardest thing about Data Science is **asking the right question**.

**Breakthrough Success**

**Let's Put the “Business” back in Business Intelligence™**

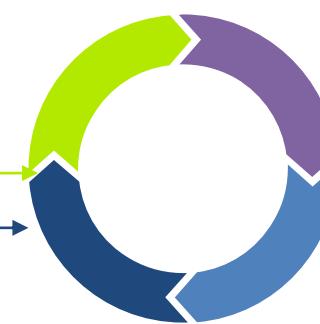


Understanding

### ORGANIZATIONS EXIST TO CREATE VALUE

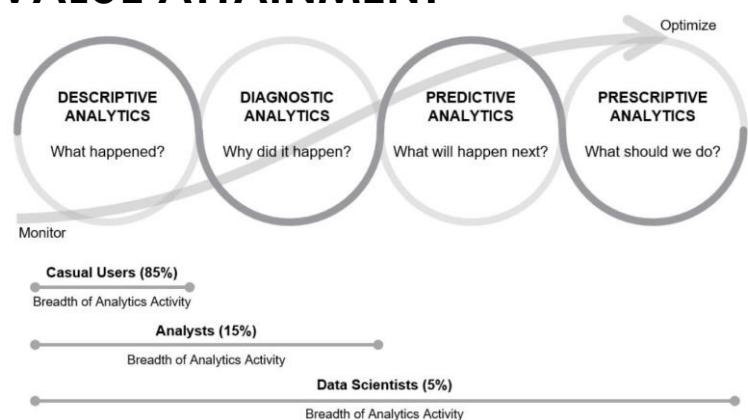
Creating value is taking what you know and turning it into action in order to achieve a desired business outcome.

- ❖ **Data** must be relevant
- ❖ Information must be meaningful
- ❖ **Insight** must be **actionable**



Defining

### ANALYTICS IS A JOURNEY TO VALUE ATTAINMENT



Agile BI

### ORGANIZATIONS HAVE TO BE QUICK AND NIMBLE

Agile BI (speed-to-value)

Now, more than ever, business leaders need **access to the right information at the right time in order to act before decision windows close.**

Describing

### EFFECTIVE SELF-SERVICE IS A BALANCING ACT BETWEEN FREEDOM AND CONTROL

Broaden BI usage while reducing the burden on IT. These companies have learned that the goal of self-service is **not unfettered liberation from IT**, but rather a **partnership** that balances freedom and control, flexibility and standards, governance and self-service

# Business Intelligence in Corporates

## Self-service BI & Analytics



Figure 1. Magic Quadrant for Analytics and Business Intelligence Platforms



Figure 1. Magic Quadrant for Data Science and Machine Learning Platforms



# Business Intelligence in Corporates

## Self-service BI & Analytics



### 2017-2018

- Static Reports
- Silo Views
- Excel Reports
- Lack of Reporting Solution
- Lack of Data Integration
- Lack of Interaction
- Performance Measurement

### 2019+

- Automatic Reports
- Data Warehouse
- Interactive Dashboards
- BI Self-Services Tools
- Email Alerts
- Report Subscription
- Collaborative Analysis
- Data Visualization
- Performance Measurement
- Opportunity Identification
- Exception Report

### 2020/21+

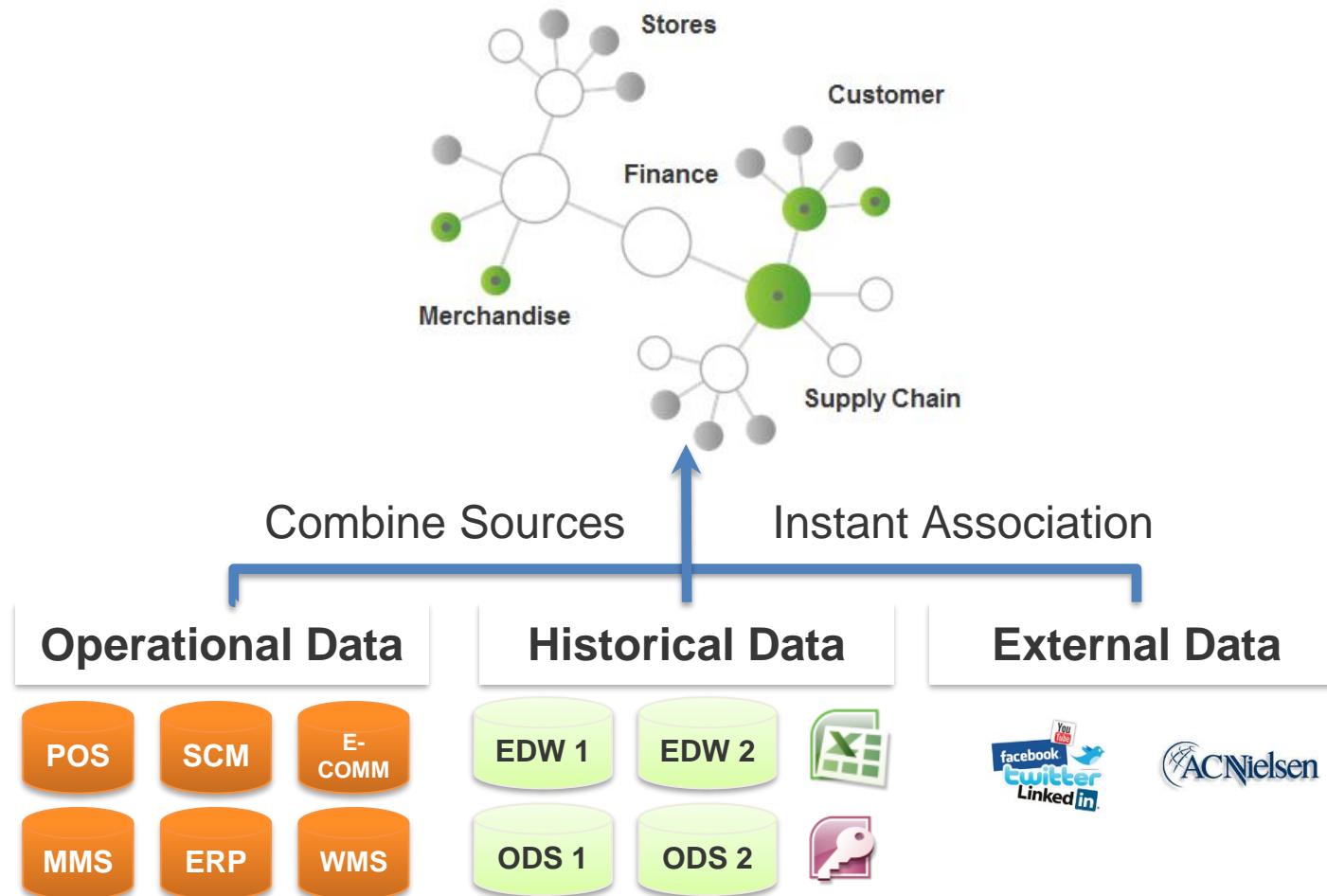
- Predictive Modeling
- Prescriptive Analytics
- Advanced Analytics

# Business Intelligence in Corporates

Analytics structure and Coordination Model

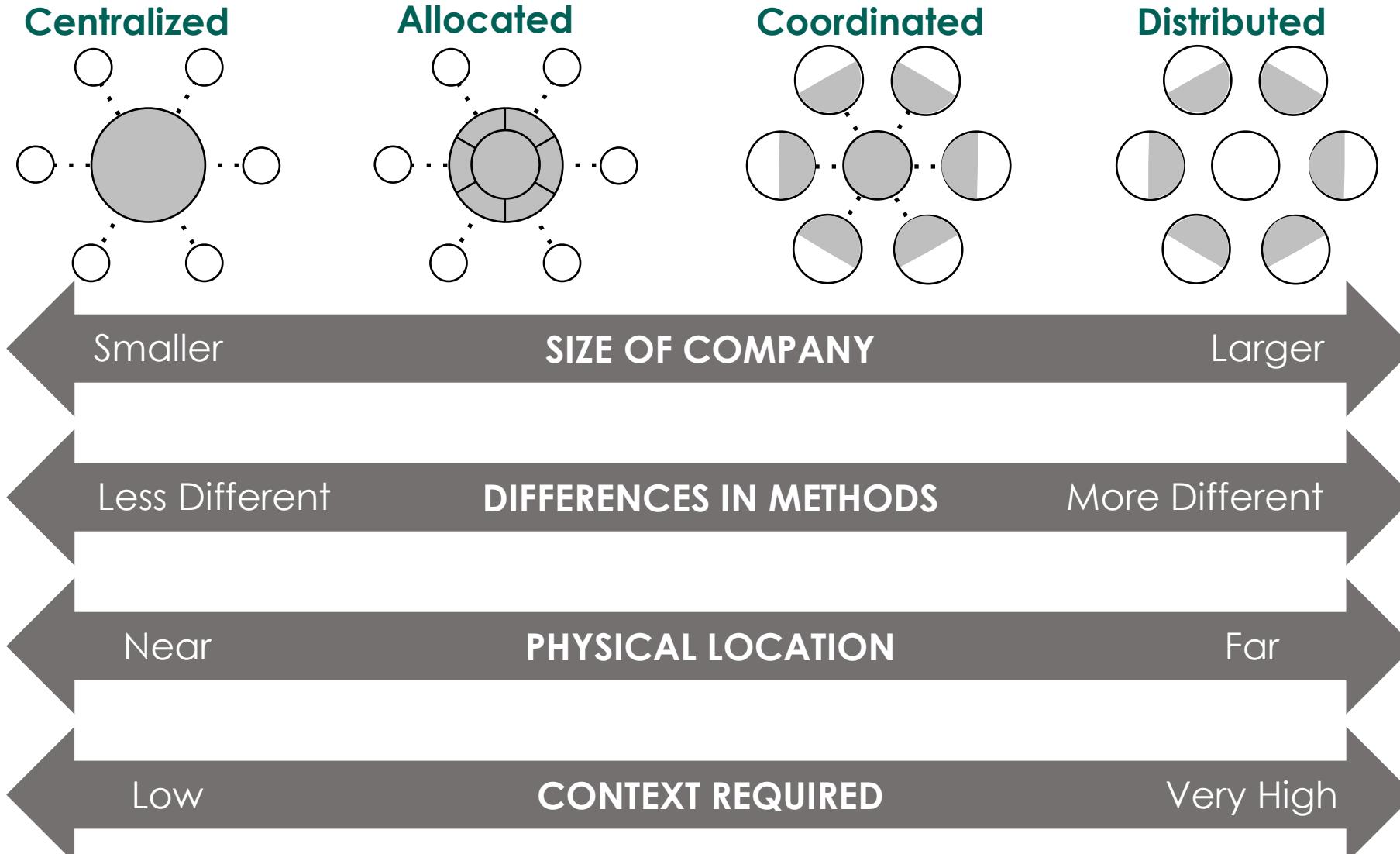


## Business Intelligence Discovery



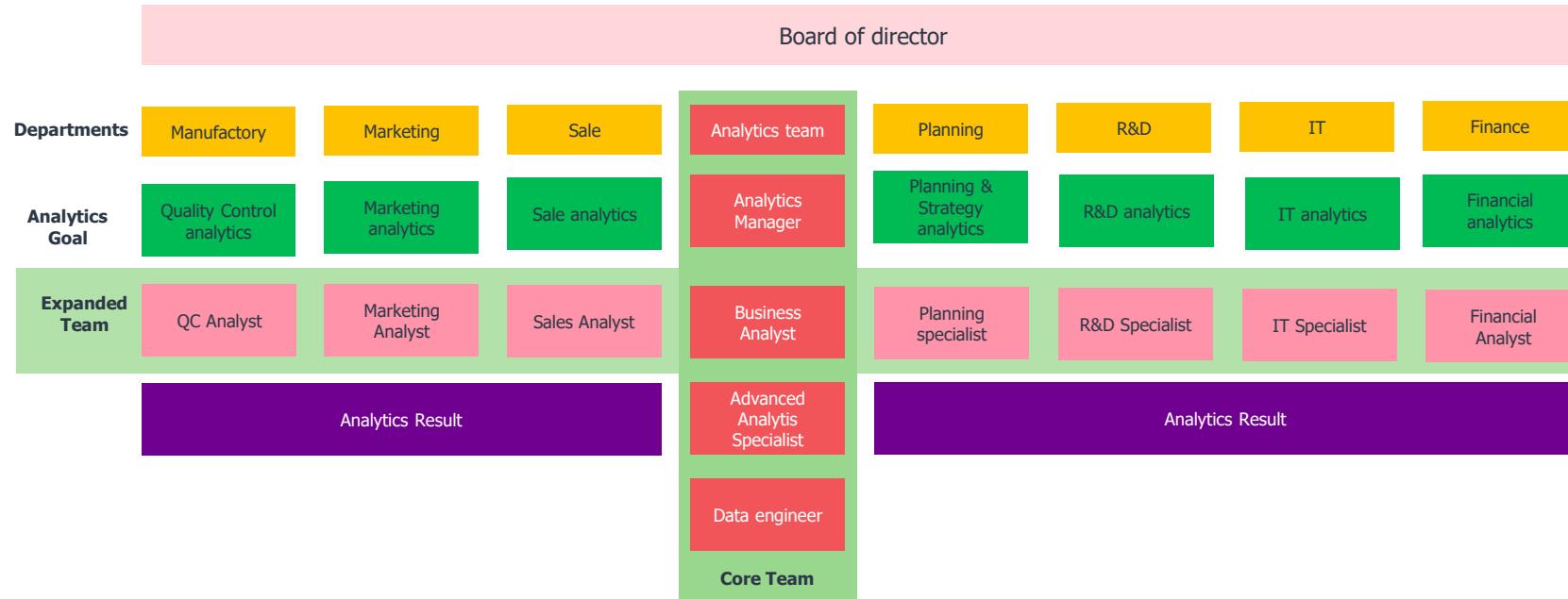
# Business Intelligence in Corporates

## Analytics structure and Coordination Model



# Business Intelligence in Corporates

## Analytics structure and Coordination Model



*Model of structure and coordination of personnel of analysis team members*

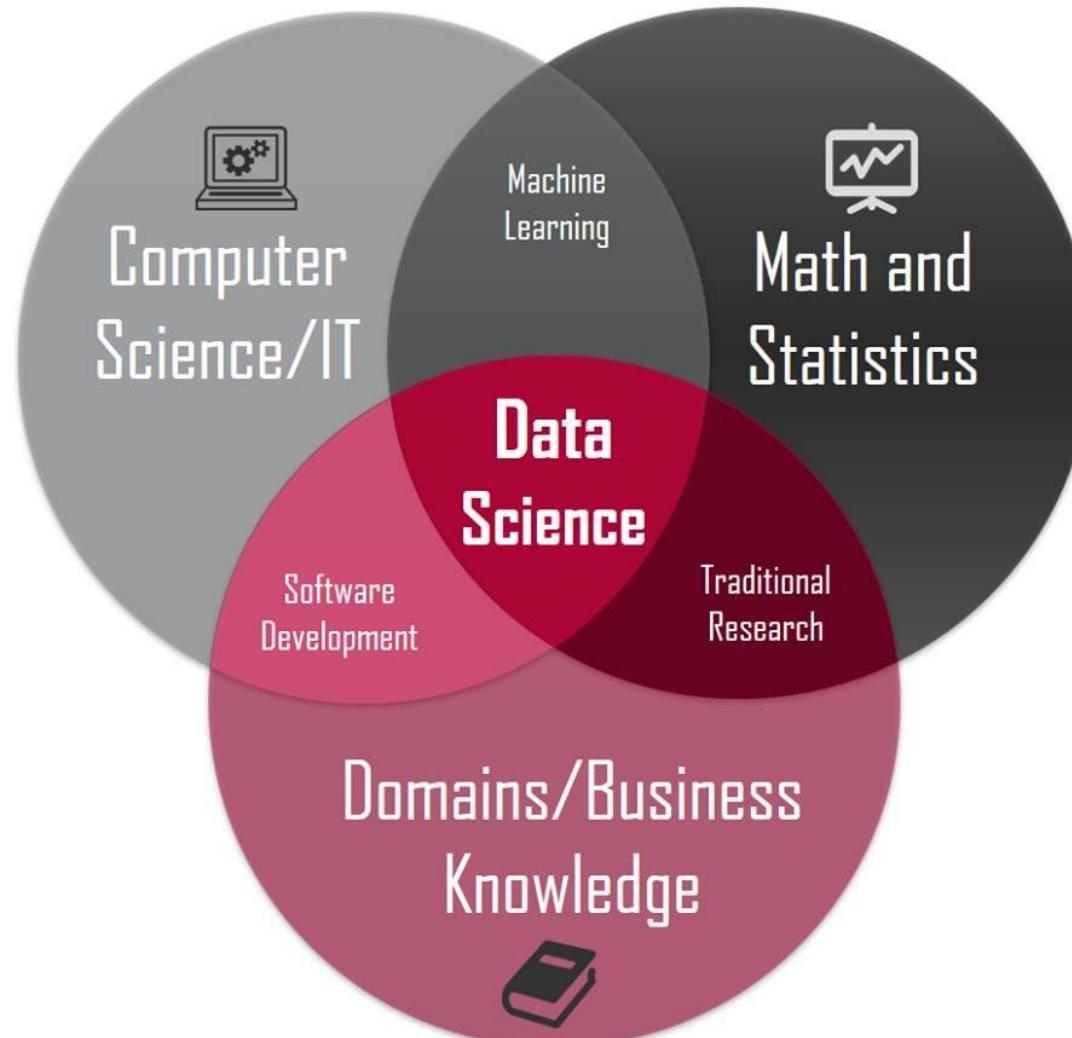
Center of Excellence (CoE) model fits into the current context

Under the Board of Directors

- Main member (full time)
- Extensive members: Business, Information and Communication Department, IT, R&D, Finance and Accounting, Human Resource Department (concurrently)

# Business Intelligence in Corporates

## BI Success (Individual)



# Business Intelligence in Corporates

## BI Success (Organization)



### 01. The People Domain

- Organizational Alignment
- The organizational model
- The importance of collaboration
- The right team
- The right support

### 02. The Process Domain

- Setting priorities
- Balancing risk and reward
- Building requirements that work
- Evaluate and Avolve
- Sell the vision
- Control the Chaos



### 03. The Technology Domain

- The role of technology
- The self-service architecture
- The place for big data
- The confusing analytics landscape

### 04. The Data Domain

- Understanding data
- Preparing data
- Data on the edge
- Understanding data science
- Data privacy

# Business Intelligence in Corporates

## The Evolution of Business Intelligence

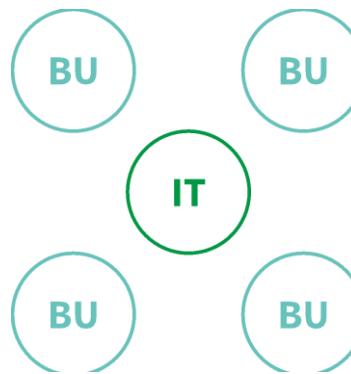


1<sup>st</sup> Generation



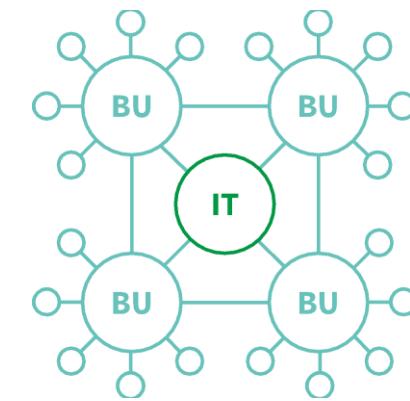
Centralized

2<sup>nd</sup> Generation



Decentralized

3<sup>rd</sup> Generation

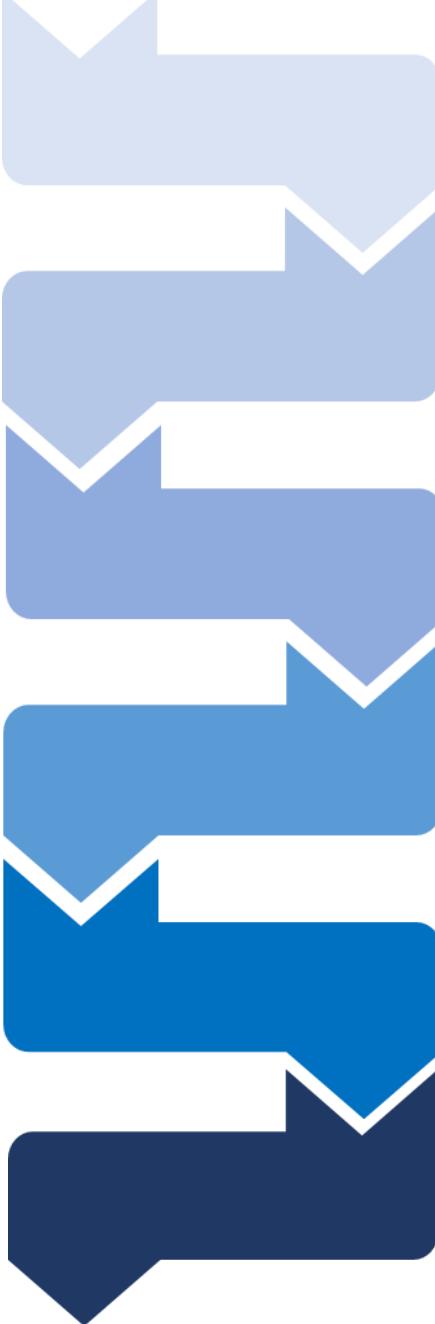


Democratized

# Business Intelligence in Corporates

How can data analytics help organizations?



- 
- 1 Fundamental BI & **Analytical Thinking**
  - 2 End-to-End BI Workflow in Power BI
  - 3 Descriptive Statistics & Analytics
  - 4 Diagnostics Analytics
  - 5 Analytical Idea Presentation  
(Dashboard – Insight - Story)
  - 6 Business Intelligence Capstone



# ANALYTICAL THINKING

**PART 1:** Overview Concept

**PART 2:** Data Analytics Problem Solving

**PART 3: Qualitative (LOGIC TREE)**

3.1 Logic Tree Fundamentals

3.2 Techniques to build Logic Trees

3.3 The 4 things you need to "get" to understand Logic Trees

3.4 Summary

**PART 4: 5 core structures overview**

4.1 Algebraic structures

4.2 Process Structures

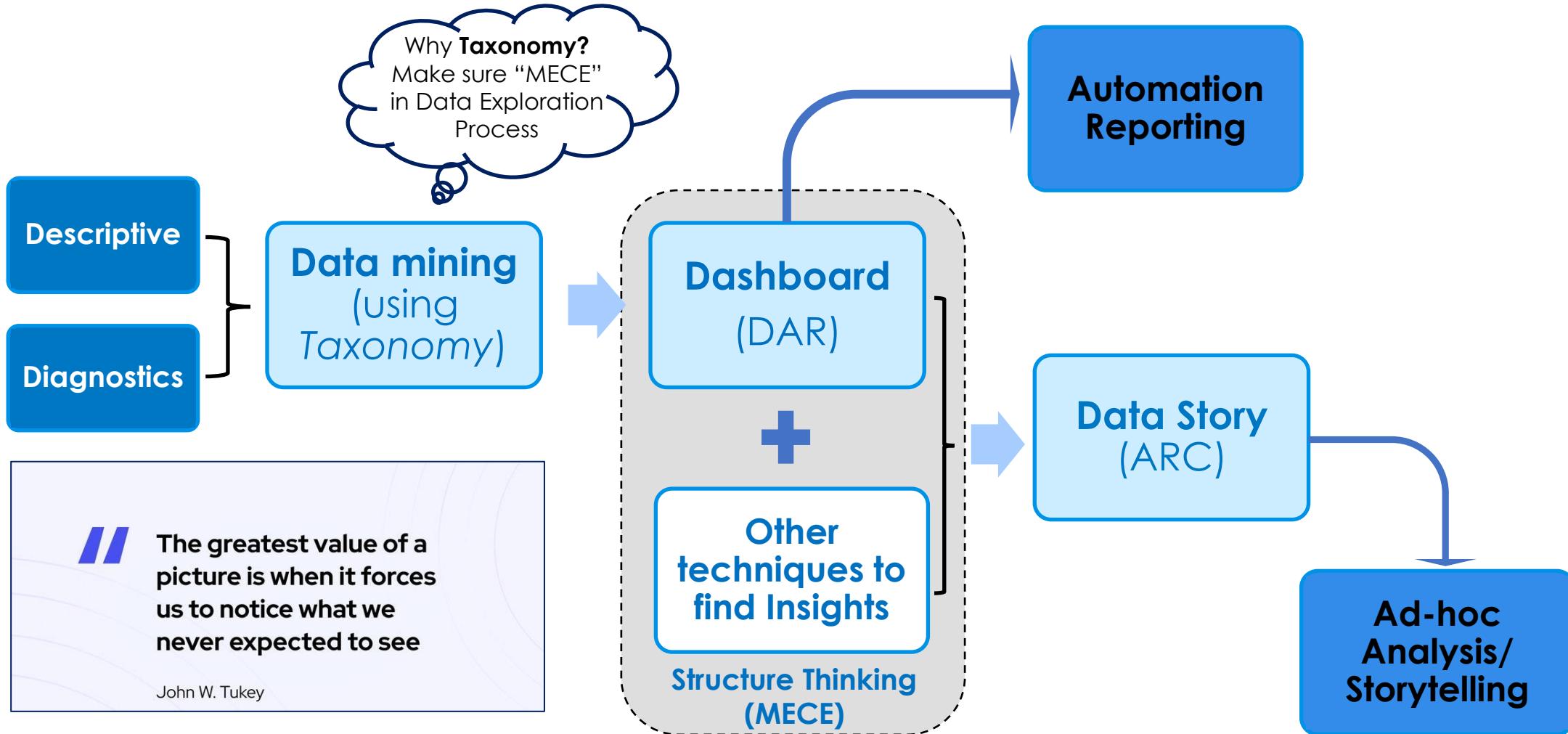
4.3 Conceptual Frameworks

4.4 Segmentations

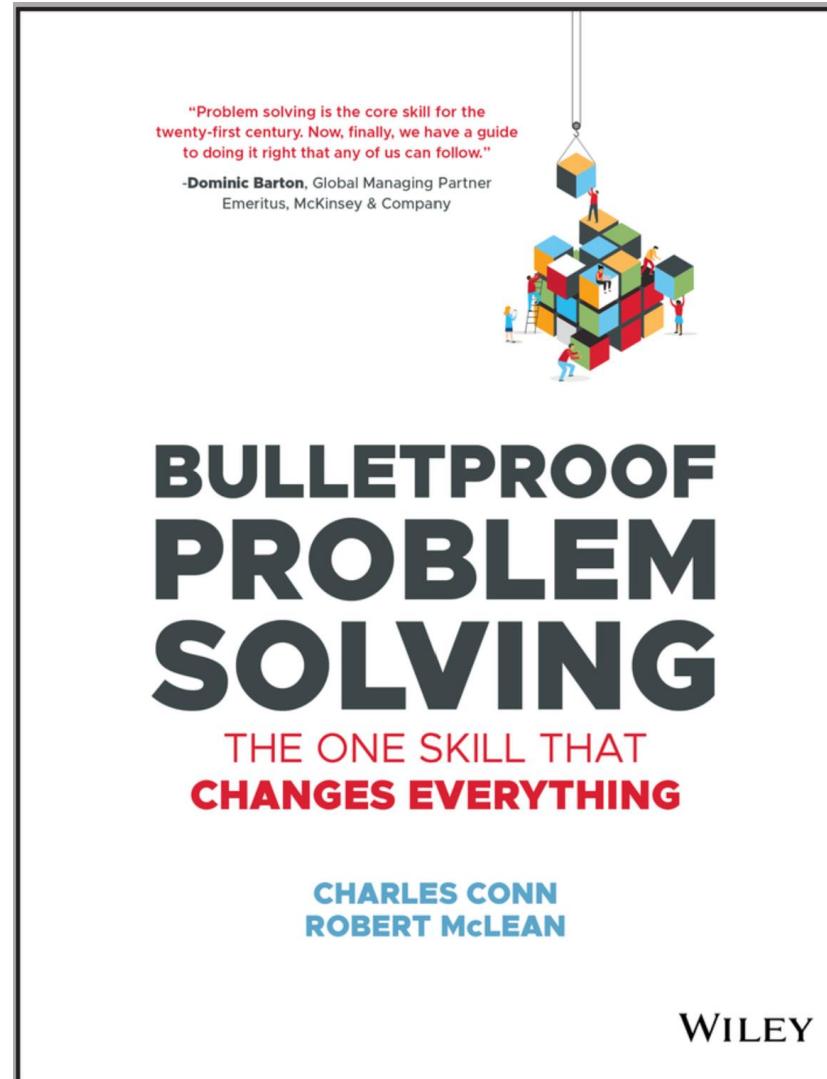
4.5 Opposite Words

4.6 Combine Structures

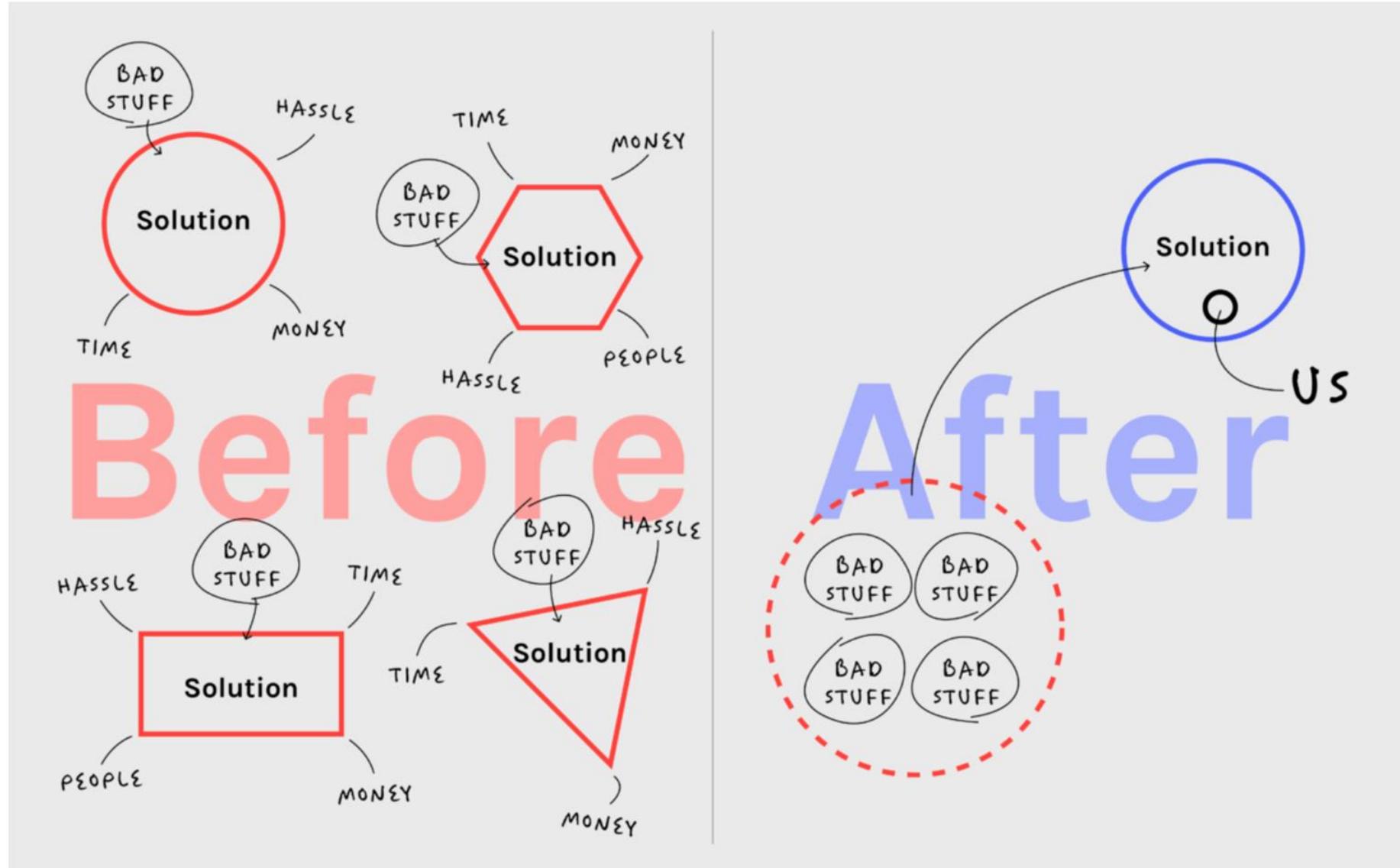
# Business Intelligence overview



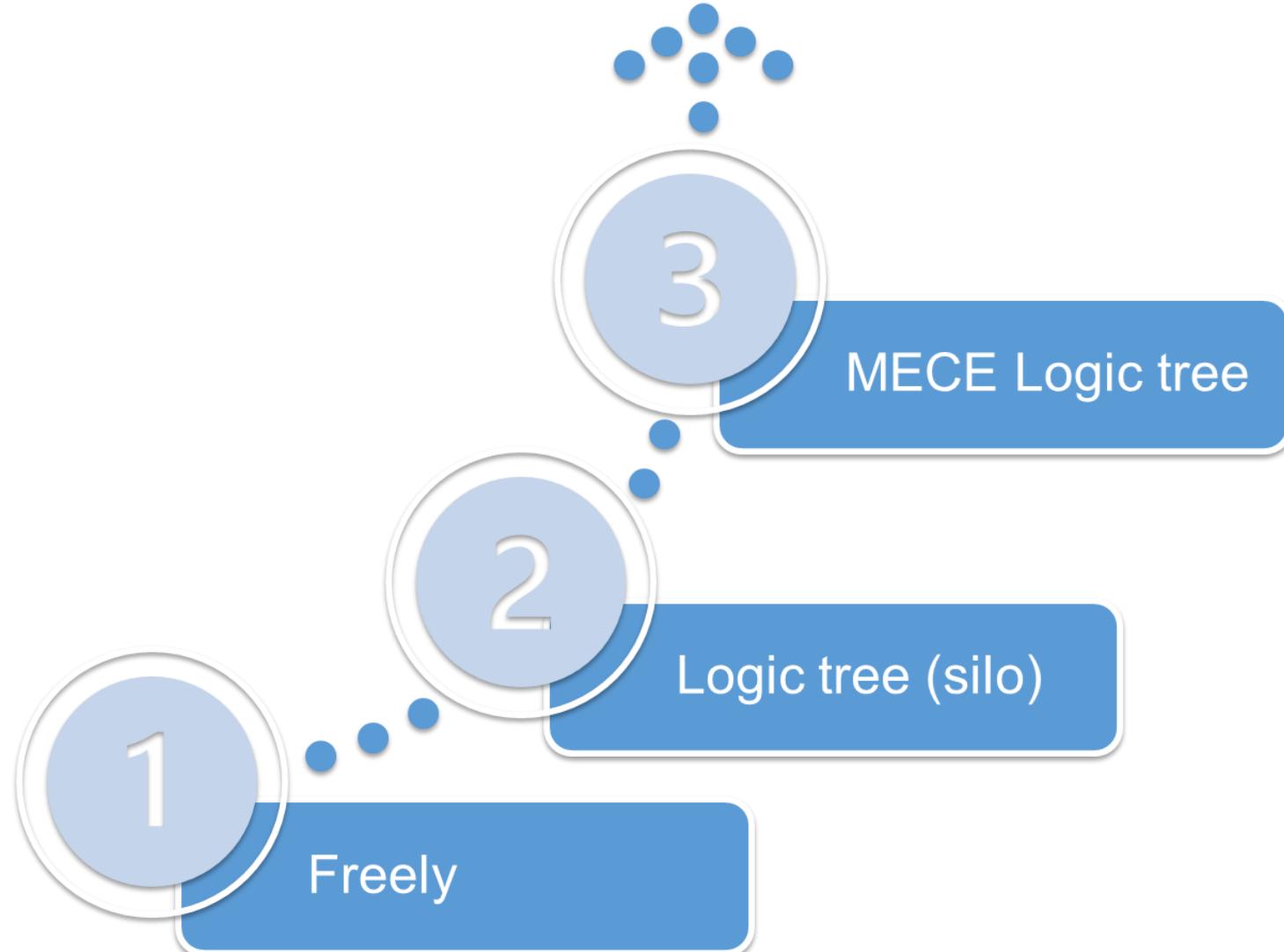
# Data Analytics Problem Solving

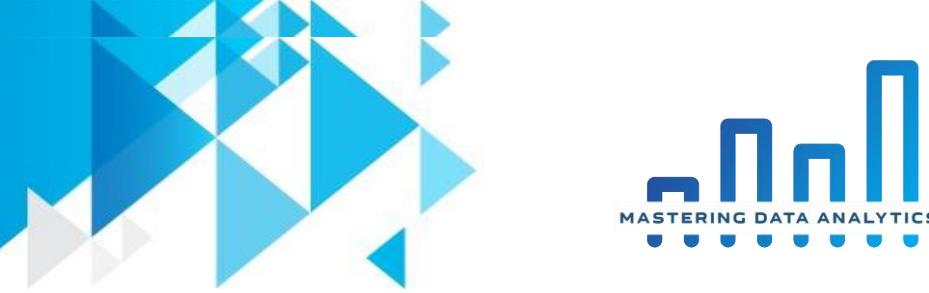


# Data Analytics Problem Solving

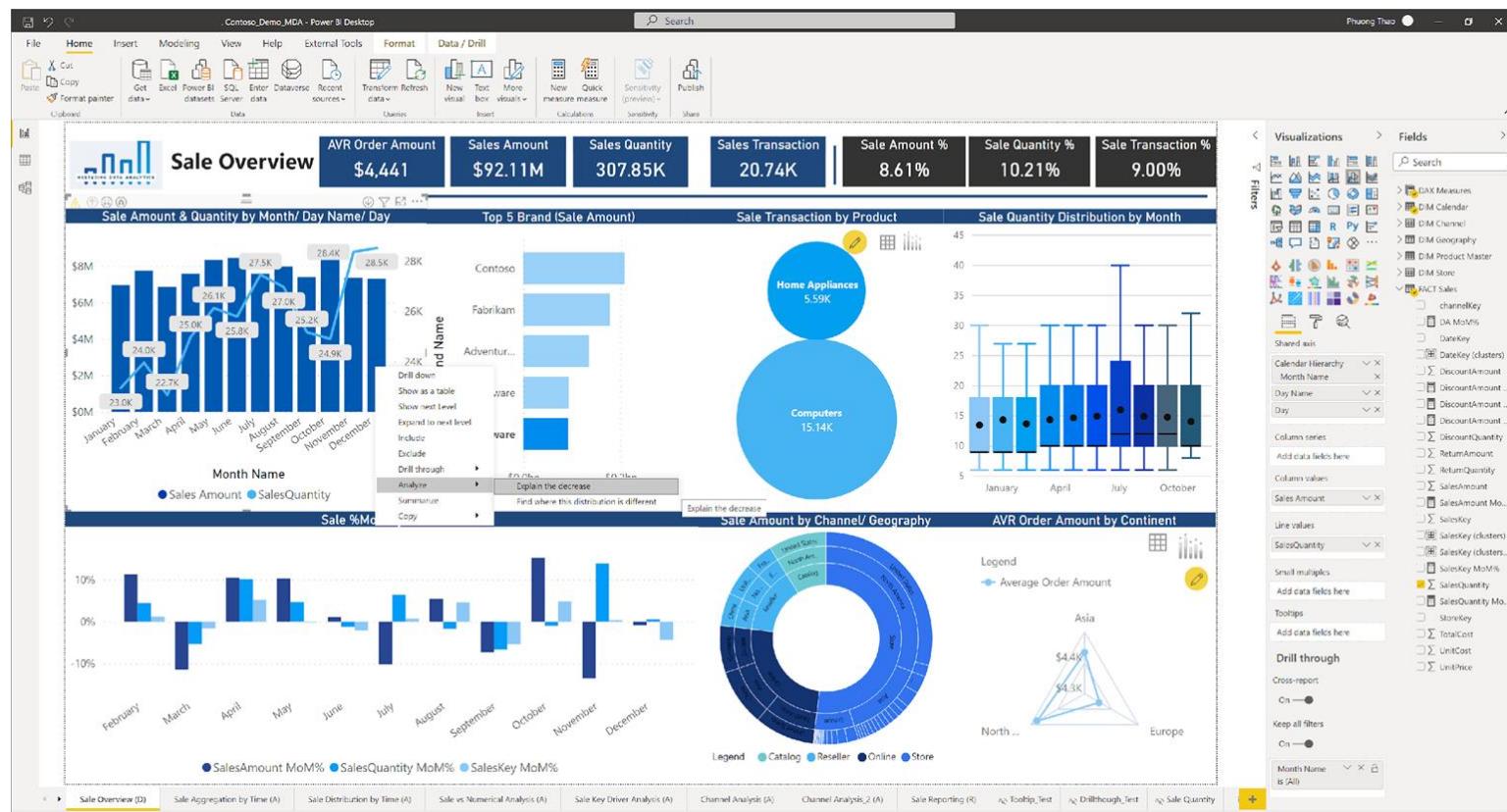


# 3 levels of Analytical Thinking



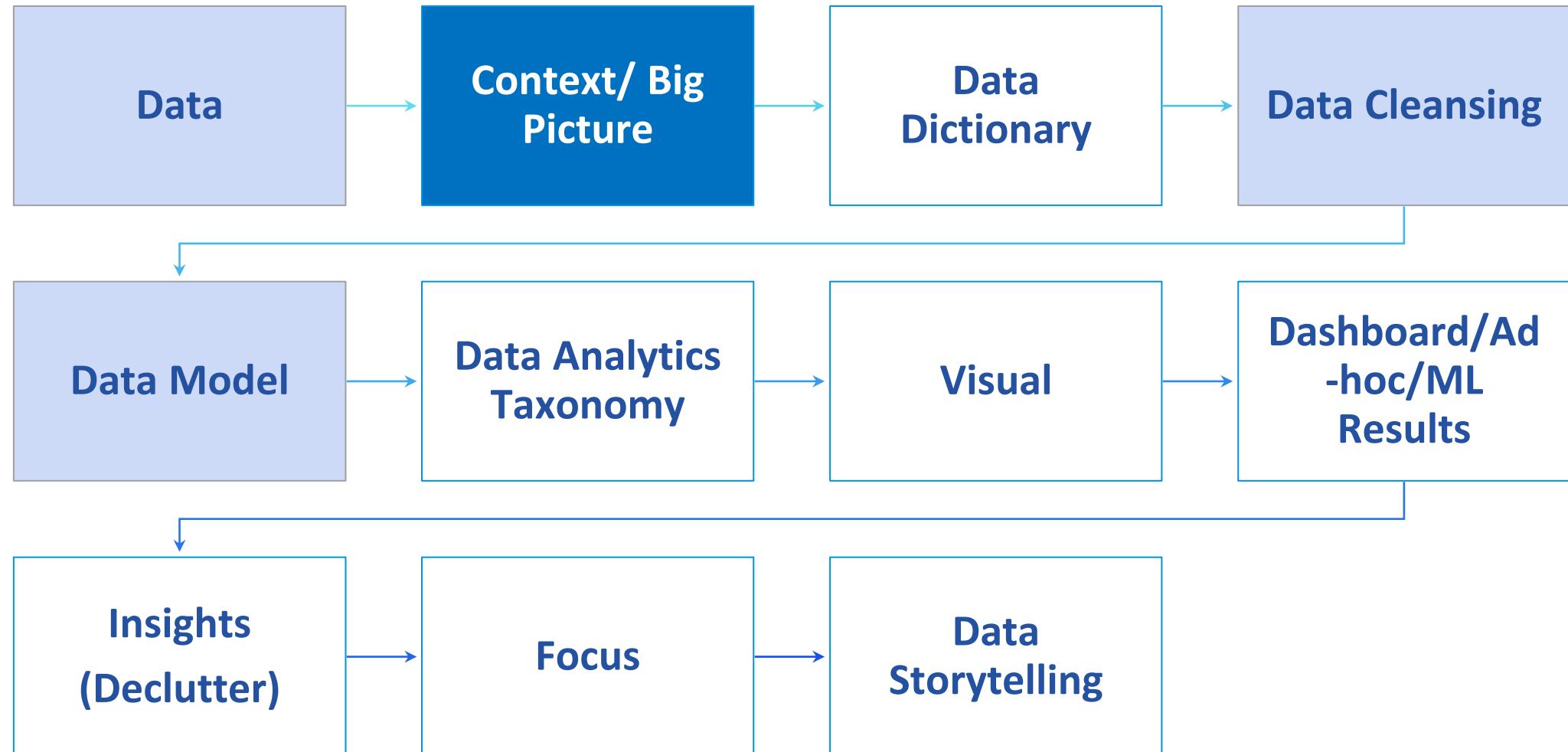


## Ad-hoc Analytics: WHEN? From Reports From Managers



Why has our ROAS dropped from 150% to 130% over the past month?

# From Data to Story Process

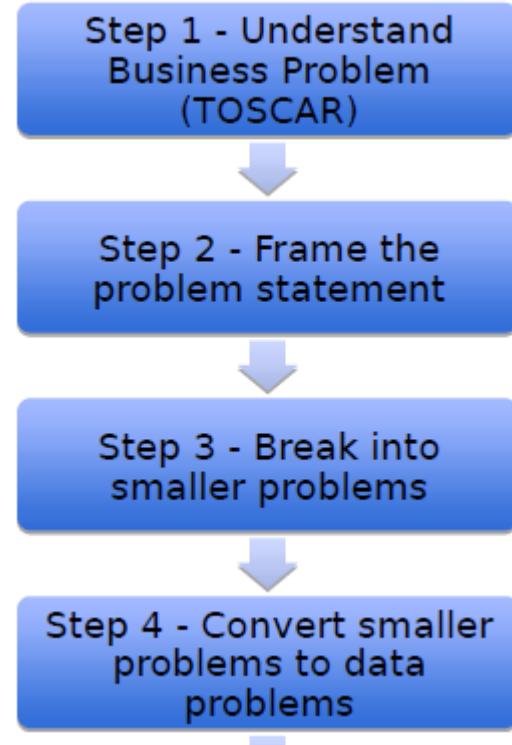


# Data Analytics Problem Solving

## Understanding the context



### Frameworks for converting business problem into a data problem



Trouble	Owner	Success criteria	Constraints	Actors	Reference
Why? • Why existing customers? • Why now? • Where does it fit in your (Sales Director) priority? • Do we have any Cross-sell practice in place? • Any competition benchmarks?	Sales Director? • Customer Management Director? • Who would own the implementation? • Are the counterparts in Organizations aligned? Do they feel this is a problem? • What does the CEO feel about this problem?	How do we measure success? • Average spend from existing customers? • % of customers buying over a time period? • What would we want to achieve in what time frame?	• How many communications can we do with a customer in a day / week / month? • How much can we spend? • Do we have CRM in place? • Do we capture behavioral data? How much past data do we have? • Any regulations? • Trade-offs- NPS, unsubscribe	Sales Team / Director • Customer Management • CEO • Operations team • Brand Communication & Marketing	Have we tried this in the past? • What were the results? • <u>How are Current Cross-sales to existing customers handle?</u>

# Data Analytics Problem Solving

Understanding the context



## Understanding the real trouble, NOT solutions, NO BIAS

### **Business Problem:**

"I want to increase revenue from our existing customers. Can you help us do a propensity model?" – Head of Sales

Why existing customers,  
Why now,  
Any regional/ competition benchmark,  
Any X-sell practice?



### **Data Analytics Problem Statement**

“Increase x% revenue from existing customers in next y months to reduce reliance on new customers by identifying which customers are likely to X-sell”

# Data Analytics Problem Solving

## Understanding the context



**the BIG IDEA worksheet**

storytelling data

Identify a project you are working on where you need to communicate in a data-driven way. Reflect upon and fill out the following.

PROJECT \_\_\_\_\_

**WHO IS YOUR AUDIENCE?**

(1) List the primary groups or individuals to whom you'll be communicating.  
(2) If you had to narrow that to a single person, who would that be?  
(3) What does your audience care about?  
(4) What action does your audience need to take?

**WHAT IS AT STAKE?**

What are the benefits if your audience acts in the way that you want them to? What are the risks if they do not?

**FORM YOUR BIG IDEA**

It should:

(1) articulate your point of view,  
(2) convey what's at stake, and  
(3) be a complete (and single!) sentence.

**the BIG IDEA worksheet**

storytelling data

Identify a project you are working on where you need to communicate in a data-driven way. Reflect upon and fill out the following.

PROJECT Back-to-school opportunity

**WHO IS YOUR AUDIENCE?**

(1) List the primary groups or individuals to whom you'll be communicating.  
  
*the executive team*  
  
(2) If you had to narrow that to a single person, who would that be?  
  
*the head of retail*  
  
(3) What does your audience care about?  

- Having a highly profitable back-to-school shopping season
- Making customers happy because happier customers spend more
- Beating the competition

  
(4) What action does your audience need to take?  
  
*Agree that training is the right way to deal with inconsistent service levels and approve the resources it will take to make that happen (cost, time, people)*

**WHAT IS AT STAKE?**

What are the benefits if your audience acts in the way that you want them to?  
  
*- better service levels = happier customers*  
  
What are the risks if they do not?  
  
*- no action could lead to negative word of mouth*  
  
*- people shopping with competitors*  
  
*- reputational risk*  
  
*- lost revenue*

**FORM YOUR BIG IDEA**

It should:

(1) articulate your point of view,  
(2) convey what's at stake, and  
(3) be a complete (and single!) sentence.

*Let's invest in sales associate training to improve the in-store shopping experience and make the upcoming back-to-school season the best revenue generating one yet!*

FIGURE 1.3a The Big Idea worksheet

FIGURE 1.3b Completed Big Idea worksheet

# Data Analytics Problem Solving

## Understanding the context



THREE  
MINUTE  
STORY

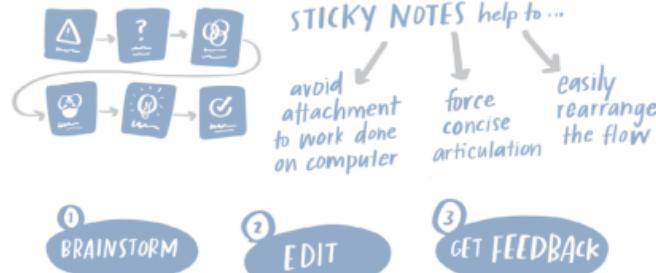


BIG  
IDEA\*

\*from Nancy Duarte  
(Resonate)

STORY  
BOARDing

UPFRONT PLANNING to CREATE STRUCTURE



### Solution 1.7: storyboard!

Looking back to Exercise 1.3, my Big Idea was the following:

Let's invest in sales associate training to improve the in-store shopping experience and make the upcoming back-to-school season the best revenue generating one yet!

I'll keep this in mind as I work through the storyboarding steps.

**STEP 1:** Below is my initial list of potential topics/pieces of content to include from my brainstorming process.

1. Historical context (back-to-school shopping is important)
2. Problem we're trying to solve (historically not data driven)
3. Different ways we envisaged solving the problem
4. Course of action we undertook: survey
5. Survey: customer groups we asked, general demographics, response rates
6. Survey: details on competitors we included
7. Survey: questions we asked, open and close date of survey
8. Data: how our store compares across the various items
9. Data: how this breaks down across stores and regions
10. Data: how we compare to the competition
11. Data: how competitor comparison breaks down by stores & regions
12. Good news: where we're doing best or beating competition (with store breakdown)
13. Bad news: where we're doing worse or lower than competition (with store breakdown)
14. Areas for improvement
15. Potential remedies
16. Recommended course of action: invest in sales training
17. Resources needed (people, budget)
18. What this will solve
19. Projected timeline
20. Discussion to have / decision to be made

**STEP 2:** Figure 1.7 illustrates how I might curate the preceding list into a storyboard.



FIGURE 1.7 Back-to-school shopping: a potential storyboard

**STEP 2:** Figure 1.8 illustrates how I could curate the preceding list into a storyboard.



FIGURE 1.8 Pet adoption pilot program: a potential storyboard

# Data Analytics Problem Solving

## Part 1: Logic Tree Fundamentals - Overview



Part 1: Logic Tree Fundamentals

Part 2: Techniques to build Logic Trees

Part 3: Principles

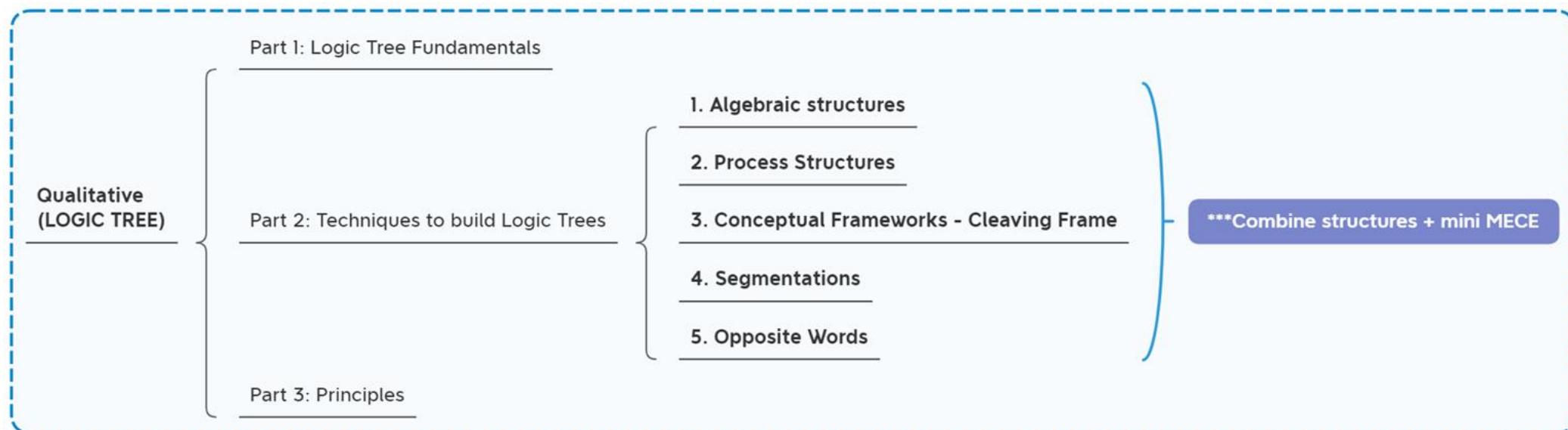
**“No adventurer should explore a territory without a good map. And no smart problem solver should start solving a problem without a good structure thinking.”**

# Data Analytics Problem Solving

## Part 1: Logic Tree Fundamentals - Overview



- Consultants from **MBB (McKinsey, BCG, Bain) and other consulting firms** use logic tree as a "map" to **solve both simple and complex problems**. For this reason, it's one of the **most widely used problem solving tools**. This is **the most fundamental tool to structure and solve problems in a systematic way**.
- You can't have one toolbox that is perfect for every problem, but you can assemble a toolbox that is perfect for each job if you have a few different boxes to choose your tools from and you have familiarity with them. If you learn to tie-up these **five techniques in a coherent way**, you will learn to create issue trees from scratch.

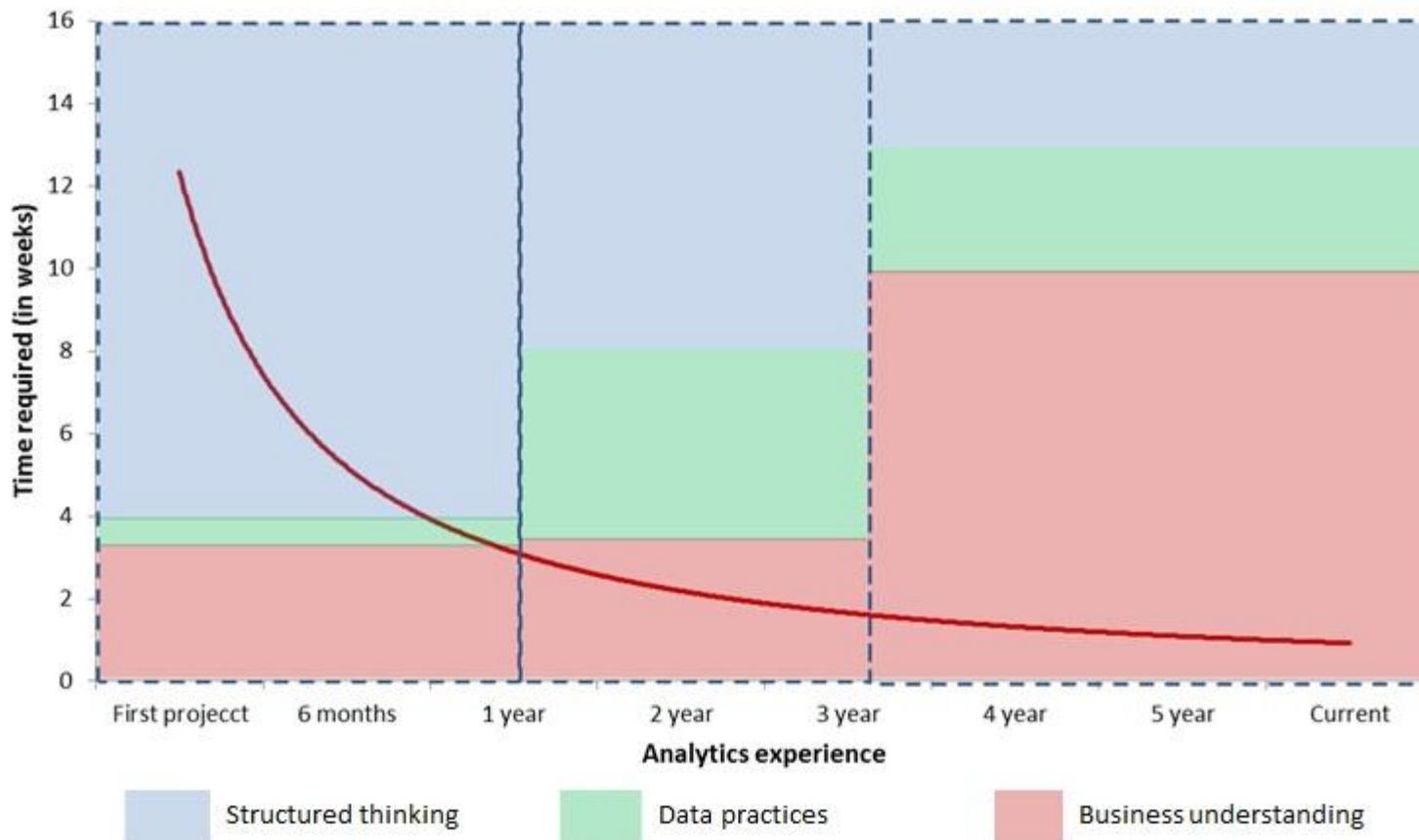


# Data Analytics Problem Solving

## Part 1: Logic Tree Fundamentals - Overview



Time required to complete project



- **Red line** in the graph shows how **time to complete a project** (in weeks) has come down with experience
  - With in each of three blocks (< 1 year; 1 – 3 year; 3+ years), the area of color shows the factor responsible for drop in time.
  - For example, during the first block, time required to complete the project comes down from 12+ weeks to 3 weeks and **75% of this drop is because of structured thinking.**

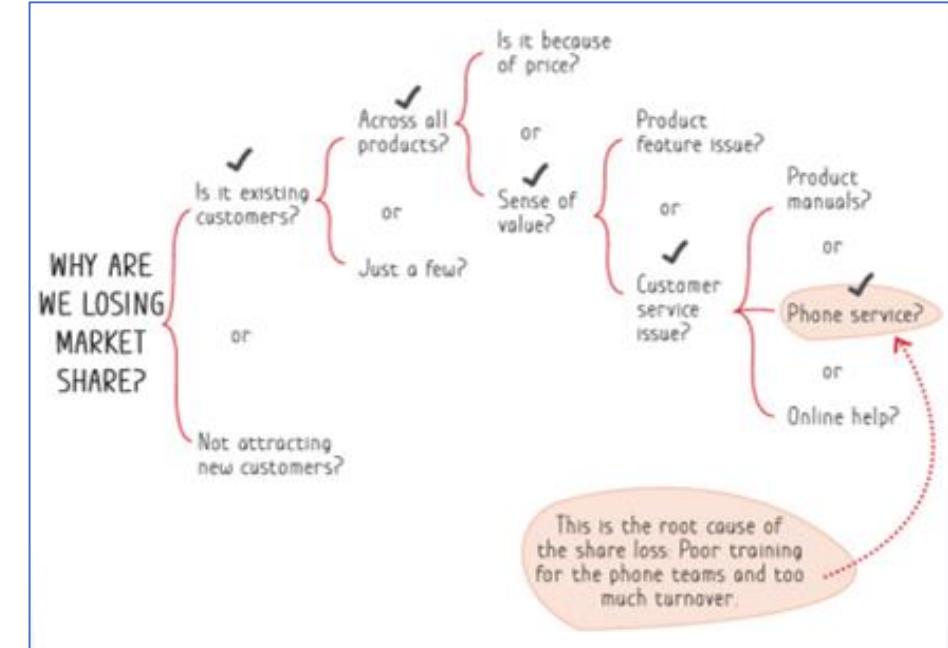
# Data Analytics Problem Solving

## Part 1: Logic Tree Fundamentals - Overview



### The 4 things you need to "get" to understand Logic Trees

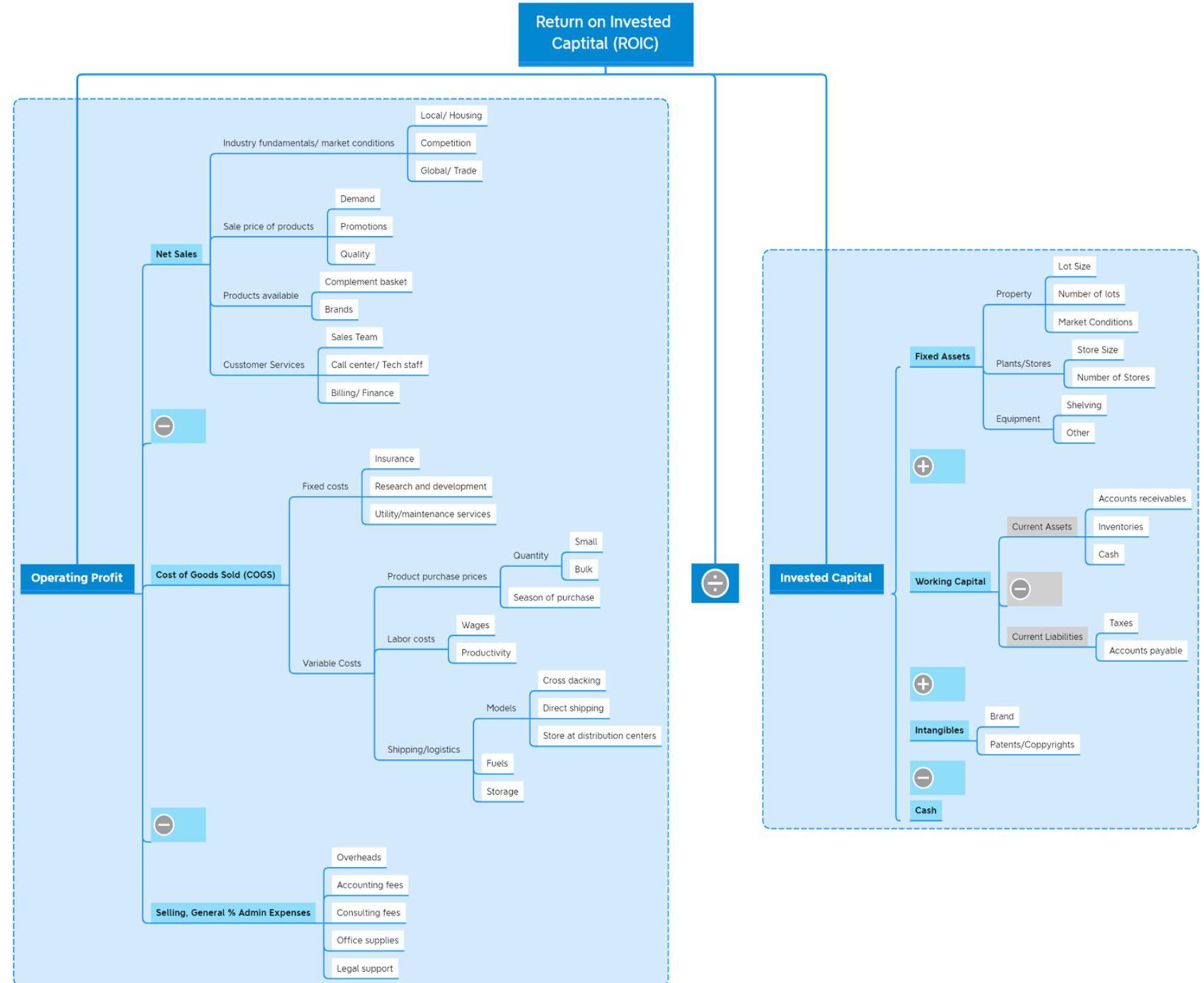
1. They are a "**map**" of your problem
2. Issue Trees are *the* tool for "**dividing and conquering**"
3. Issue Trees are excellent for **prioritization**
4. You can have "**problem trees**" and "**solution trees**"



# Data Analytics Problem

## Part 1: Logic Tree Fundamentals

1. They are a "map" of your



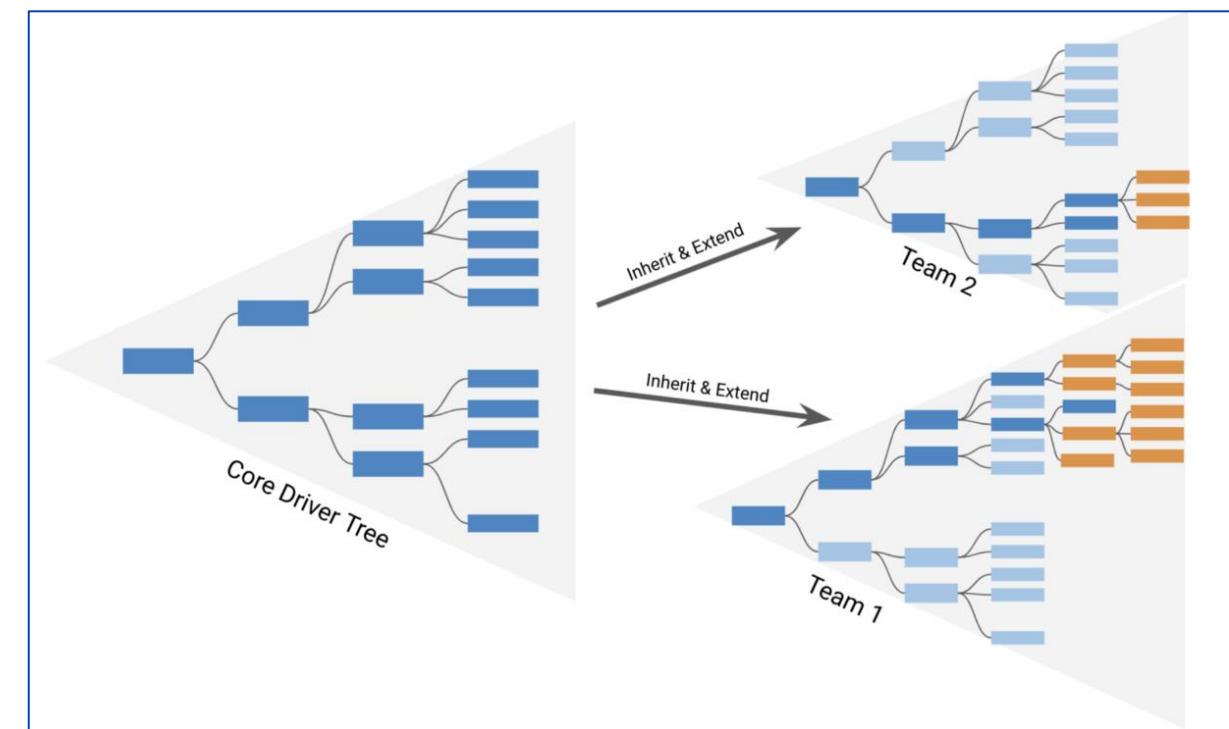
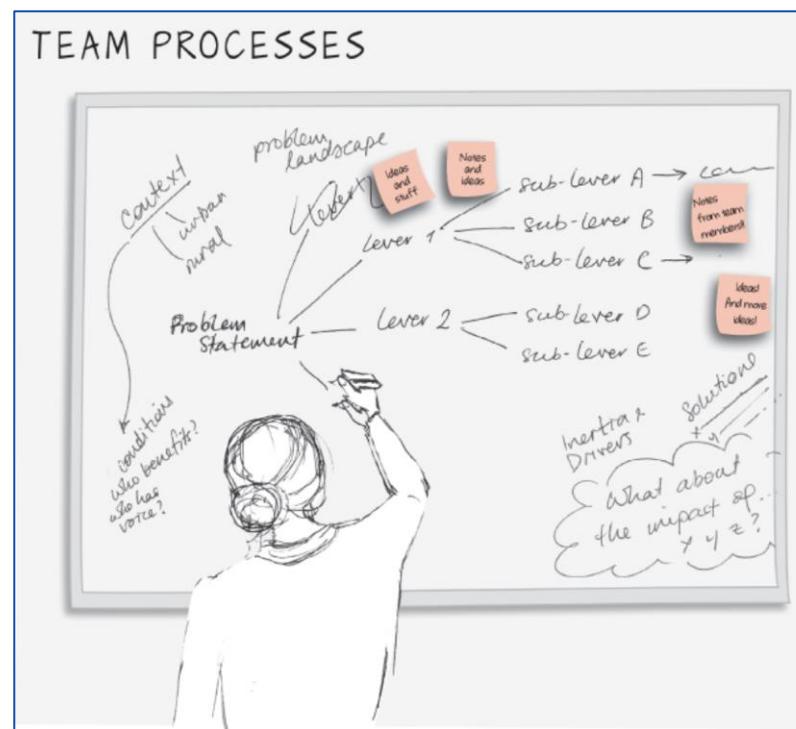
# Data Analytics Problem Solving

## Part 1: Logic Tree Fundamentals - 4 things



Never met a person that can **generate that many ideas** with **just the prompt question** (how to improve customer retention) and **without building an Issue Tree first**. Our brains seem to get confused with that **many ideas**. But if you add structure (forced constraints), you can think freely about each part without worrying about missing something.

It is often difficult to see the structure of the problem, **team brainstorming** is hugely valuable, especially when trying different lenses or cleaving frames.



# Data Analytics Problem Solving

## Part 1: Logic Tree Fundamentals - 4 things



Why do I want to use **Logic Trees (brainstorm)** for mapping out types of solutions?  
Why not just **Brainstorm freely**?

Logic Trees (brainstorm)	Reasons	Extra documents
(1) Your ideas are gonna be way more organized	<ul style="list-style-type: none"><li>This helps you communicate your ideas with others.</li><li>And it also helps you <u>organize</u> everyone's ideas into a coherent whole.</li><li>And then better prioritize those ideas and even "divide and conquer" the implementation of them. You know, all the good stuff Issue Trees allow you to do.</li></ul>	
(2) Creativity from constraints	<ul style="list-style-type: none"><li>This is counter – intuitive, but bear.</li><li>There's significant research showing that having some <u>constraints</u> make people MORE creative, not less.</li></ul>	<p>Link 1: <a href="https://www.fastcompany.com/3067925/how-constraints-force-your-brain-to-be-more-creative">https://www.fastcompany.com/3067925/how-constraints-force-your-brain-to-be-more-creative</a></p> <p>Link 2: <a href="https://medium.com/stanford-d-school/want-some-creativity-crank-up-the-constraints-5728a988a635">https://medium.com/stanford-d-school/want-some-creativity-crank-up-the-constraints-5728a988a635</a></p> <p>Link 3: <a href="https://hbr.org/2013/01/how-intelligent-constraints-dr">https://hbr.org/2013/01/how-intelligent-constraints-dr</a></p>
(3) They force you to see whole categories of ideas you wouldn't have seen before.	<p><b>Ex:</b> Take the "Make it costly to unsubscribe" category for example.</p> <ul style="list-style-type: none"><li>When I came up with it, I was thinking about financial costs. You know, contracts and stuff.</li><li>But when I saw the word "financial" coming up in my mind, I immediately noticed that there could also be "non-financial" costs, such as having to go to a physical retail store to cancel the service or losing your dear phone number that you had for 8 years and all your friends and business connections have.</li><li>I didn't have these "<b>non-financial costs</b>" <b>ideas</b> before I create the category for them. Which is another big advantage for using Issue Trees to come up with solutions for your problems. <u>You can see the larger picture.</u></li></ul>	

# Data Analytics Problem Solving

## Part 1: Logic Tree Fundamentals - 4 things



### 2. Issue Trees are *the tool for "dividing and conquering"*

It so happens that this “divide and conquer” strategy is not only good for dealing with military opponents, but **also GREAT for dealing with Big, Hairy, Complex problems, separating them and dealing with a part of their forces one at a time.** It’s much easier to deal with one cockroach a hundred times than with a hundred cockroaches at once.

But **if you try making it more specific without the help of an Issue Tree**, you’re gonna **end up with one of two things:**

- (1) An **incomplete list** of possible hypotheses (like the one you probably wrote down on your piece of paper)
- (2) A **HUGE list with hundreds, even thousands of hypotheses** (which, at the end of the day, you don’t even know if it’s complete anyway)

# Data Analytics Problem Solving

## Part 1: Logic Tree Fundamentals - 4 things

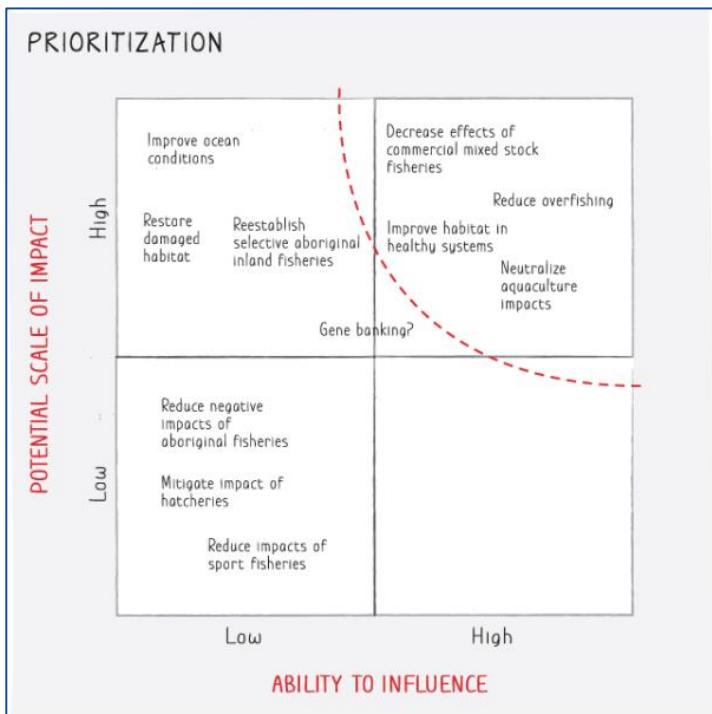


### 3. Issue Trees are excellent for **prioritization**

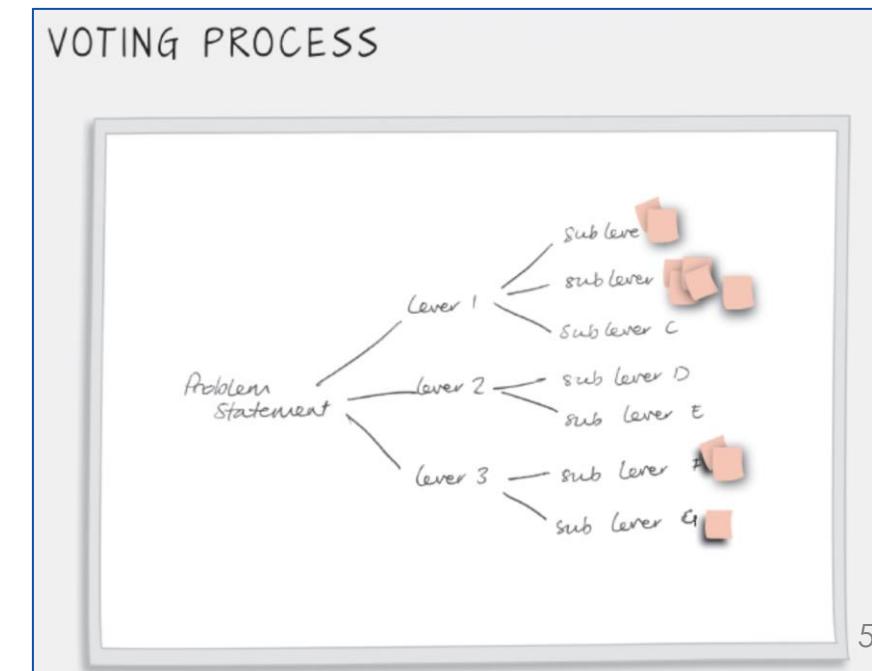
**Before** we start to invest significant time and effort into work **planning and analysis**, we have to **prune our trees**. Focus your early efforts on the big levers that you can pull.

#### Logical reasoning and a bunch of assumptions to prioritize

**Size of potential impact** and **whether you can affect it**.

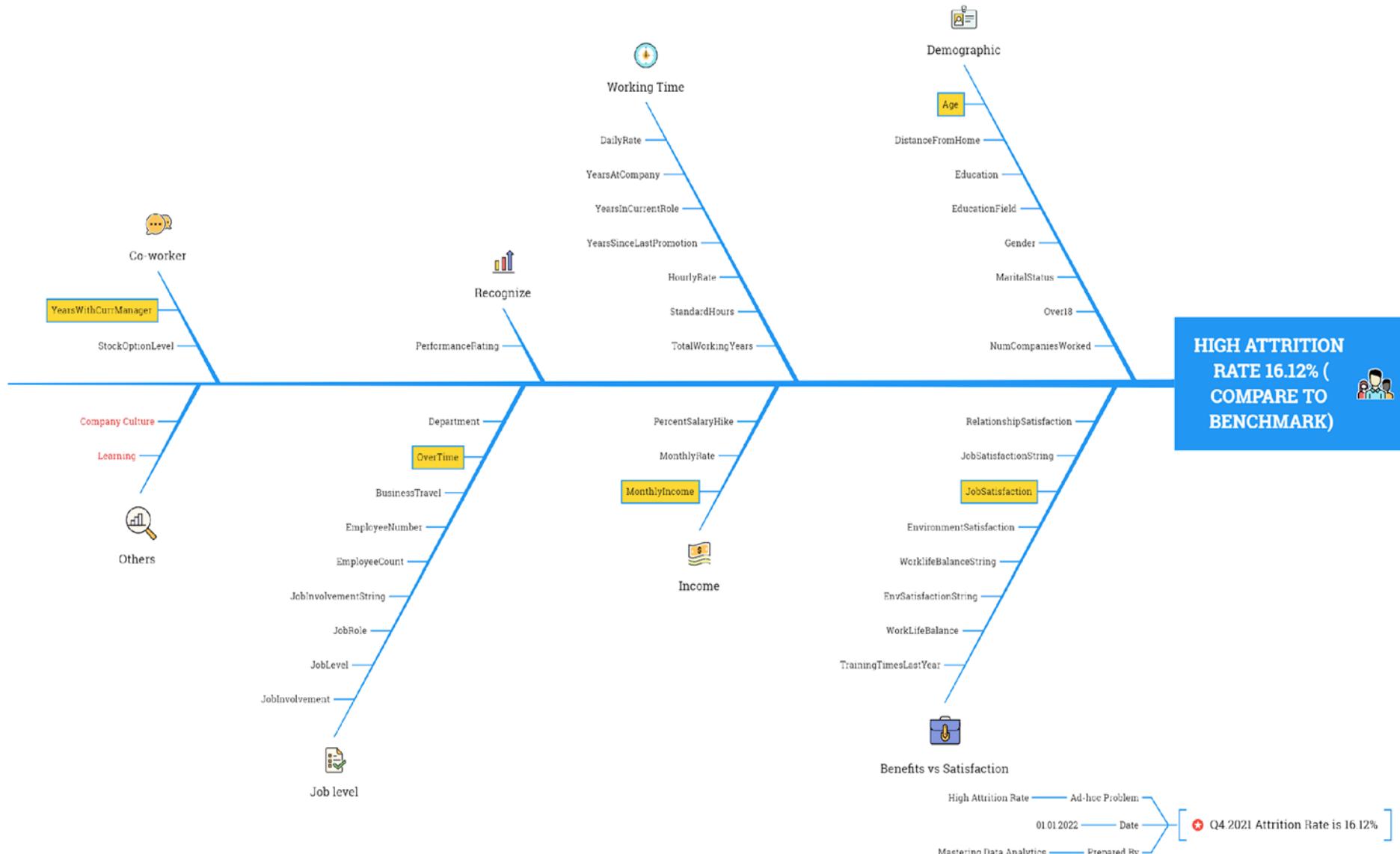


Another technique we have used is giving every team member 10 sticky notes and let them allocate them in a **voting process** for priority analyses.



# Data Analytics Problem Solving

## Part 1: Logic Tree Fundamentals - 4 things



# Data Analytics Pro

## Part 1: Logic Tree Fundamentals - 4 things



Key Driver Analysis - Power BI Desktop

File Home Help External Tools Table tools

Mark as date table Manage relationships New measure New measure column New table

Age Attrition BusinessTravel DailyRate Department DistanceFromHome Education EducationField EmployeeCount EmployeeNumber EnvironmentSatisfaction Gender HourlyRate JobInvolvement JobLevel JobRole JobSatisfaction MaritalStatus MonthlyIncome MonthlyRate NumCompaniesWorked Over18 Overtime PercentSalaryHike PerformanceRating RelationshipSatisfaction StandardHours StockOptionLevel TotalWorkingYears TrainingTimesLastYear WorkLifeBalance WorklifeBalanceString YearsAtCompany

Search

Table: WA\_Fn-UseC\_HR-Employee-Attrition (1,470 rows) Update available (click to download)

Age	Attrition	BusinessTravel	DailyRate	Department	DistanceFromHome	Education	EducationField	EmployeeCount	EmployeeNumber	EnvironmentSatisfaction	Gender	HourlyRate	JobInvolvement	JobLevel	JobRole	JobSatisfaction	MaritalStatus	MonthlyIncome	MonthlyRate
37	Yes	Travel_Rarely	1373	Research & Development	2	2	Other	1	4	4	Male	92	2	1	Laboratory Technician	3	Single	2090	
30	No	Travel_Rarely	1358	Research & Development	24	1	Life Sciences	1	11	4	Male	67	3	1	Laboratory Technician	3	Divorced	2693	
21	No	Travel_Rarely	391	Research & Development	15	2	Life Sciences	1	30	3	Male	99	3	1	Research Scientist	4	Divorced	1232	
35	No	Travel_Rarely	464	Research & Development	4	2	Other	1	53	3	Male	75	3	1	Laboratory Technician	4	Divorced	1951	
27	No	Travel_Rarely	1240	Research & Development	2	4	Life Sciences	1	34	4	Female	33	3	1	Laboratory Technician	1	Divorced	2341	
37	No	Travel_Rarely	408	Research & Development	19	2	Life Sciences	1	61	2	Male	73	3	1	Research Scientist	2	Married	3022	
48	Yes	Travel_Rarely	626	Research & Development	1	2	Life Sciences	1	64	1	Male	98	2	3	Laboratory Technician	3	Single	5381	
45	No	Travel_Rarely	1339	Research & Development	7	3	Life Sciences	1	86	2	Male	59	3	3	Research Scientist	1	Divorced	9724	
36	No	Travel_Rarely	132	Research & Development	9	3	Life Sciences	1	97	2	Female	55	4	1	Laboratory Technician	4	Married	3638	
23	No	Travel_Rarely	541	Sales	2	1	Technical Degree	1	113	3	Male	62	3	1	Sales Representative	1	Unmarried	2322	
32	No	Travel_Rarely	827	Research & Development	1	1	Life Sciences	1	134	4	Male	71	3	1	Research Scientist	1	Single	2956	
22	No	Travel_Rarely	534	Research & Development	15	3	Medical	1	144	2	Female	59	3	1	Laboratory Technician	4	Single	2871	
34	No	Travel_Rarely	1091	Research & Development	6	4	Life Sciences	1	152	3	Female	45	2	2	Research Scientist	2	Divorced	4505	
36	No	Travel_Rarely	922	Research & Development	3	2	Life Sciences	1	155	1	Female	39	3	1	Laboratory Technician	4	Divorced	2835	
19	No	Travel_Rarely	1181	Research & Development	3	1	Medical	1	201	2	Female	79	3	1	Laboratory Technician	2	Single	1483	
52	No	Travel_Rarely	1169	Research & Development	7	4	Medical	1	211	2	Male	34	2	2	Manufacturing Director	3	Married	6132	
38	No	Travel_Rarely	1261	Research & Development	2	4	Life Sciences	1	271	4	Male	88	3	2	Manufacturing Director	3	Married	6553	
38	Yes	Travel_Rarely	1180	Research & Development	29	1	Medical	1	282	2	Male	70	3	2	Healthcare Representative	1	Married	6673	
42	No	Travel_Rarely	895	Sales	6	3	Life Sciences	1	298	4	Female	75	3	3	Manager	4	Single	13591	
59	No	Travel_Rarely	142	Research & Development	3	3	Life Sciences	1	309	3	Male	70	2	1	Research Scientist	4	Married	2177	
37	Yes	Travel_Frequently	504	Research & Development	10	3	Medical	1	342	1	Male	61	3	3	Manufacturing Director	3	Divorced	10048	
29	No	Travel_Rarely	1210	Sales	2	3	Medical	1	366	1	Male	78	2	2	Sales Executive	2	Married	6644	
18	Yes	Travel_Rarely	230	Research & Development	3	3	Life Sciences	1	405	3	Male	54	3	1	Laboratory Technician	3	Single	1420	
36	No	Travel_Frequently	565	Research & Development	18	4	Life Sciences	1	407	3	Male	81	4	1	Laboratory Technician	4	Married	3688	
18	No	Travel_Rarely	812	Sales	10	3	Medical	1	411	4	Female	69	2	1	Sales Representative	3	Single	1206	
47	No	Travel_Frequently	1309	Sales	4	1	Medical	1	467	2	Male	99	3	2	Sales Representative	3	Single	2976	
42	No	Travel_Rarely	810	Research & Development	23	5	Life Sciences	1	468	1	Female	44	3	4	Research Director	4	Single	15992	
42	No	Travel_Rarely	1332	Research & Development	2	4	Other	1	477	1	Male	98	2	2	Healthcare Representative	4	Single	6781	
36	No	Non-Travel	845	Sales	1	5	Medical	1	479	4	Female	45	3	2	Sales Executive	4	Single	6653	
32	Yes	Travel_Rarely	350	Sales	5	3	Marketing	1	485	4	Female	34	3	1	Sales Representative	3	Single	2851	
23	Yes	Travel_Rarely	155	Sales	12	3	Life Sciences	1	491	3	Female	50	4	1	Sales Representative	2	Single	2716	
30	No	Travel_Rarely	202	Sales	2	1	Technical Degree	1	508	3	Male	72	3	1	Sales Representative	2	Married	2476	
30	Yes	Travel_Frequently	464	Research & Development	4	3	Technical Degree	1	514	3	Male	40	3	1	Research Scientist	4	Single	2285	
40	No	Travel_Rarely	555	Research & Development	2	3	Medical	1	521	2	Female	78	2	2	Laboratory Technician	3	Married	3448	
38	No	Travel_Frequently	1490	Research & Development	2	2	Life Sciences	1	556	4	Male	42	3	1	Laboratory Technician	4	Married	1702	
54	No	Travel_Rarely	548	Research & Development	8	4	Life Sciences	1	578	3	Female	42	3	2	Laboratory Technician	3	Single	3780	
34	Yes	Travel_Frequently	534	Research & Development	20	3	Life Sciences	1	587	1	Male	65	3	3	Healthcare Representative	3	Married	9824	
28	Yes	Travel_Frequently	1306	Sales	5	3	Marketing	1	614	2	Male	69	3	1	Sales Representative	2	Single	1878	
26	No	Travel_Rarely	775	Sales	29	2	Medical	1	618	1	Male	45	3	2	Sales Executive	3	Divorced	4306	
38	No	Travel_Rarely	1455	Research & Development	10	3	Medical	1	634	3	Female	76	3	2	Healthcare Representative	3	Married	9824	
24	No	Travel_Rarely	823	Research & Development	17	2	Other	1	643	4	Male	94	2	1	Laboratory Technician	2	Married	2127	
30	No	Travel_Frequently	160	Research & Development	3	3	Medical	1	680	3	Female	71	3	1	Research Scientist	3	Divorced	2083	
35	No	Non-Travel	727	Research & Development	3	3	Life Sciences	1	704	3	Male	41	2	1	Laboratory Technician	3	Married	1281	
37	No	Travel_Rarely	1225	Research & Development	19	2	Life Sciences	1	715	4	Male	80	4	1	Research Scientist	4	Single	4680	
29	No	Travel_Rarely	1395	Sales	10	3	Life Sciences	1	719	3	Male	59	3	1	Sales Representative	3	Single	2612	
27	No	Travel_Rarely	1479	Research & Development	9	6	Life Sciences	1	774	5	Female	39	2	2	Manufacturing Director	1	Divorced	6191	

# Data Analytics Problem Solving

## Part 1: Logic Tree Fundamentals - 4 things



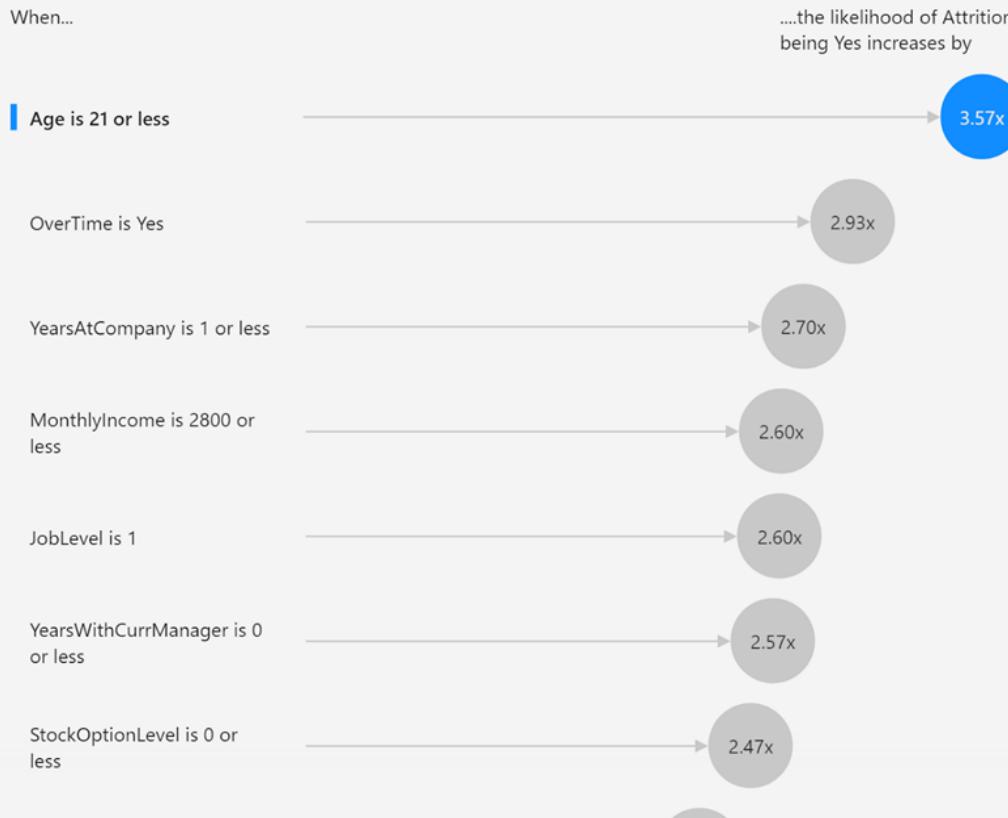
### What influences Employee Attrition?

Department  JobRole   
All  All

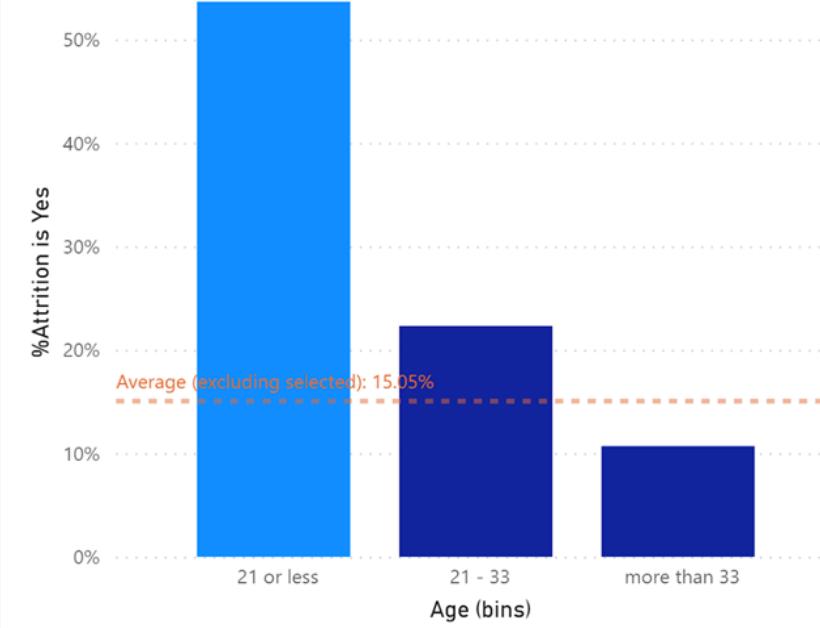


#### Key influencers Top segments

What influences Attrition to be



← Attrition is more likely to be Yes when Age is 21 or less than otherwise (on average).



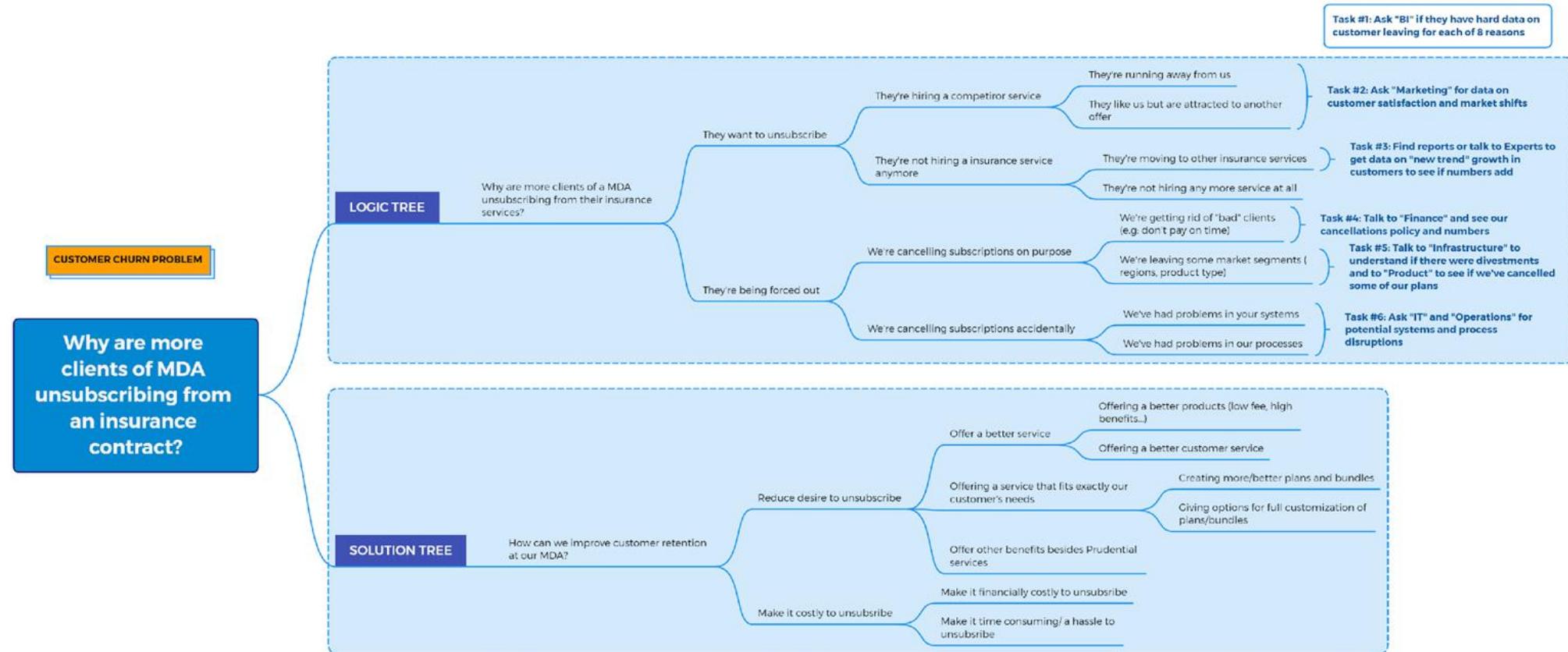
Only show values that are influencers

# Data Analytics Problem Solving

## Part 1: Logic Tree Fundamentals - 4 things



### 4. You can have "problem trees" and "solution trees" (Or solution after analyzing process)

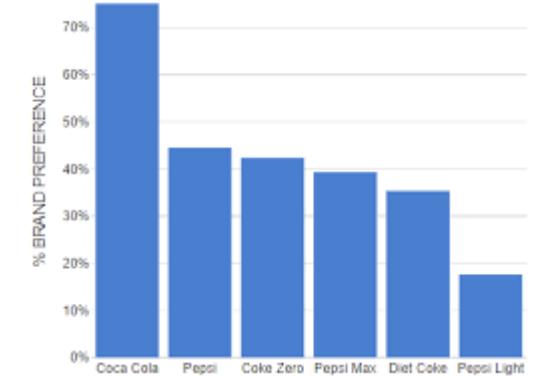
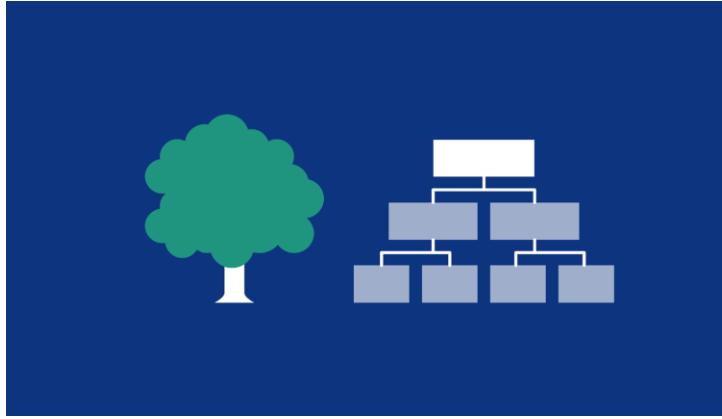


A consultant who can figure out **what's causing a problem every single time** is a pretty good asset to the team.

But to have a consultant that not only can do that, but who can also figure out the **best solutions to those problems every single time** is even better!

# Data Analytics Problem Solving

## Part 1: Logic Tree Fundamentals

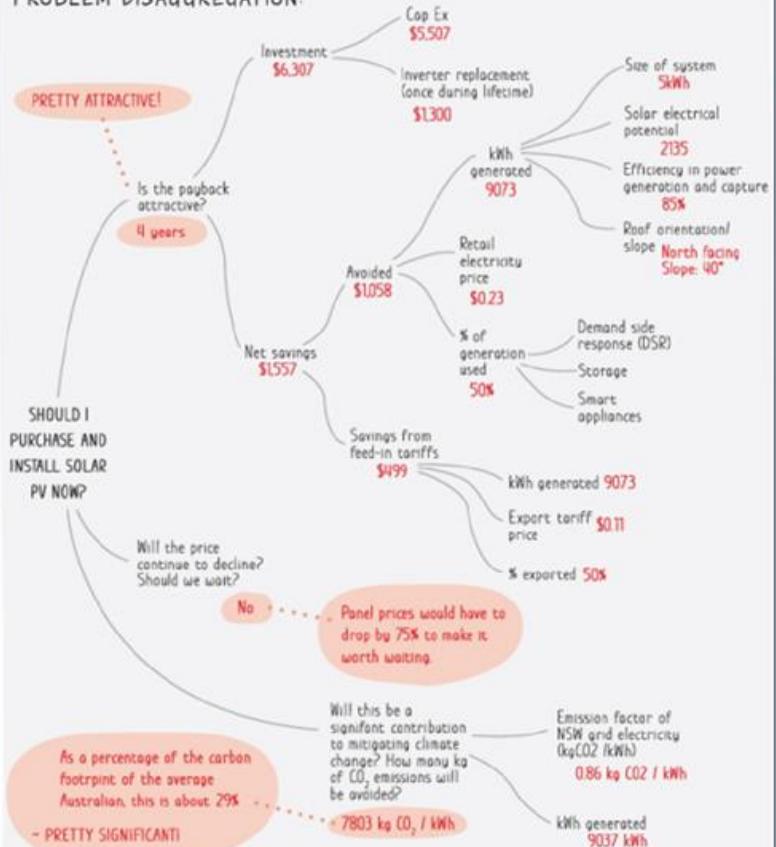


# Data Analytics Problem Solving

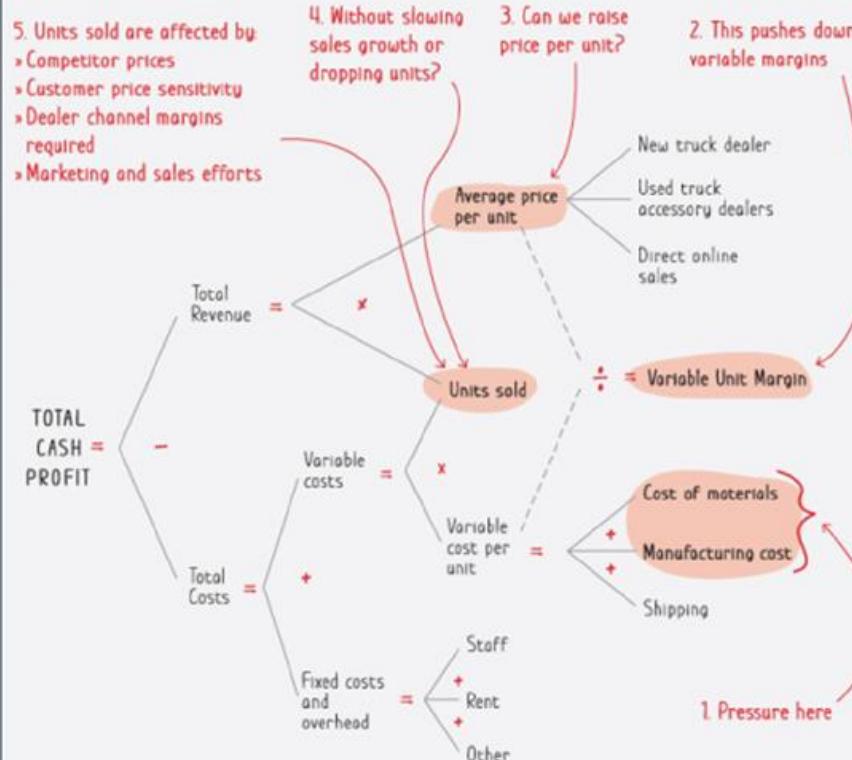
## Part 1: Logic Tree Fundamentals



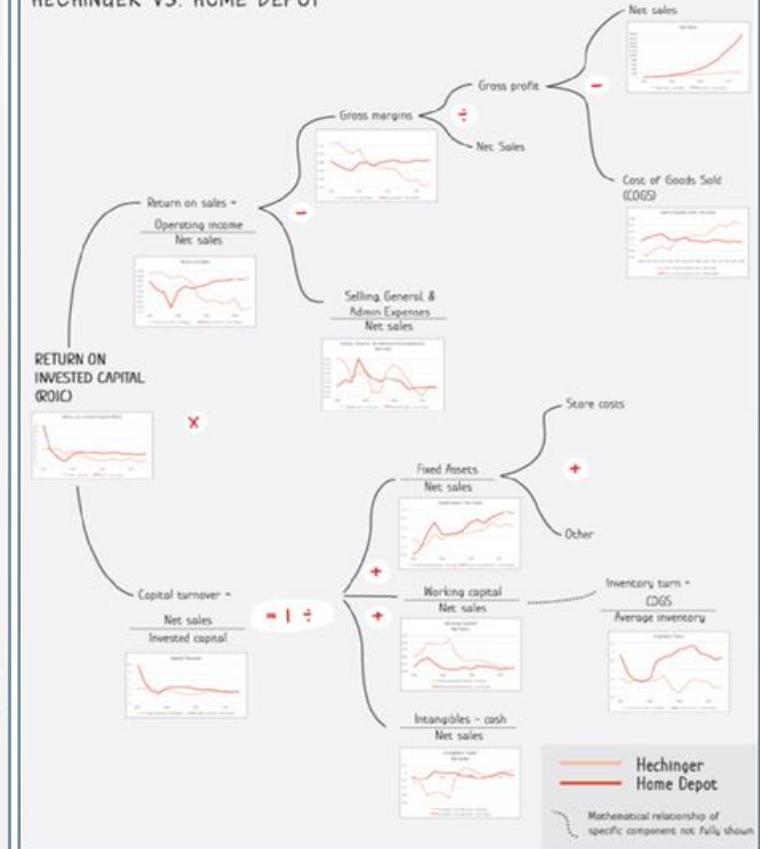
### PROBLEM DISAGGREGATION:



### TRUCKGEAR PROFIT LEVER TREE



### RETURN ON INVESTED CAPITAL ANALYSIS HECHINGER VS. HOME DEPOT



# Data Analytics Problem Solving

## Part 1: Logic Tree Fundamentals - Summary



Part 1: Logic Tree Fundamentals

Part 2: Techniques to build Logic Trees

Part 3: Principles

### **Summary:**

1. Team Brainstorming to create logic trees
2. Using Logic Trees to brainstorm, NOT Brainstorm freely
3. Prioritization
4. Logic Trees -> Solution Trees
5. Logic Trees: Calculation/Number/Chart/Color

# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees - Overview



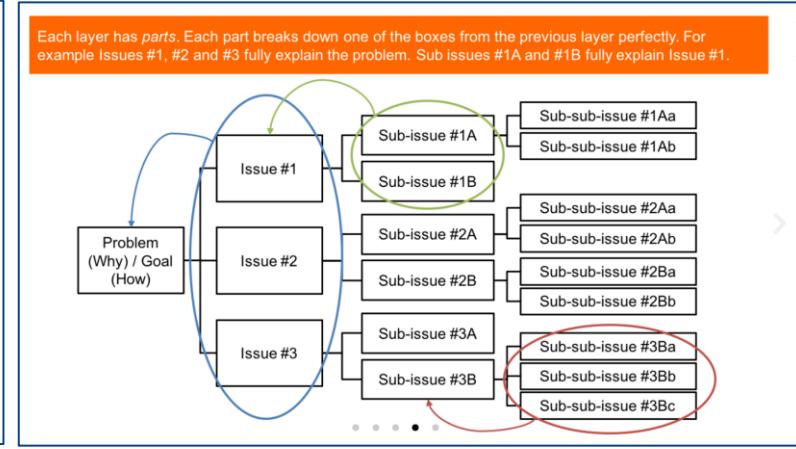
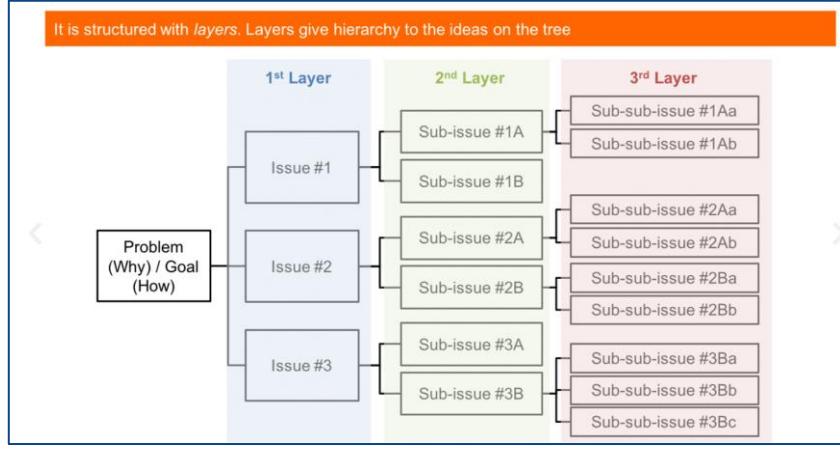
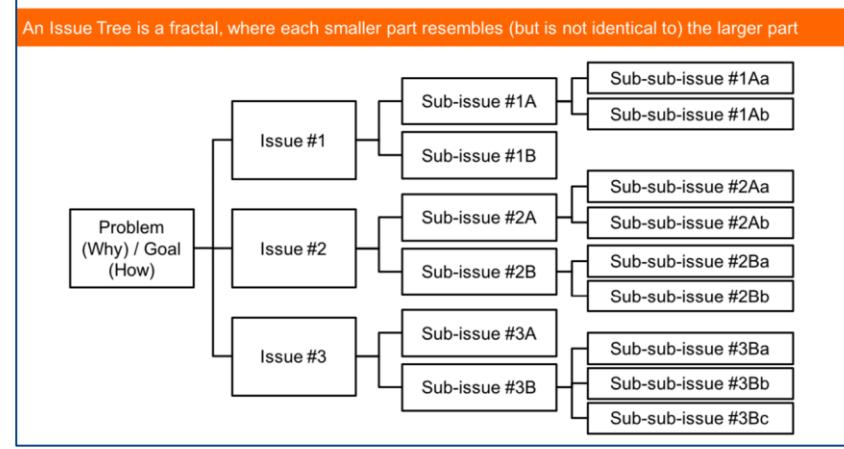
Part 1: Logic Tree Fundamentals

Part 2: Techniques to build Logic Trees

Part 3: Principles

# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees - Step-by-step

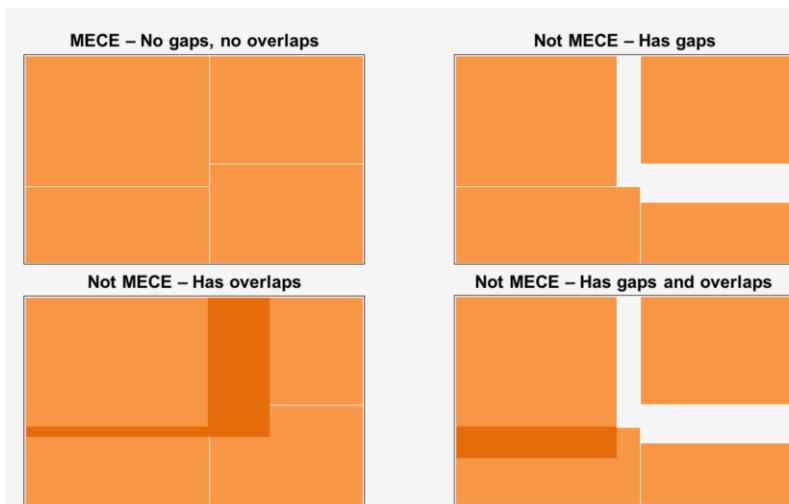


You can go as deep as you want in your Issue Trees (as many layers as you want).

And you can make some areas of your tree deeper than others.

But each *part* must FULLY explain the previous *bucket* from the previous *layer*.

To do this you use the MECE principle.



Takeaway #1: Break down a numerical problem mathematically as long as the math remains meaningful/insightful – then **get more layers using qualitative “mini-MECE-structures”**

Takeaway #2: **Stop each branch when it can reasonably explain the source of the problem**

Takeaway #3: You can **still go deeper** in the buckets you need

# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees - Step-by-step



MECE stands for “**mutually exclusive, collectively exhaustive**”. Because this tree **confuses or overlaps** some of its branches, it isn't MECE. It's a mouthful, but it is a really **useful concept**.

MECE: mutually exclusive (**no overlapping branches**) and collectively exhaustive (**no missing branches**).

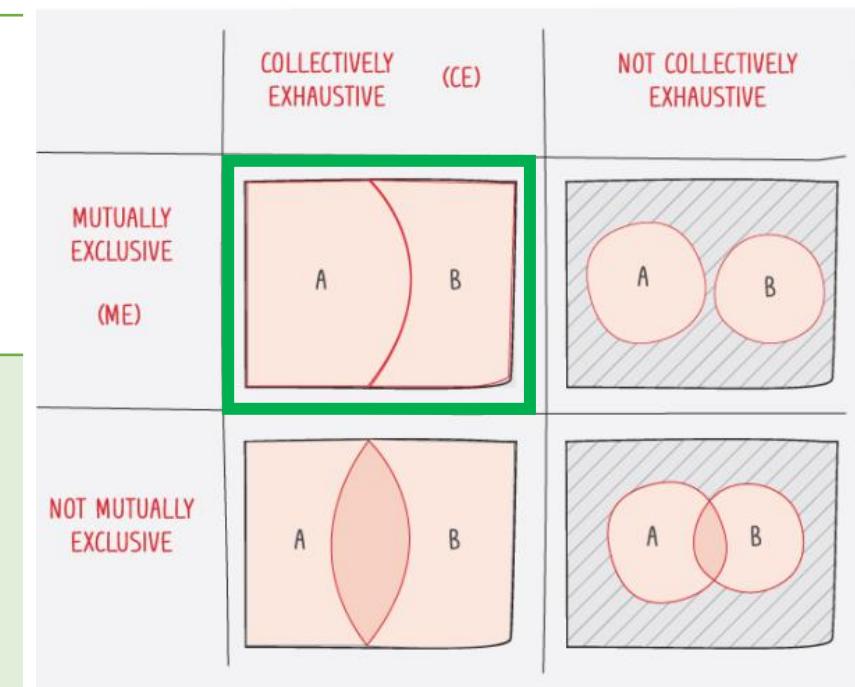
Trees should have branches that are:

### Mutually Exclusive

The branches of the tree **don't overlap**, or contain partial elements of the same factor or component. This is a little hard to get your head around, but it means that the core concept of each trunk or branch of the problem is self-contained, not spread across several branches.

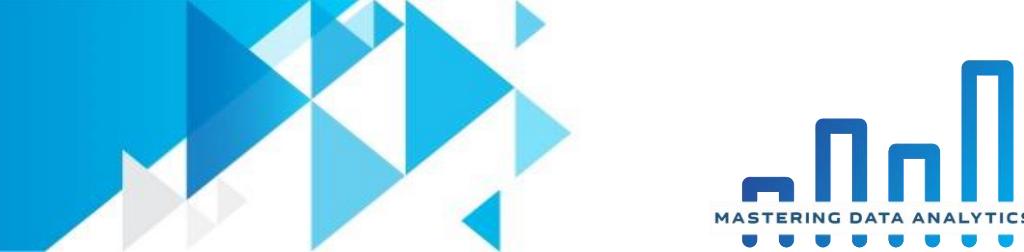
### Collectively Exhaustive

Taken as a whole, your tree contains **all of the elements of the problem, not just some of them**. If you are missing parts, you may very well miss the solution to your problem.



# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees - Step-by-step



*Six steps to practice building issue trees and become a structuring wizard*

### Step 1

*Pick a case*

Any case. Solved or not. Common or weird

### Step 2

*Find ways to break down the problem*

As many as you can, using all 5 techniques

### Step 3

*Pick ONE breakdown to start issue tree*

MECE, insightful and efficient. The 2<sup>nd</sup> best is fine, no need to overthink

### Step 4

*Build rest of issue tree*

Break down first layer using the techniques. Do it again for as many layers as needed

### Step 5

*Evaluate your structure*

With others or by self-evaluating. This is the most important step

### Step 6

*Improve your structure*

To apply your learnings, this is how you get better

**Then do it again for another structure!**

*(The whole process takes about 20 minutes and is often more valuable than solving a case with a partner)*

# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees



How many structures can you come up with to structure that problem? One? Three? Six?

That's 13 structures!

For any given problem, you can **create MANY structures that fit**, all of them MECE, many of them good enough to impress your interviewer. And you can learn this skill by **understanding and practicing five simple patterns**, which I have nicely grouped in the image above.

There are **three core techniques that you must learn**. These are **“Algebraic structures”, “Process structures” and “Conceptual frameworks”**. The **other two**, **“Segmentations” and “Opposite words”** are easy to learn and will help you get out of **tricky situations**, but they **aren’t as important**.

**Conceptual frameworks** are by far the **toughest technique to master**. You should expect to spend quite a bit of time working with them because they’re also the most versatile tool out there (especially for **strategy** cases).

# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – 5 core structures overview



### The 2 minute recap to “The 5 Ways to be MECE”

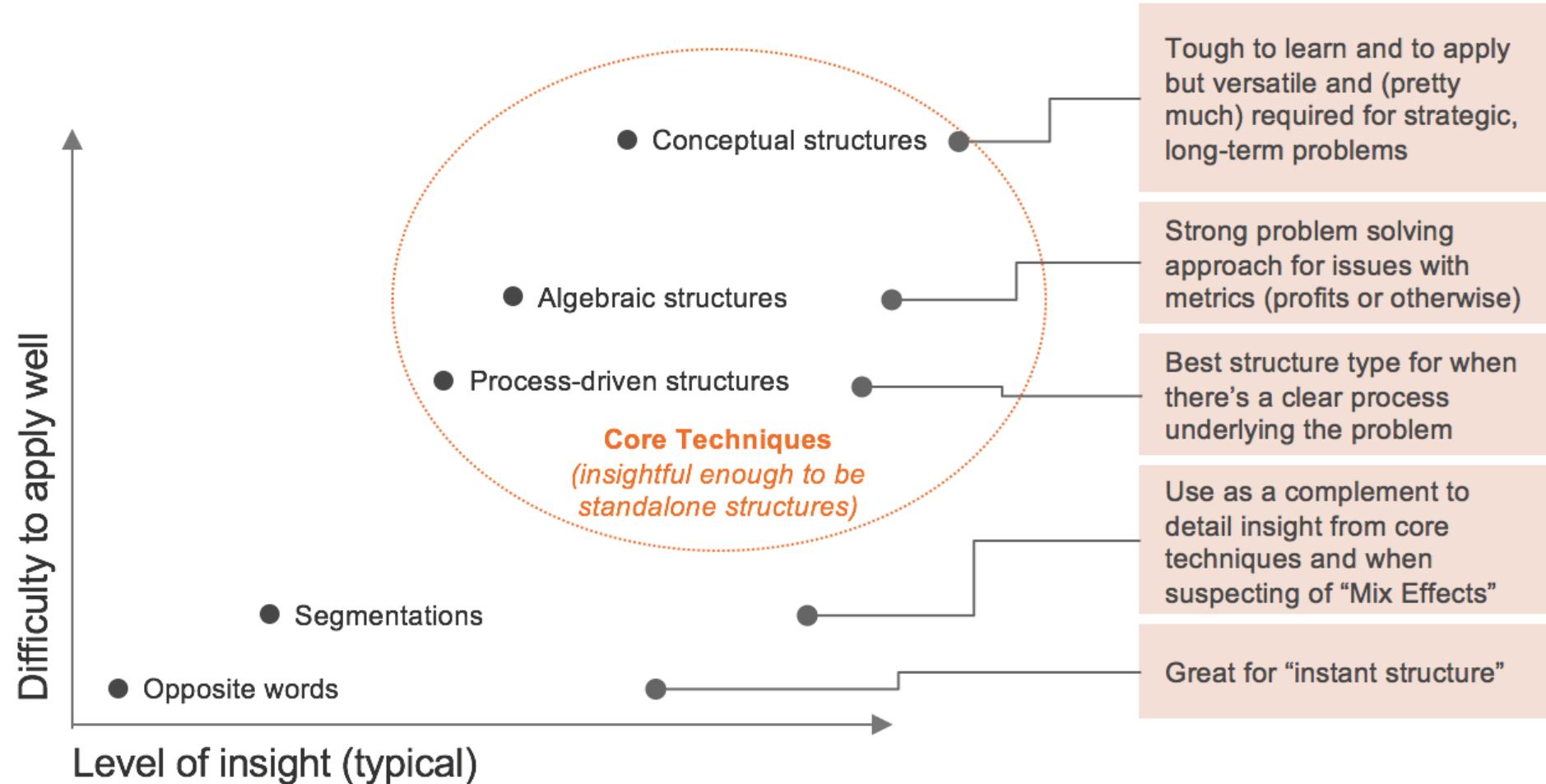
	Technique	What it is this technique like	A famous framework from each technique	Structuring the “how to increase store sales” problem using each technique
<b>Must learn</b>	Algebra Structures	A math equation derived from the drivers of a variable	The Profitability Equation: “Profits = Revenues – Costs”	Increase # of customers  Increase \$ spent per customer
	Process Structures	A break down of the problem’s underlying process into its stages	The Marketing Funnel: “Awareness -> Opinion -> Consideration -> Preference -> Purchase”	Increase store traffic  Increase % who pick up product  Increase % of pickers that buy  Increase \$ spent per buyer
	Conceptual Frameworks	A proven qualitative categorization of a problem’s parts	The 3Cs of Strategy: “Customers, Company, Competition”	Improve Product Portfolio  Improve Store Location /Visibility  Improve Prices  Improve Advertising/Awareness
<b>Toughest technique to master</b>	Segmentations	A “slicing up” of the problem into its visible parts	Customer segmentations: could be by Age, Region, Income Levels, etc.	Sell to non-buyers  Sell more to people who bought once  Sell more to people who bought more than once
<b>Tricky situations, easy but lack of insights</b>	Opposite Words	A Yin-yang-like division of the problem into its opposite, complementary parts	“Supply vs. Demand”; “Internal vs. External”; “Financial vs. Non-Financial”	Through marketing actions  Through non-marketing actions

# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – 5 core structures overview



*Not all basic structuring techniques are equally strong: some are more difficult, more insightful than others*



# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – 5 core structures overview



*Some of the possible MECE structures to answer the case “What are possible reasons for a Nespresso’s market share drop in the London’s coffee capsules market?”*

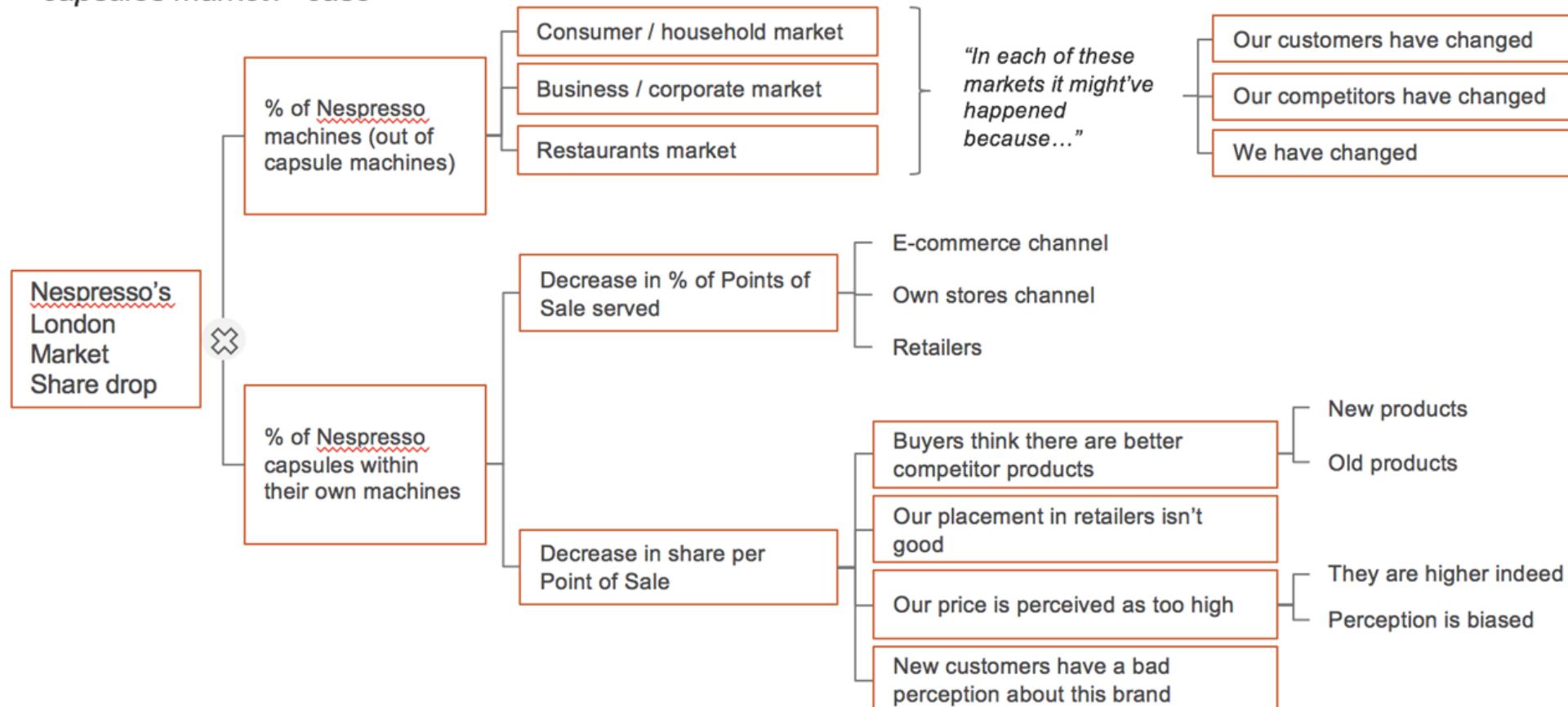


# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – 5 core structures overview



An example of an issue tree for the “What are possible reasons for a Nespresso’s market share drop in the London’s coffee capsules market?” case



# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – 5 core structures overview



An example of a poor issue tree for the “What are possible reasons for a Nespresso’s market share drop in the London’s coffee capsules market?” case



# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees - Summary



Part 1: Logic Tree Fundamentals

**Part 2: Techniques to build Logic Trees**

Part 3: Principles

### Summary:

1. 6 steps to build Logic Trees
2. 5 core structures for data analytics
3. Can combine many structures for analyzing

# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (1) Algebraic structures



### The 5 ways to be MECE – Algebraic Structures

$$y = x + (\sqrt{a} \times b \div c)$$

Difficulty to learn: ★★★★☆

**Limits:** Only use in problems in numerical variables (ex: profitability, not a yes-no decision).

**Risks:** Behind every number there's something going on in real life (we call these "qualitative"), many candidates get obsessed with the numbers and never go that deep.

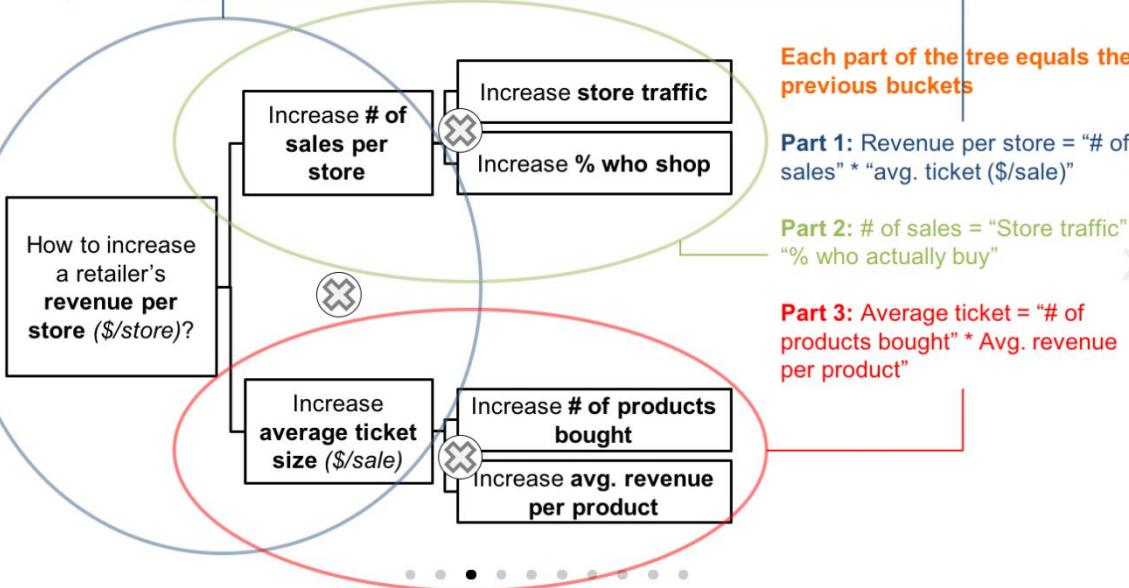
**Use when:** These structures are super strong for short-term numerical problems. If you have a problem of this type and find it difficult to find a formula, consider using a Process structure. If it's a long-term problem, consider using a Conceptual framework.

# Data Analytics Problem Solving

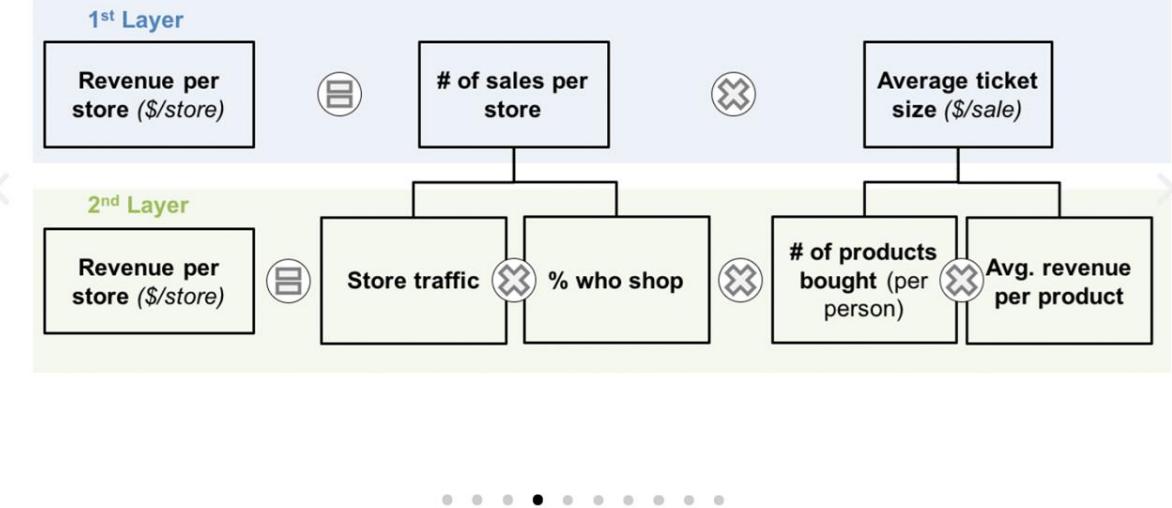
## Part 2: Techniques to build Logic Trees – (1) Algebraic structures



### Example: an applied “math tree”

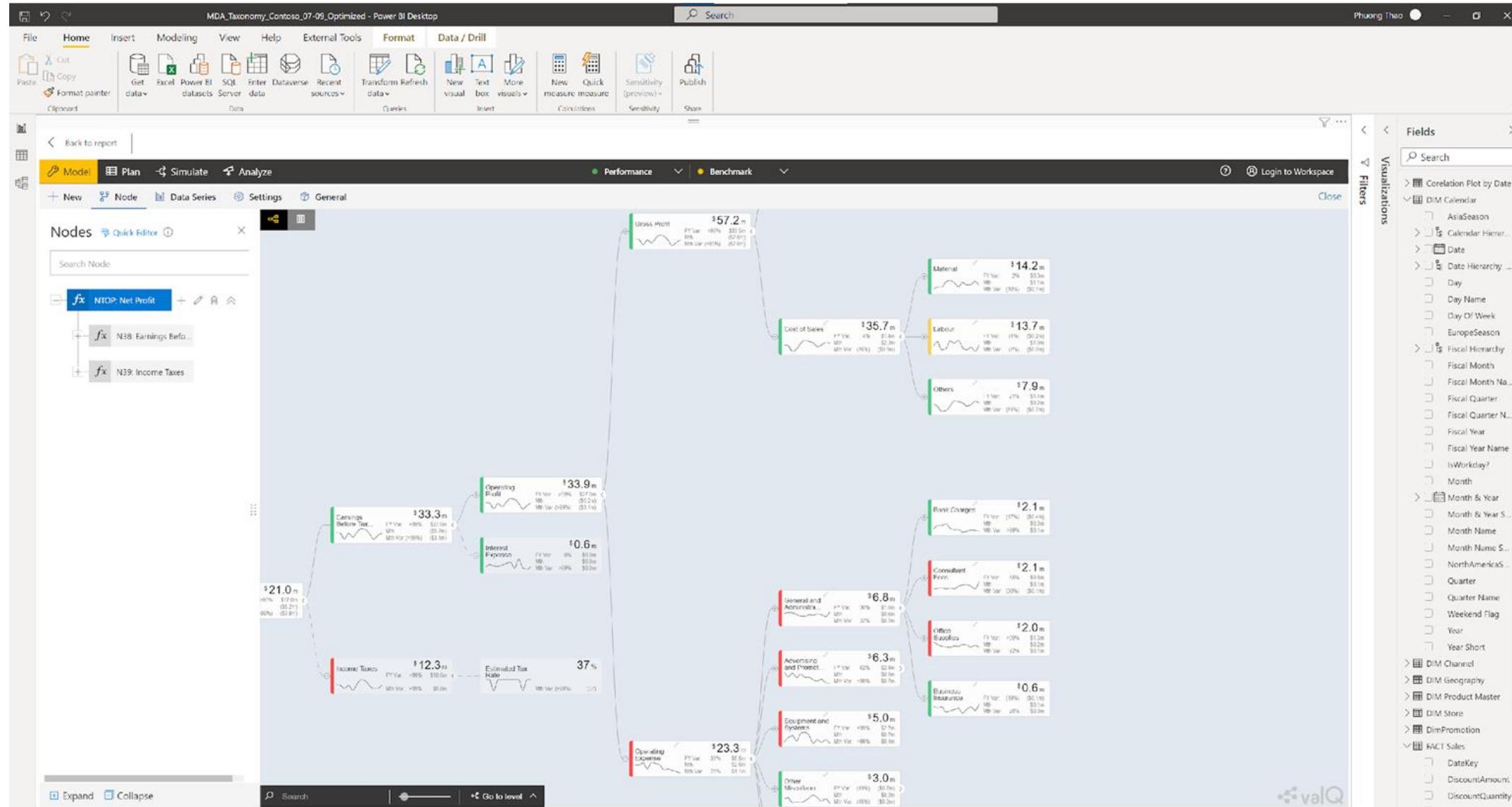


### Another way to visualize it...



# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (1) Algebraic structures

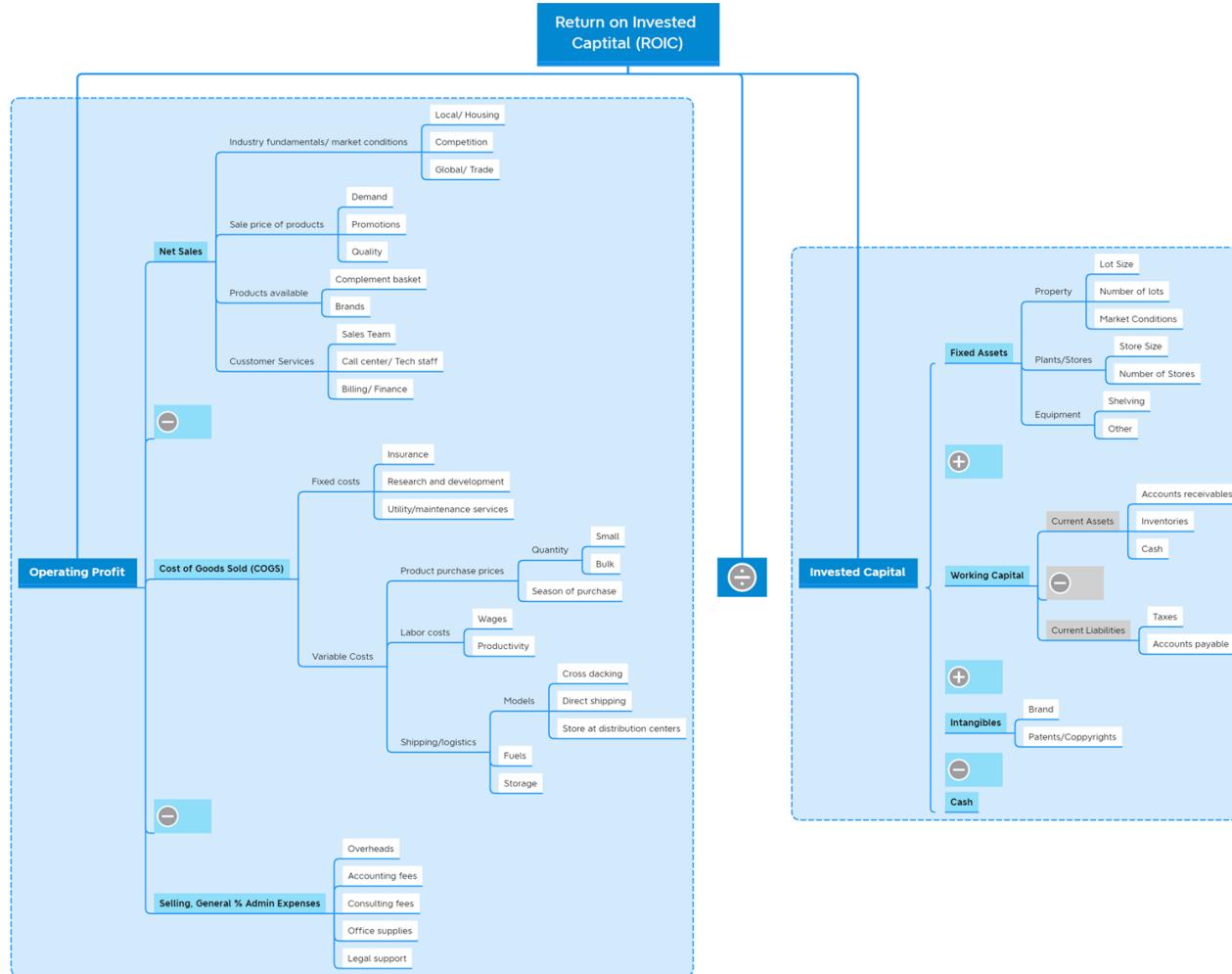


# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (1) Algebraic structures



There is **no absolute right or wrong way to construct trees (maybe have many formulas)**.

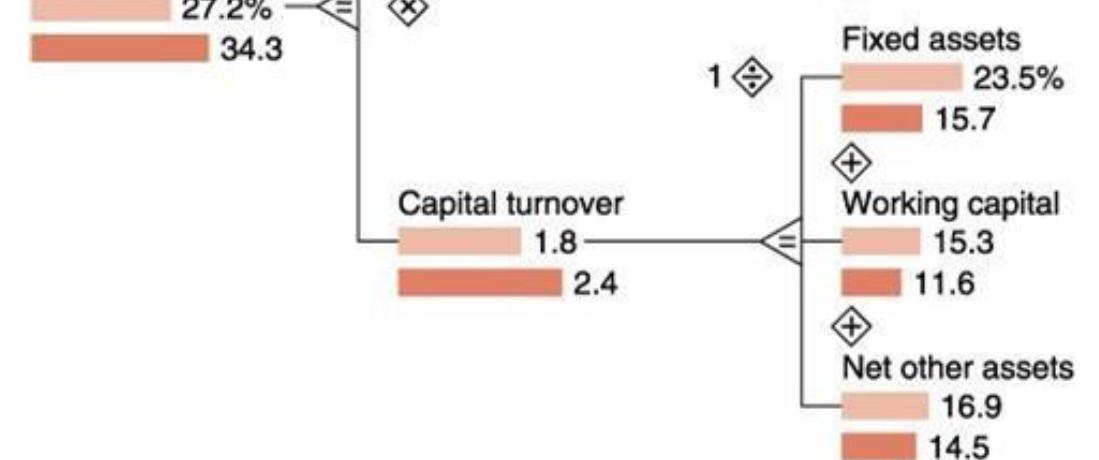


ROIC tree of Company X versus the competition

Company X  
Competitor's average

Pre-tax ROIC  
27.2%      34.3

Return on sales  
15.1%      14.3



# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (1) Algebraic structures



Most people see them done and think they can **easily do it**, but it all goes downhill when they actually grab a piece of paper and attempt to do these trees. So, here are **four methods** to actually create your “mini-equations” to break down each bucket:

- #1. Use a proven formula**
- #2. The "Dimensional Analysis" method**
- #3. The Funnel method**
- #4. Use a sum of segments**

# Data Analytics Problem Solving

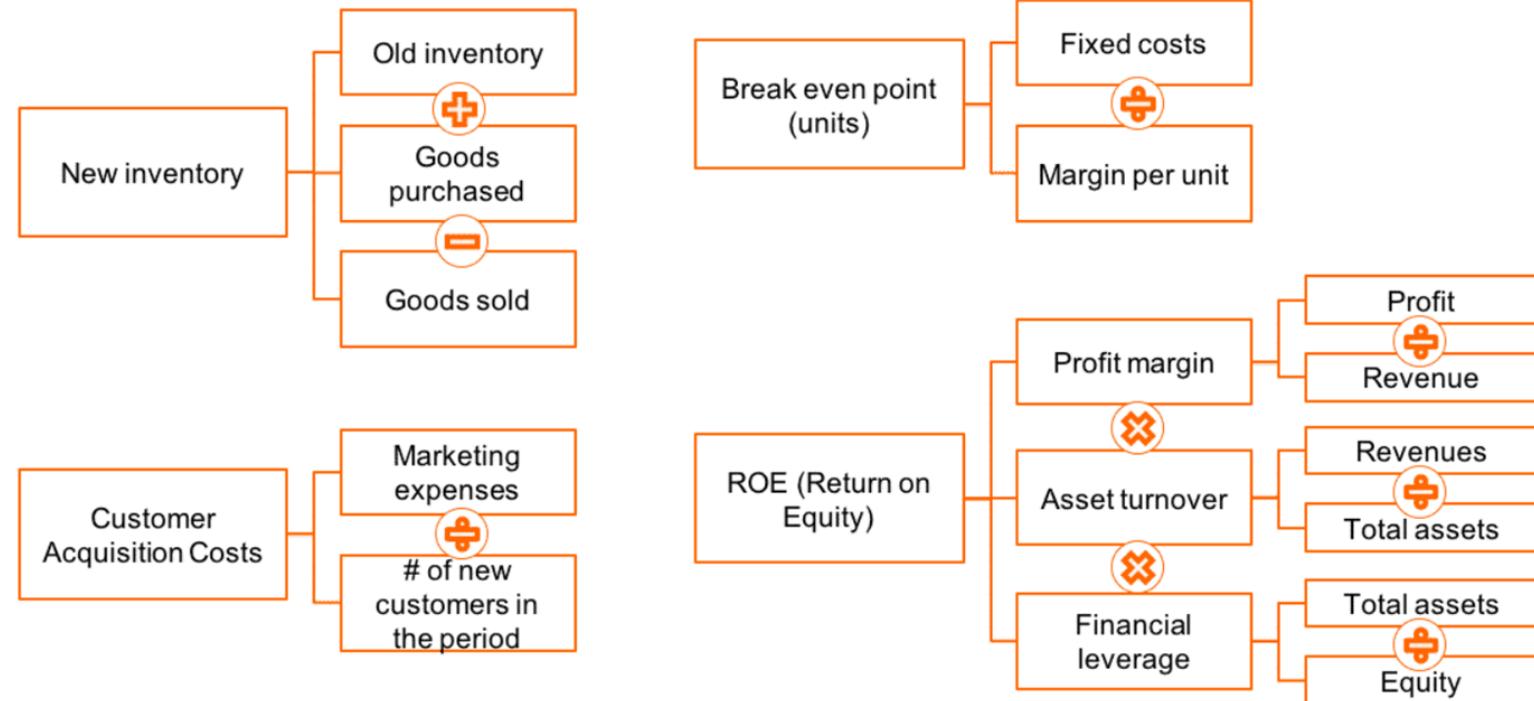
## Part 2: Techniques to build Logic Trees – (1) Algebraic structures



### #1. Use a proven formula

Most of the time you **don't need to reinvent the wheel**. If you know a formula that fits the problem well, **just use it!**

#### Examples of proven formulas to rely on



# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (1) Algebraic structures

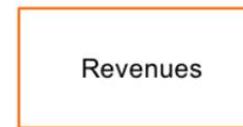


### #2. The "Dimensional Analysis" method

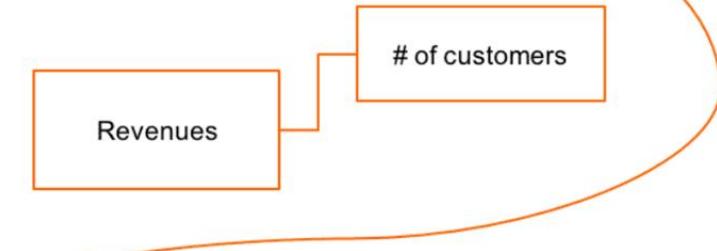
This method is amazing because it lets you **break down almost any metric** into a formula really quickly – the only thing to be careful with is to not lose meaning in the process and end up with a formula that is mathematically right but doesn't make any sense to actual human beings.

**How to use the dimensional analysis method to break down any metric into a formula...**

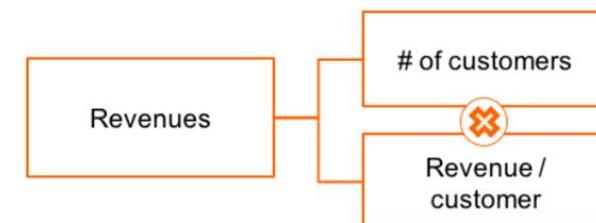
**Step 1: Define the metric you want to break down**



**Step 2: Find ONE “driver” – a numerical “cause” of that number**



**Step 3: Find its “mathematical complement” to multiply your first metrics with**



$$\text{Revenue} = \# \text{ of customers} * \frac{\text{revenue}}{\text{customer}}$$

# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (1) Algebraic structures



### #2. The "Dimensional Analysis" method

**Product Centric:** Revenue = Quantity \* Price

**Sale Centric:** Revenue = # of Sales \* Avg. Ticket

**Customer Centric:** Revenue = # of Customers \* Revenue per Customer

# Data Analytics Problem Solving

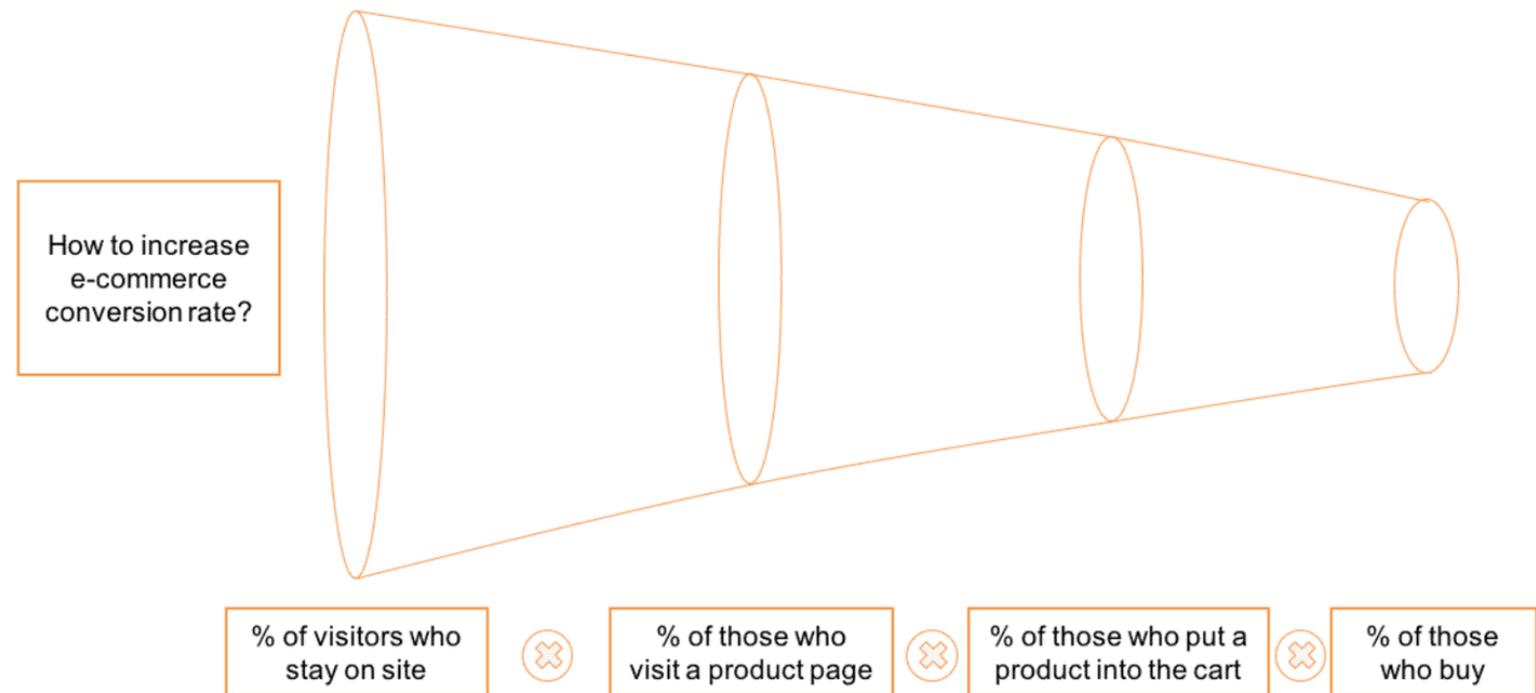
## Part 2: Techniques to build Logic Trees – (1) Algebraic structures



### #3. The Funnel method

This works wonders when the target metric is a percentage or is **the end result of a funnel**. Funnels are everywhere: Sales, Product Development, Process Optimization. All you have to do is to find these funnels and then break them into stages.

#### Example of the funnel method



# Data Analytics Problem Solving

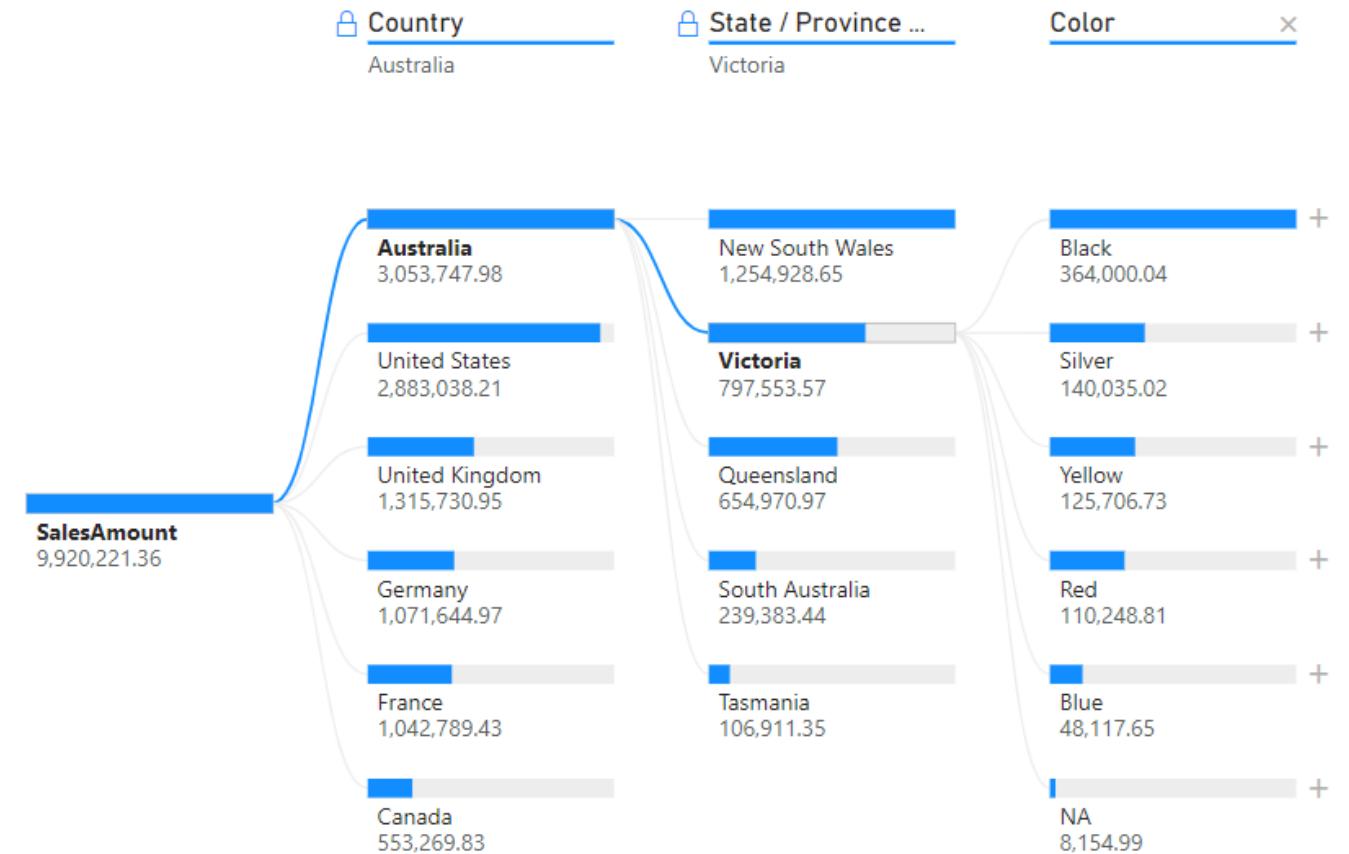
## Part 2: Techniques to build Logic Trees – (1) Algebraic structures



### #4. Use a sum of segments

This is my least favorite method because it **doesn't go too much into the structure of the problem, but simply slices it out.** However, it can be useful. For example, if you're working with a conglomerate and their profits are down, it might be useful to **segment that conglomerate into its different businesses.**

Or if you're trying to understand a company's **market share drop** in a certain category, it might be useful to just **break it down** into the market shares of its **product lines.**

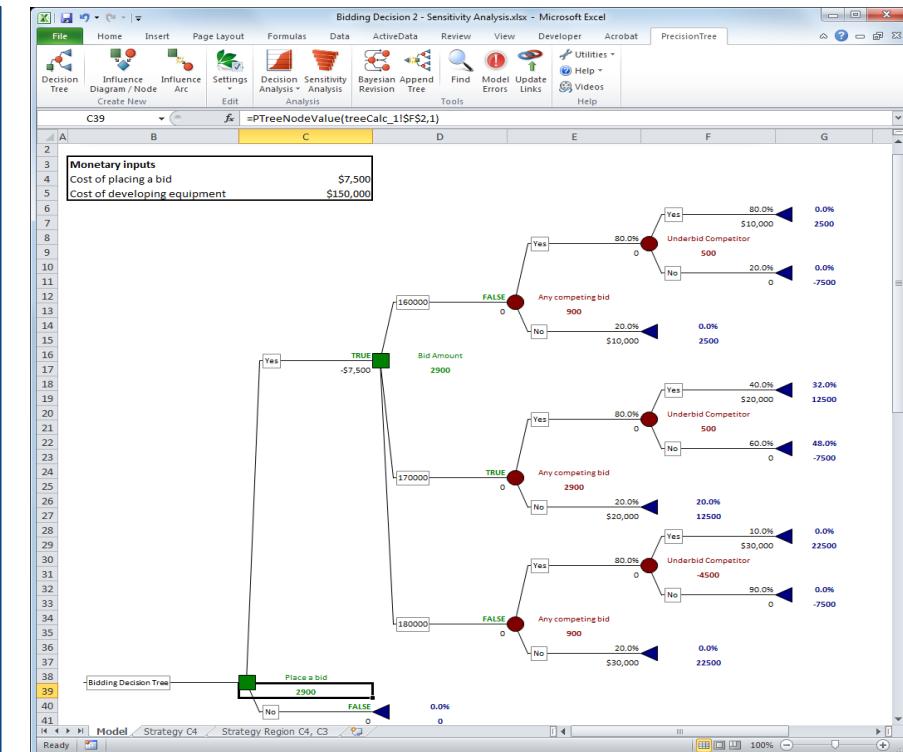
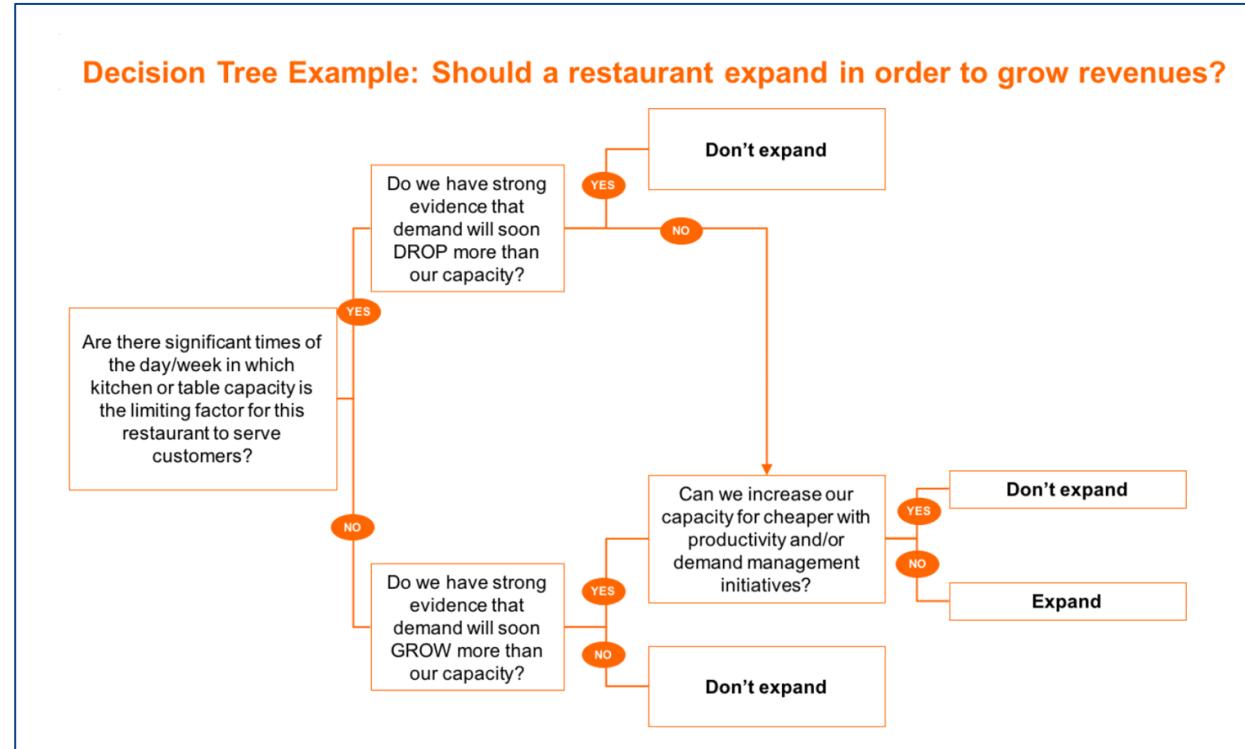


# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (1) Algebraic structures



If you wanna go a step further you can use what they call “**boolean operators**”: **AND functions**, **OR functions and so on**. And if you want to go a third step further, you can use “conditional operators”, the most famous of which are IF functions. **Decision Trees** are basically regular Issue Trees with “conditional operators”, **IF-THEN functions**.

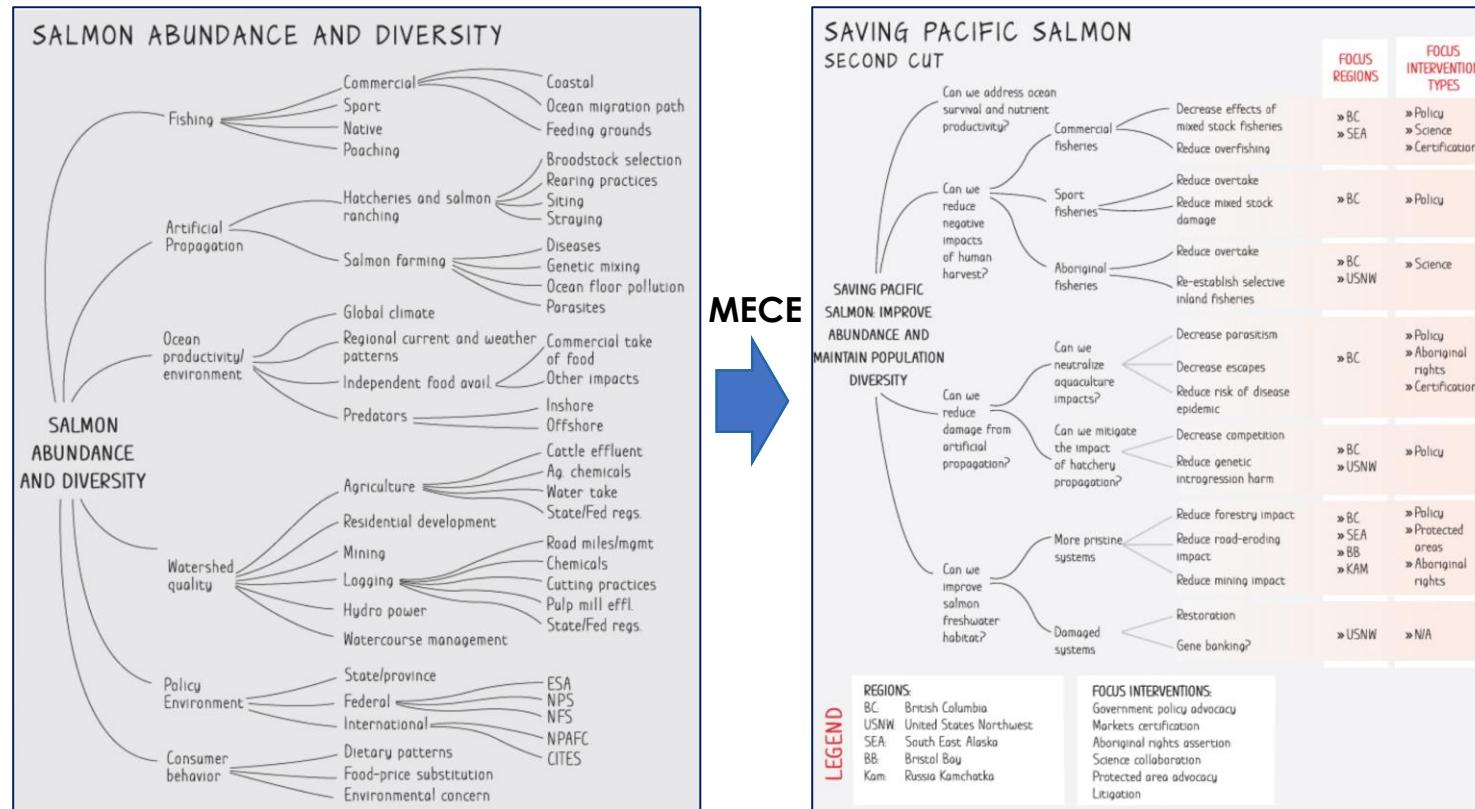


# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (1) Algebraic structures



### OR functions: Develop Hypothesis Tree

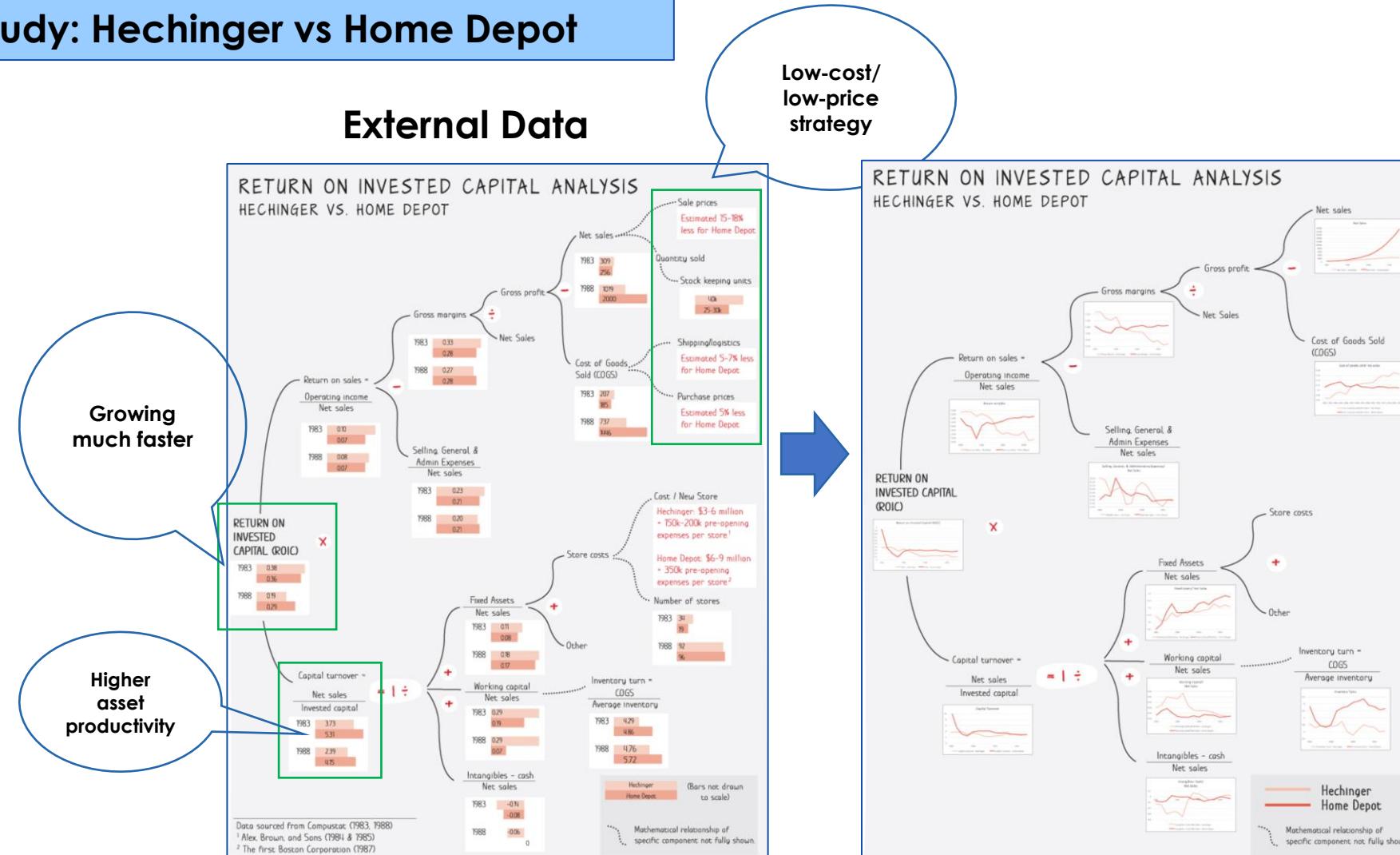


# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (1) Algebraic structures



### Real case study: Hechinger vs Home Depot



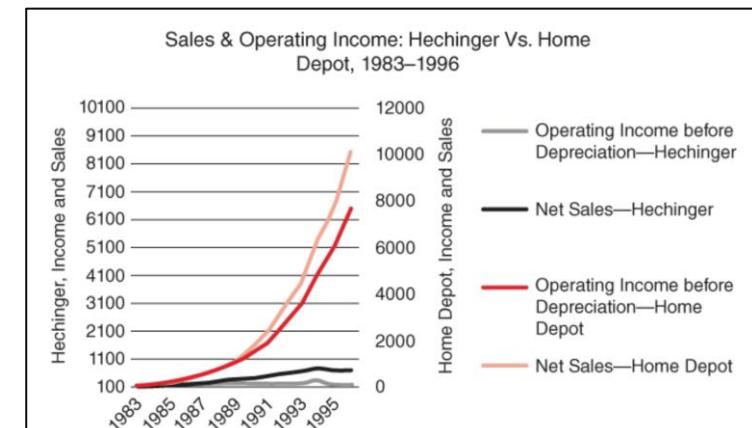
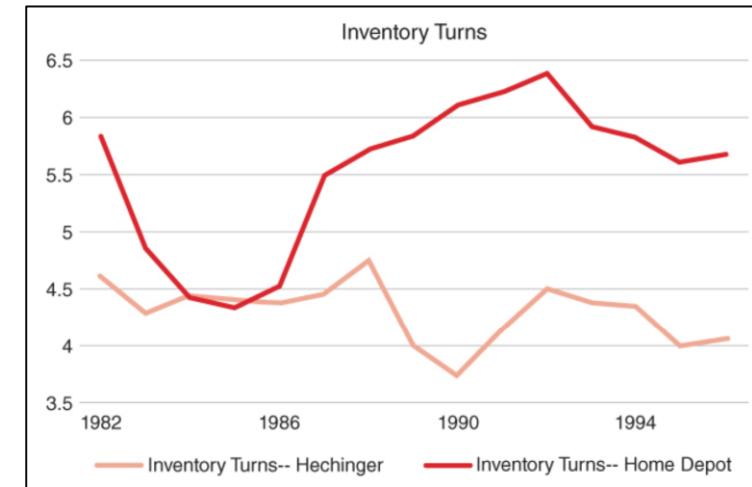
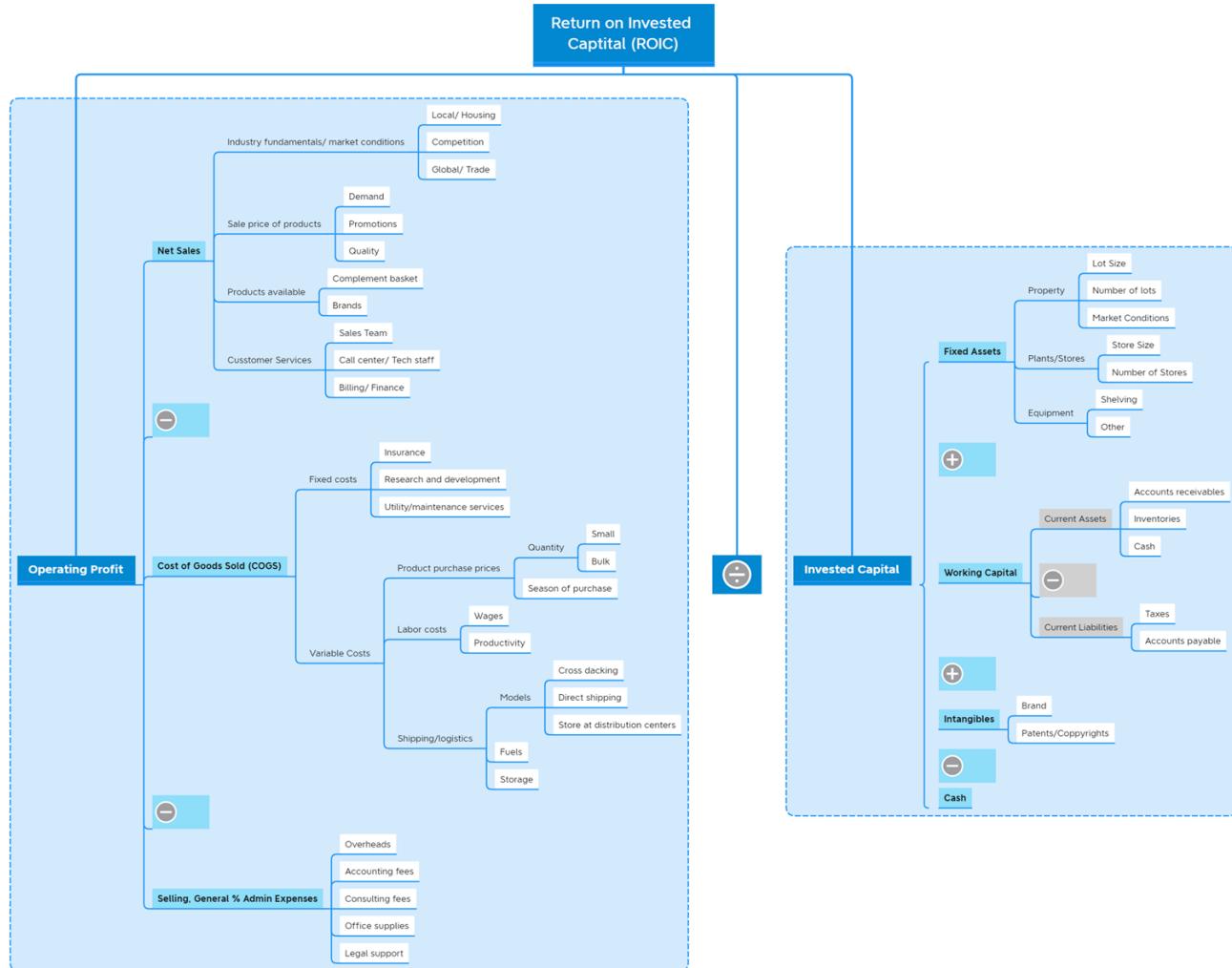
# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (1) Algebraic structures



### Internal Data

Generalized  
version



# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (1) Algebraic structures

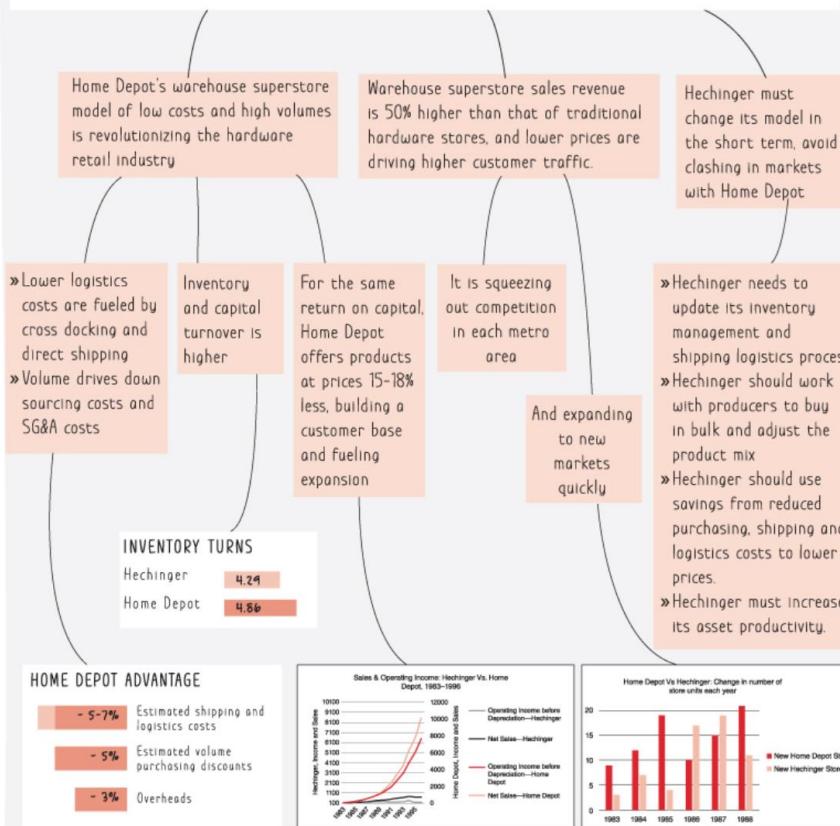


### HECHINGER DRAFT STORYLINE

**RESOLUTION:** Hechinger must work to develop and implement a lower cost, higher volume hardware retail store model to compete in markets which Home Depot is in or planning to enter.

**SITUATION:** A new warehouse superstore model has emerged and is planning expansion concurrent with Hechinger's expansion and into Hechinger's markets.

**OBSERVATION:** Home Depot is able to price 15% lower, has higher asset turns and is growing revenue very quickly.



# Data Analytics Problem Solving

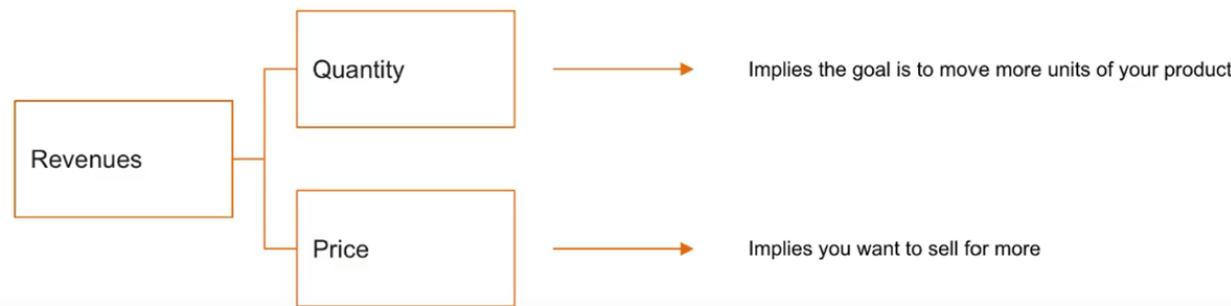
## Part 2: Techniques to build Logic Trees – (1) Algebraic structures



**Same as  $P^*Q$ :**

- Consulting Revenue Model (Example) = # of Projects (X) Revenue per project
- Website Revenue Model (Example) = # of Visitors (X) Revenue per Visitor

*First: Understand  $P^*Q$*



iPhone example

**“Product Centric Models”:  $P^*Q$**

- Cross Sell (Combo)
- Increase
- Increase price, not drop quantity too much
- Upsell (128GB->256GB)

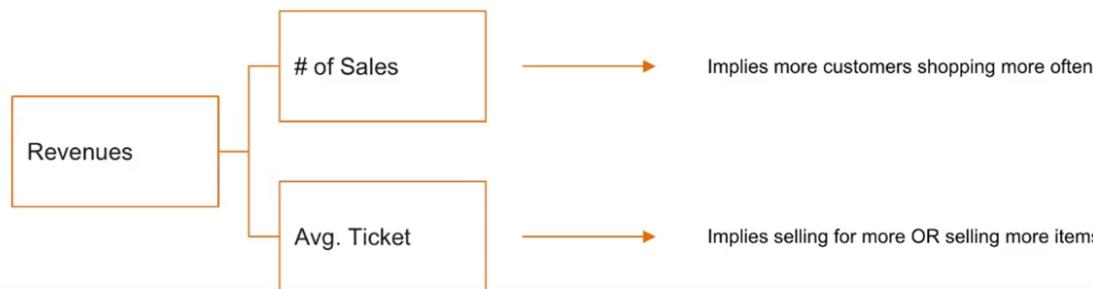
# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (1) Algebraic structures



### 3 Alternative Revenue Models

The Sales-centric model



Supermarket example

### “Product Centric Models”: P\*Q

Beyond P\*Q model

#### 1. “Sale Centric Models” (Transaction approach)

- Good products portfolio => increase traffic
- Not selling more products => moving more units
- More items
- Product centric model is not meaningful:
  - Sell more products=> sell more transactions
  - Higher price=> optimize revenue of each sale
    - Example No.1 : push products close to the cashier => sale more items than it is sale items for a higher price
    - Example No.2 : loyalty program
    - Example No.3 : good portfolio products => visit more often

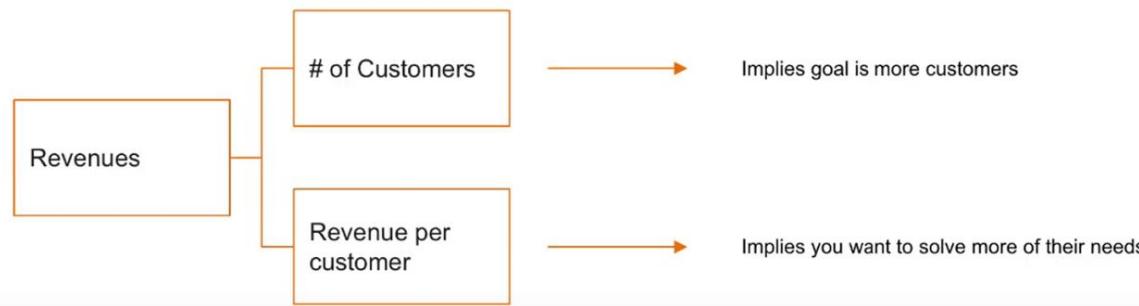
# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (1) Algebraic structures



### 3 Alternative Revenue Models

*The Customer-centric model*



Apple example

### "Product Centric Models": P\*Q



Beyond P\*Q model

### 2. "Customer Centric Models" (longer-time view of the sales centric models)

- Could be Supermarket/ Retailer
- Example No.1 : Amazon developed different types of products: Kindle, Amazon Prime, they do their own publishing => can publish books or can buy as well
- Example No.2: Iphone/ Macbook/ Apple Store Subscribe/iCloud (when develop 1 product => think ecosystem products)

# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (1) Algebraic structures



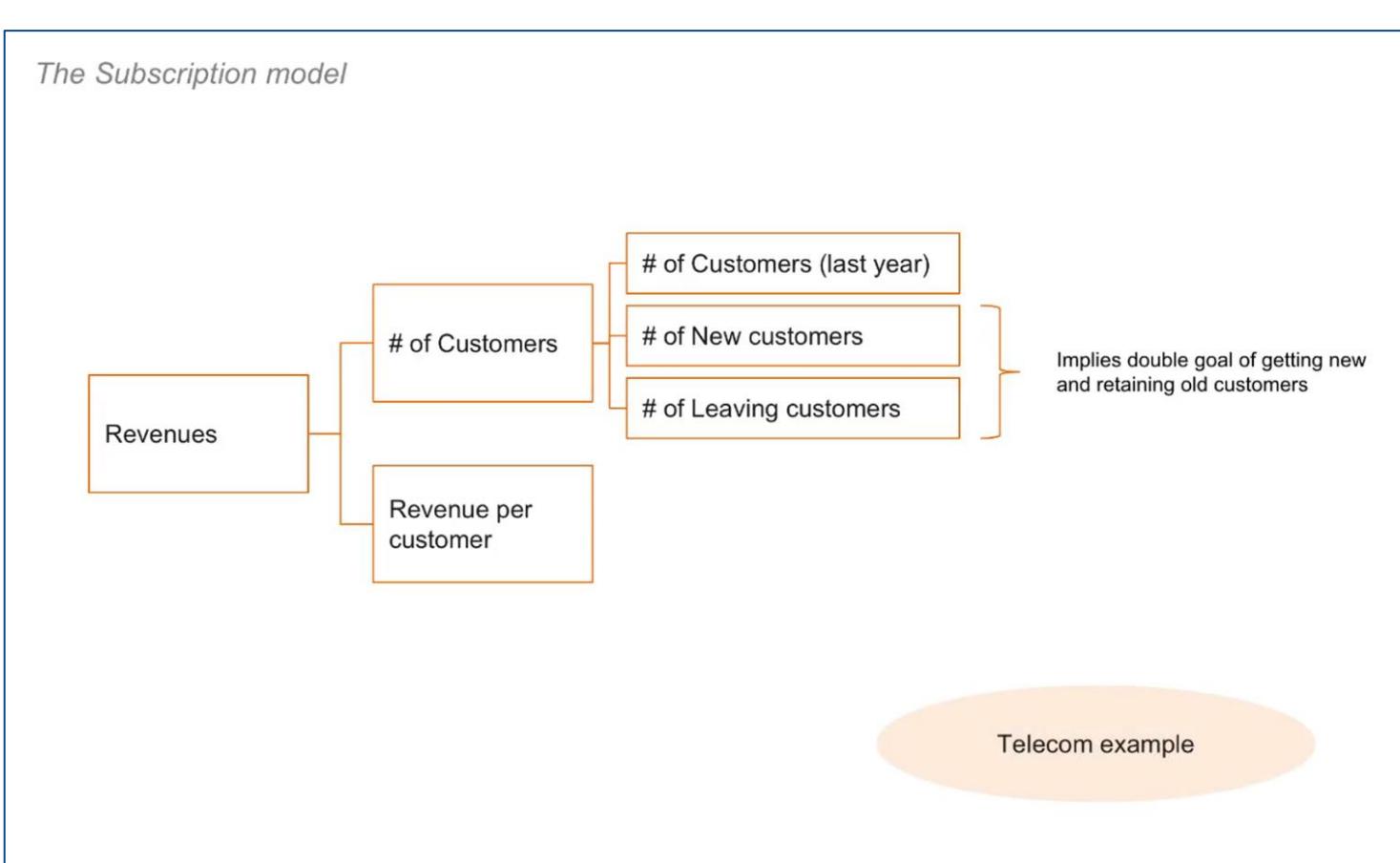
"Some businesses are better off using a customer-centric revenue model, others will thrive more in a more 'transactional' approach"

# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (1) Algebraic structures



### 3 Alternative Revenue Models



### "Product Centric Models": P\*Q



### 3. Subscription model

- In Subscription model your main concern is how to retain customers then you have secondary concern of how to get new customers and how to make your current customer spend more.
- Ex: Netflix does their strategy they've not created new products so that you can buy more from them, they worried about keeping you within the Netflix ecosystem so they do all these new movies TV series that they don't charge anything more for you because their main concern is to keep you on their platform, keep you on their recurring revenues so they have a healthy business (this is slightly different way to see the business)

# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (1) Algebraic structures



"There are several mathematically right, MECE ways to break down revenues but each is more meaningful in a situation than the others"

Ex: Amazon: Sale Centric Model or Customer Centric Model

# Data Analytics Problem Solving

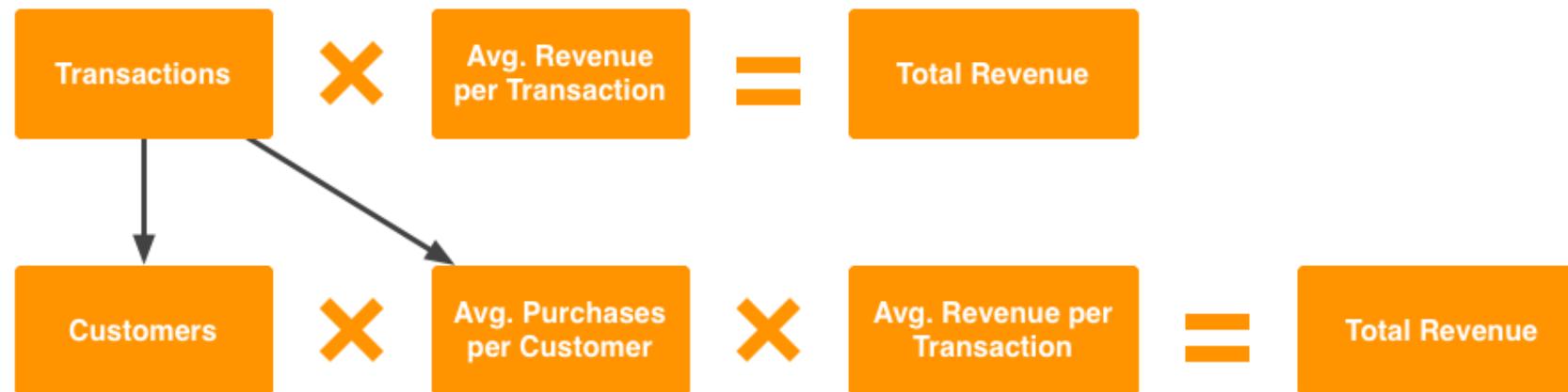
## Part 2: Techniques to build Logic Trees – (1) Algebraic structures



Revenue was driven by essentially the same **three factors**:

- the **number of customers** making purchases,
- the **number of purchases** that those customers make, and
- the **size of those purchases**.

Simple Revenue Model

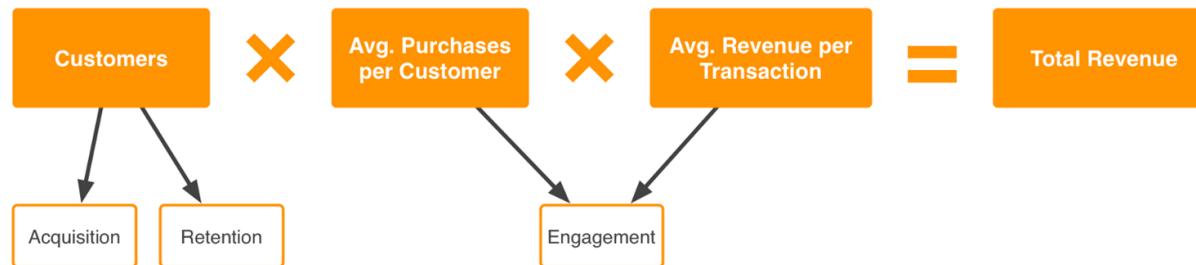


# Data Analytics Problem Solving

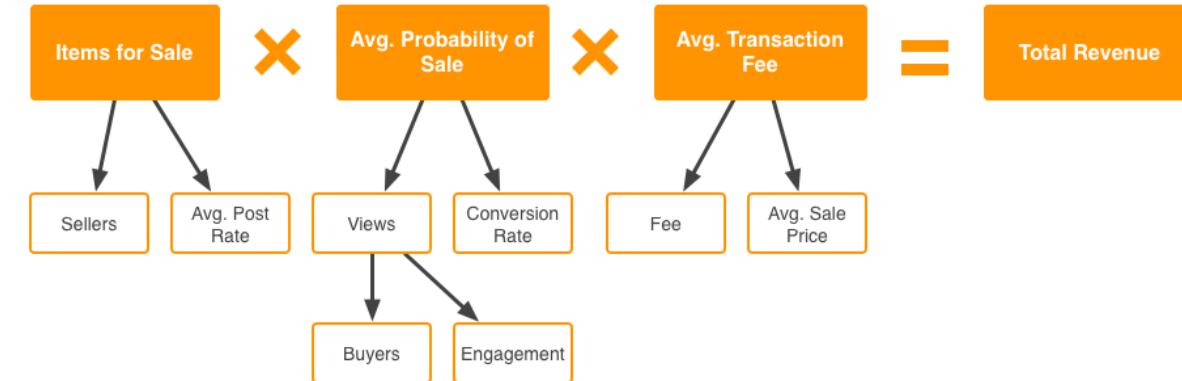
## Part 2: Techniques to build Logic Trees – (1) Algebraic structures



How the Customer Lifecycle Drives the Revenue Model

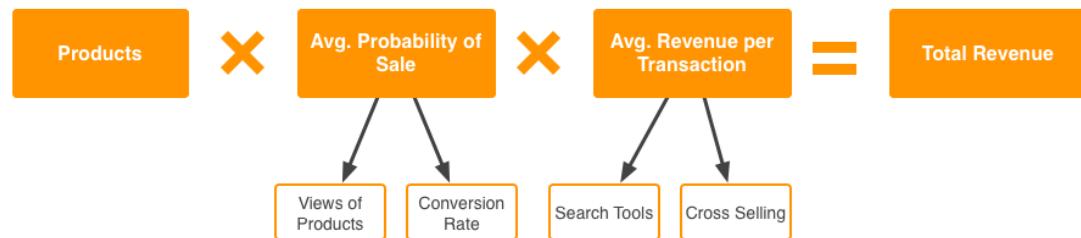


Marketplace Revenue Model

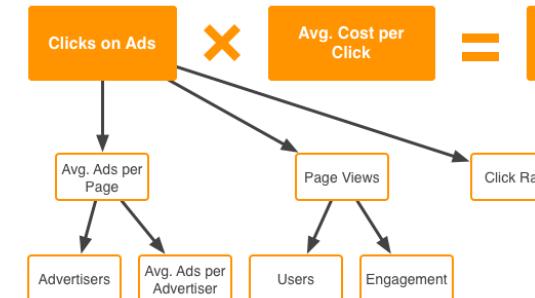


Copyright 2017 GrowthzillaBook.com

E-Commerce Revenue Model



Community or User Generated Content Revenue Model



SaaS Revenue Model



# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (1) Algebraic structures



**Resource:** <https://medium.com/growthzilla>

### 2.1.1 Understanding Your Customers' Journey

To identify the opportunities for growth along the customer lifecycle, it is first important to understand the customer's experience...

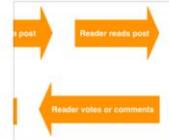
 **Kimmy Paluch**  
Jun 21, 2017 · 8 min read



### 2.1.2 Modeling Your Business for Growth

If there is one concept that we hope to convey, it is that fostering growth for your product should be systematic and strategic rather than...

 **Sergio Paluch**  
Jun 22, 2017 · 7 min read



### 2.1.3 Common Revenue Growth Models

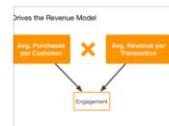
When modeling a business, it's best to begin with its core: how it generates revenue. By starting at the most fundamental level, you can...

 **Sergio Paluch**  
Jun 24, 2017 · 8 min read



### 2.1.4 Customer Growth Models

In the previous section we covered common revenue growth models to understand how companies make money on different types of products. In...



### 2.2 The Customer Lifecycle

Let's review the customer lifecycle before we dive too deeply into strategy since it will serve as the basis for a lot of the concepts in...

 **Sergio Paluch**  
Jul 7, 2017 · 14 min read



### 2.3 Strategizing and Prioritizing Experiments

This post is part of the Growthzilla Book series, which is an online draft of the print edition that will be available in 2018.

 **Sergio Paluch**  
Jul 13, 2017 · 4 min read



### 2.4 Running Successful Growth Experiments

By utilizing experimentation to help us decide if changes to product, marketing, and operations are effective, we avoid having to rely...



 **Sergio Paluch**  
Jul 15, 2017 · 10 min read

### 2.5 Iterating on Previous Growth Experiments

A key part of the growth science methodology is iteration. It's not enough to form one hypothesis, test it, and implement a change. If you...



# Data Analytics Problem Solving

Part 2: Techniques to build Logic Trees –  
(1) Algebraic structures



<https://1.1.1.1/>

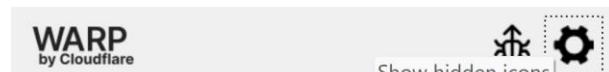


**WARP**



Connected

Your Internet is **private**.



1.1.1.1

**The free app that makes  
your Internet safer.**

**Now available for even more devices.**



[macOS Installation Instructions](#)



[Windows Installation Instructions](#)



[Linux Installation Instructions](#)



# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (1) Algebraic structures



The screenshot shows the homepage of [www.worldline.technology](https://www.worldline.technology). The background features a vibrant, colorful nebula or galaxy image. On the left, there's a vertical sidebar with large, bold letters spelling "DATA DRIVEN". At the bottom of this sidebar is a white button labeled "REQUEST". The main navigation bar at the top includes links for Home, Documents, Copy of Documents, Article, Products, and Contact. A search bar with a magnifying glass icon is positioned above the navigation. To the right of the navigation, there's a large image of an astronaut floating in space. Overlaid on this image is a large, bold text message: "DO YOU FEEL DISMAYED? OR ARE YOU UPTATED? INFORMATION TO PROCESS GROWTH WITH TECHNOLOGIES & INNOVATIONS". Below the main content area, there's a sidebar with a list of download links:

- Download - SpeedUp Your Digital Business
- Download - Ogilvy Trends 2019
- Download - Build the AI Business Case
- Download - Deloitte Insight 2019
- Download - Future Of Marketing
- Download - Guide Content Marketing
- Download - Harvard Business Review
- Download - Way To Success In E-Commerce
- Download - 10 Hot Consumer Trends
- Download - Eat, Drink & Be Healthy
- Download - Vietnam Consumer Trends
- Download - 2019 Social Media Report
- Download - Gen Z Is Not The Big Thing
- Download - Elon Musk
- Download - 13 Trends Shaping Beauty
- Download - 6 Trends For Next 25 Years
- Download - The Transformation Of Marketi
- Download - Key Elements Of The Digital
- Download - Retail In Viet Nam

At the very bottom left, a URL is visible: <https://www.worldline.technology/featured-content>.

# Data Analytics Problem Solving

Part 2: Techniques to build Logic Trees –  
(1) Algebraic structures - Application Profit



# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (2) Process structures



### The 5 ways to be MECE – Process Structures



Difficulty to learn: ★★★☆☆

**Limits:** Only use in problems that follow a predictable process (ex: manufacturing, not business strategy).

**Risks:** It is common to overlook an important part of the process, especially when lacking business sense and asking few questions. In this case your structure won't be exhaustive.

**Use when:** There is clearly a process underlying the problem / issue. Examples of these are manufacturing, sales and hiring. If you have reason to hypothesize that only part of the process is key to the issue, there's an even stronger reason to use this type of structure

The great thing about processes is that they **have a beginning**, some steps in the **middle** and then **an end**. **Breaking down any problem that has an underlying process into its steps is a sure way to be MECE**. You can't miss a thing because you're covering the whole process and everything happens within that contained reality.

# Data Analytics Problem Solving

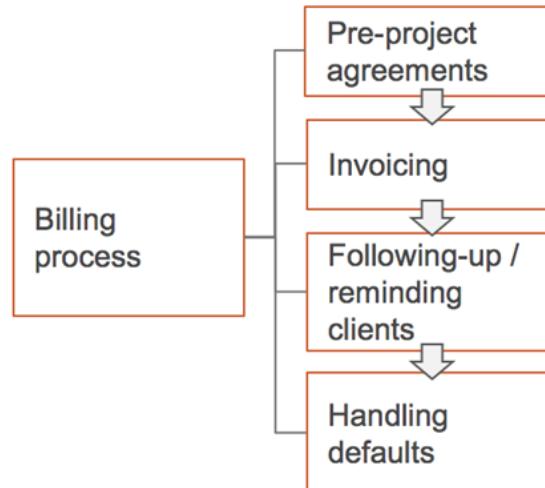
## Part 2: Techniques to build Logic Trees – (2) Process structures



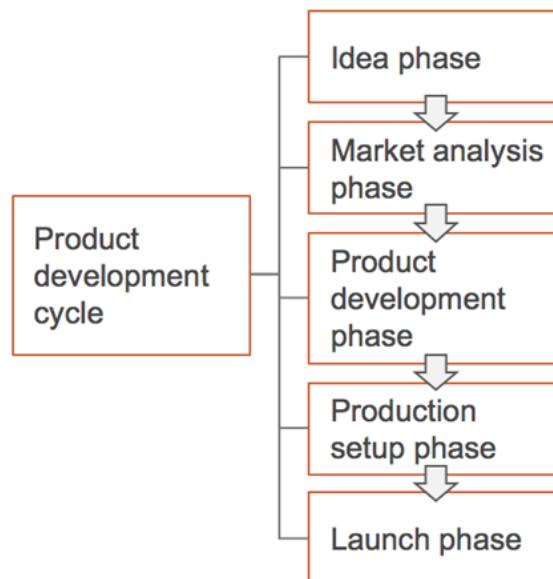
Here are a few examples of how you can **break down the problem's underlying process** to have a clear, MECE structure to solve different problems:

*Examples of how breaking down a process may help you structure your case questions*

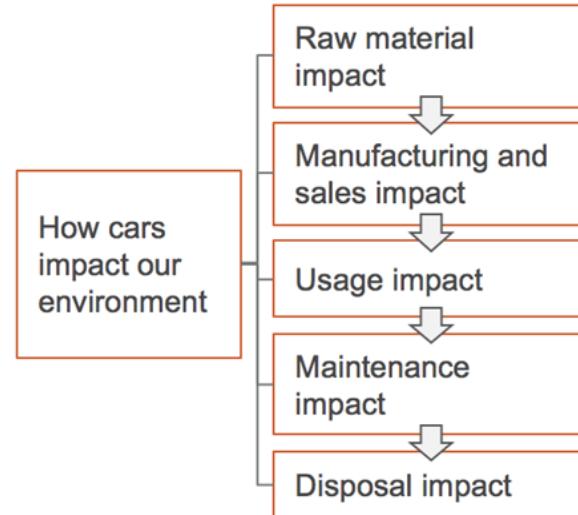
How can a consulting firm reduce its cash collection cycle (time to receive payments)?



Why are our competitors launching new products much faster than us?



How would you assess how large is the environmental impact of cars in our society?

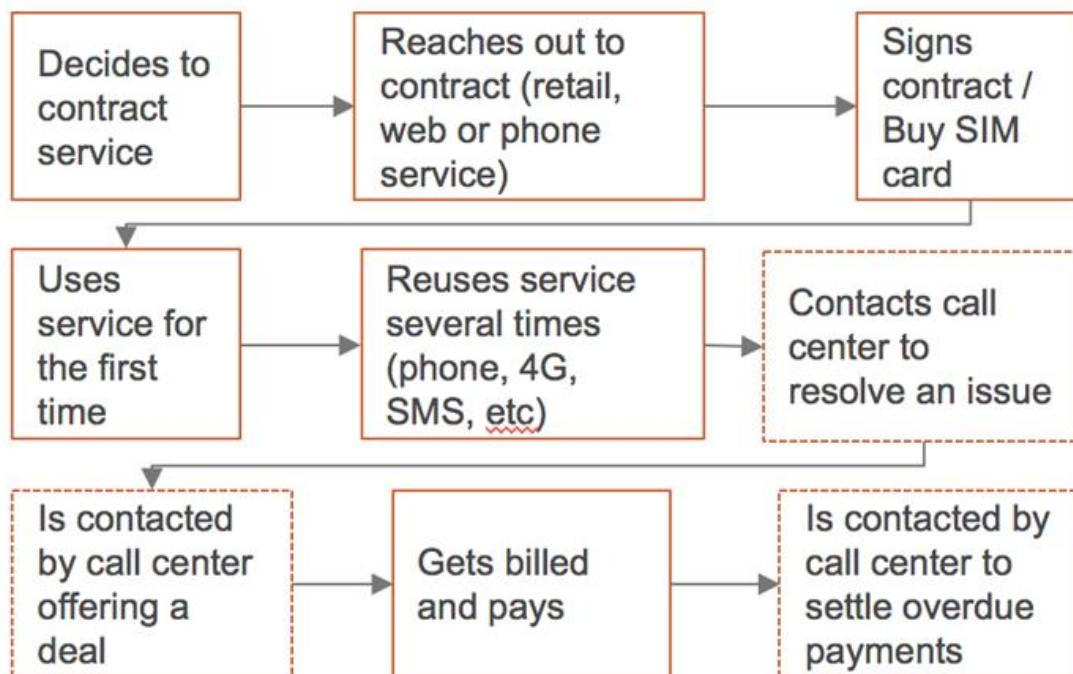


# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (2) Process structures



### How a customer interacts with a mobile<sup>1</sup> provider



### Reasons why customer satisfaction has dropped

- Satisfaction on contracting service
  - Hard to contract
  - Conditions / plans aren't clear
  - Conditions / plans aren't desired
  - Hard to setup for first usage
- Satisfaction with usage
  - Poor coverage
  - Lots of call drops
  - Unavailable / slow internet
  - Unsatisfied with other services
- Satisfaction with call center
  - Support staff can't solve problems
  - Support is unavailable / takes too long to answer
  - Too many marketing calls
- Satisfaction with billing
  - Payment process is complex / takes time
  - Bills come with errors
  - Overdue payments contact is too harsh with small matters

<sup>1</sup> I've limited to mobile, but it work work as well for a full service telecom company (although it would be more complex)

# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (3) Conceptual Frameworks



But **some problems aren't numerical problems nor processes**. Even if you practice mind-stretching, you can't really find an underlying process to it. Or maybe it's a **long-term problem**, and the qualitative issues and interrelationships between the parts are more important than the parts themselves. What do you do, then?

Then it's time to use the third **core structuring technique**. A technique so powerful you can arguably solve any case through it, but **difficult enough to take more time to learn than all others combined, conceptual frameworks are their name.**

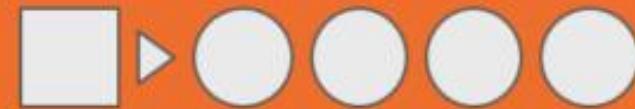
Conceptual frameworks are the hardest type of structure to achieve a MECE result, but using them is essential to many cases. **If the problem cannot be broken down as a formula or as a process, conceptual structures are pretty much the only way to go.** And even some cases that could be structured using algebra or as a process would be a better fit for a conceptual framework.

# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (3) Conceptual Frameworks



### *The 5 ways to be MECE – Conceptual Frameworks*



**Difficulty to learn:** ★★★★★

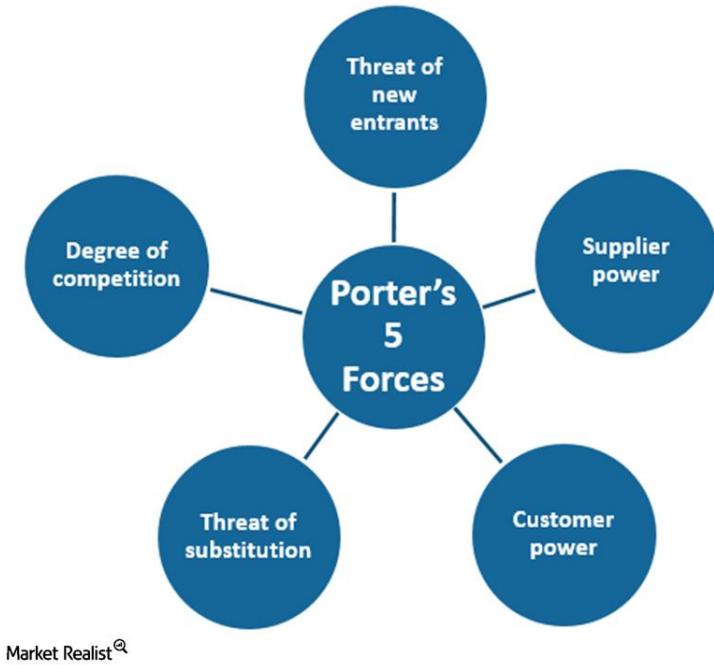
**Limits:** You need to know a framework specific to your situation.

**Risks:** Using a framework that does not apply, being unable to adapt it to the specifics of your situations and not being able to connect it to algebra and process structures. The last two are usually symptoms of not understanding your framework well enough.

**Use when:** These are the most insightful but hardest to use. They're great for qualitative problems and long-term problems, where quantitative data is unavailable or unreliable. They aren't good for diagnostics.

# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (3) Conceptual Frameworks



### Threat of New Entry

- Time and cost of entry
- Specialist knowledge
- Economies of scale
- Cost advantages
- Technology protection
- Barries to entry

Threat of  
New Entry



Supplier  
Power



### Supplier Power

- Number of suppliers
- Size of suppliers
- Uniqueness of service
- Your ability to substitute
- Cost of changing

### Threat of Substitution

- Substitute performance
- Cost of change



### Competitive Rivalry

- Number of competitors
- Quality differences
- Other differences
- Switching costs
- Customer loyalty



### Buyer Power

- Number of customers
- Size of each order
- Differences between competitors
- Price sensitivity
- Ability to substitute
- Cost of changing

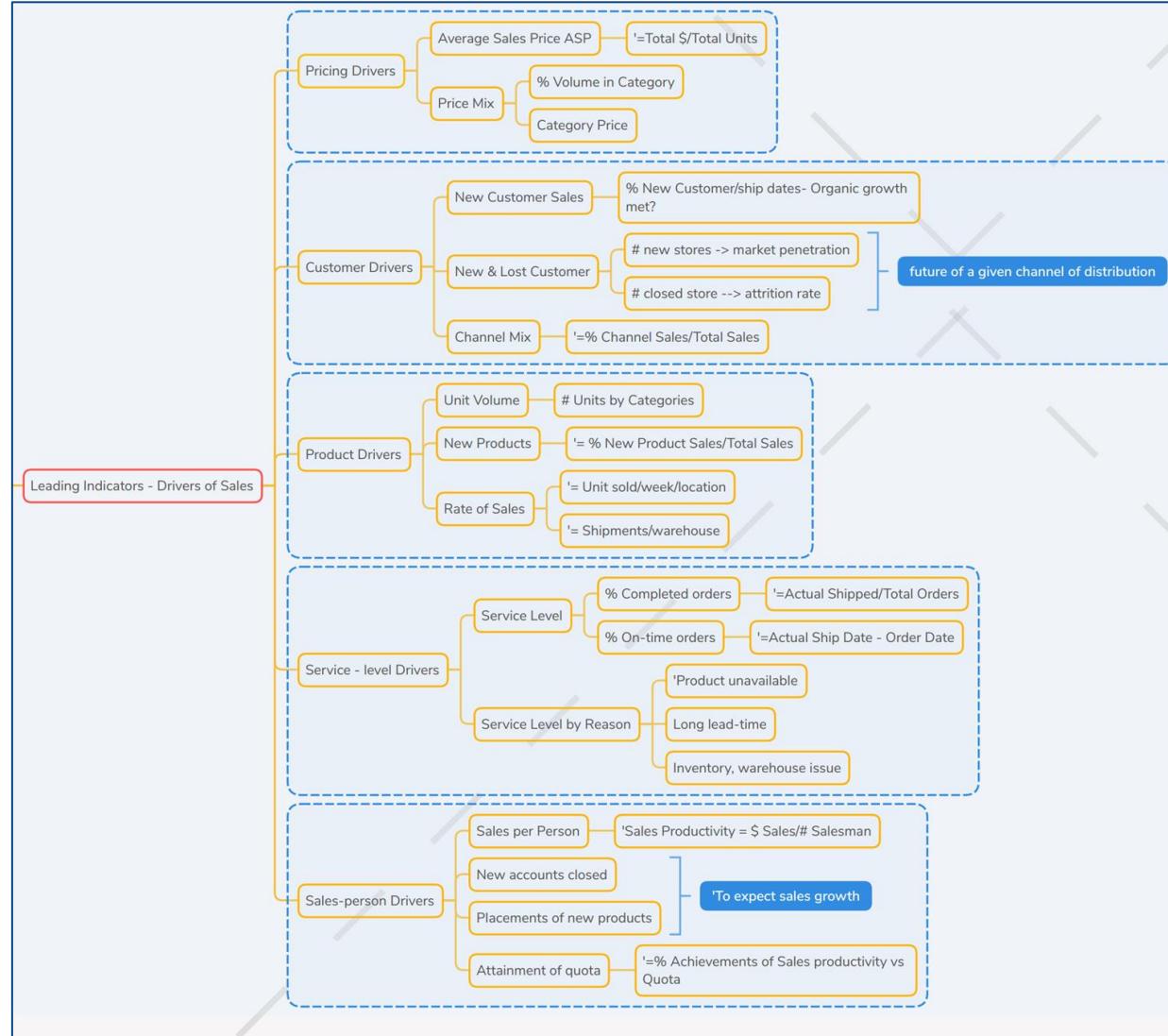


# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (3) Conceptual Frameworks



SALE

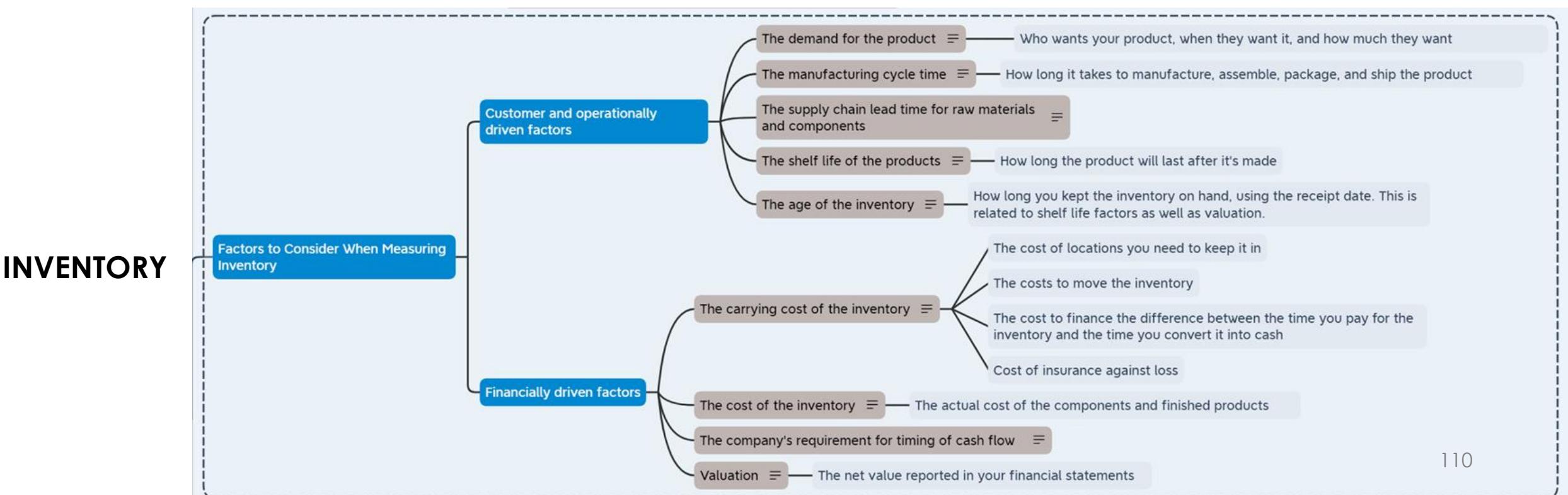


# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (3) Conceptual Frameworks



Conceptual frameworks are structures based on categories of concepts. They usually come straight from theory but can be adapted if you understand it well enough. Examples of these frameworks are the **3Cs, the 4Ps, Porter's 5 Forces, “People, Process, Systems” framework**, another example of a lesser known, but widely used framework is the Trust Equation, which says to build and maintain trust you need **four factors: Credibility, Reliability, Intimacy and (a lack of) Self-Orientation**.



# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (3) Conceptual Frameworks



For business problems it almost always makes sense to **start with a profit lever or return on capital tree**.

As you get more experienced, **try the broader set of cleaving frames** from the later part; different slices through the problem yield different insights.

In fact many business problems benefit from this **particular type of problem disaggregation**, because it shows the levers of revenue (price, volume, market share), costs (fixed, variable, overheads), and asset utilization so clearly, and in mathematical relationship to each other.

This chart shows a toolkit of what we call **cleaving frames for different kinds of problem**. Good problem solvers have toolkits like this that act as **lenses to visualize potential solutions**. They try on **one or more theoretical frames** to see which one is likely to be the **best fit** for the problem at hand. **Often they combine more than one frame** to make progress on particular problems.

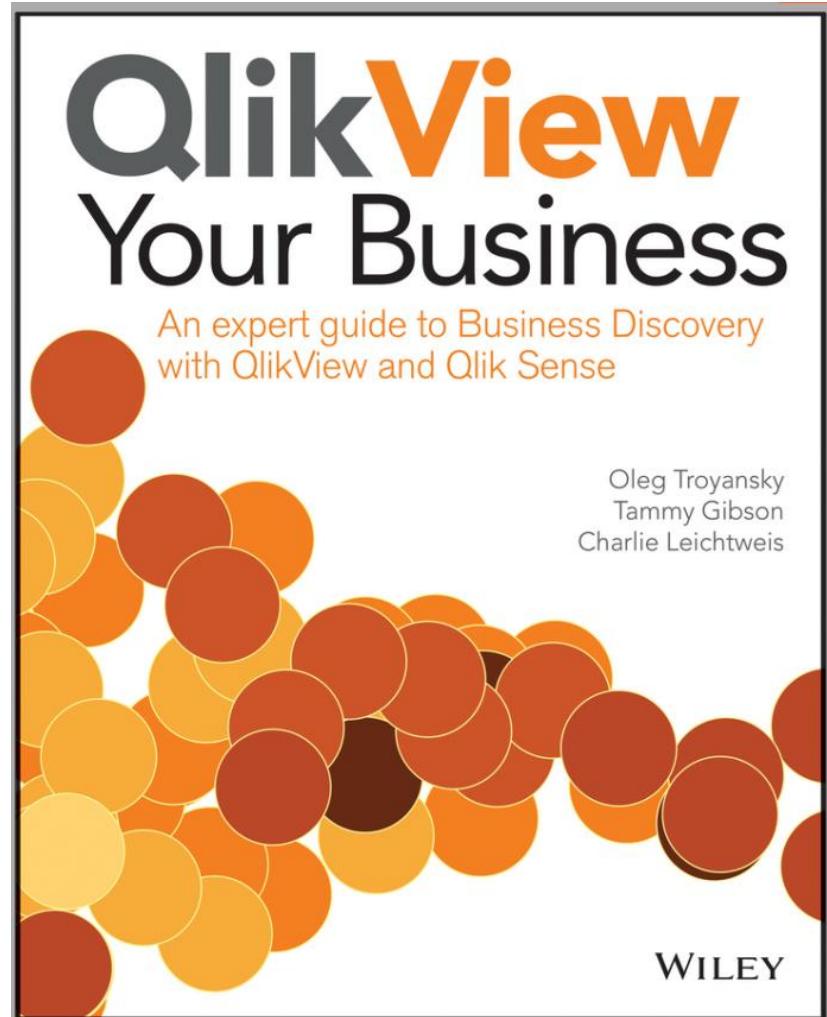
### CLEAVING FRAMES

#### BUSINESS

Frame	Elements	Example
» Price/Volume	» Market share, awareness, trial, repurchase, elasticities	» Product entry strategies
» Collaborate/Compete	» Where to play, how to fight, acquiring a reputation, signalling	» Any competitive situations » CSIRO WiFi
» Market/Ability to compete	» Opportunity, competitive position, capabilities, resources	» Entry/start up » BHP
» Invest/Harvest	» Growth/Share, explore vs exploit, disruptive entrants	» Portfolio of activities » BHP
» Margins/Asset turns	» Return to capital, valuing options	» Business model construction » Home Depot-Hechinger
» Scale/Scope	» Size vs breadth	» Social media platforms
» Capital/Noncapital	» Rent, own, borrow, share, zero-basing	» Asset efficiency » Uber, Airbnb
» Principal/Agent	» Aligning incentives, monitoring	» Compensation, insurance, second-hand markets
» Asset/Options	» Valuing potential (real and potential), puts/calls	» Multi-play investment games
» Customer/Shareholder	» Competing perspectives	

# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (3) Conceptual Frameworks



### PART II Learning the Core Techniques: Sales Analysis

CHAPTER 3 Defining a Business Scenario for Sales Analysis	41
“What Do You Mean When You Say Sales?”	42
What Is the Real Value of the Sale?	43
What Happened?	45
Why Did it Happen? What Does It Mean for My Business?	46
What Data Is Needed	50
Advanced Sales Analysis Makes the Data Visible and Available	51

### PART III Expanding Your Skill Set: Profitability Analysis

CHAPTER 7 Defining a Business Scenario for Profitability Analysis	241
The Profit and Loss Statement	242
The Direct Variable Profitability (DVP) Model	245
Deep Dive Example	248
Use of Business Intelligence Tools Makes the Data Visible and Available	251

### PART IV Mastering Advanced Techniques: Inventory Analysis

CHAPTER 12 Defining a Business Scenario for Inventory Analysis	477
What Is Inventory—Asset or Liability?	477
Factors to Consider When Measuring Inventory	479
The Definition of Inventory Analysis	481
Commonly Used Metrics for Inventory Analysis	482
Common Data Elements Required for Inventory Analysis	484
The Benefits of Advanced Inventory Analysis	485

### CHAPTER 11

# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (4) Segmentations



### *The 5 ways to be MECE – Segmentations*



**Difficulty to learn:** ★★☆☆☆

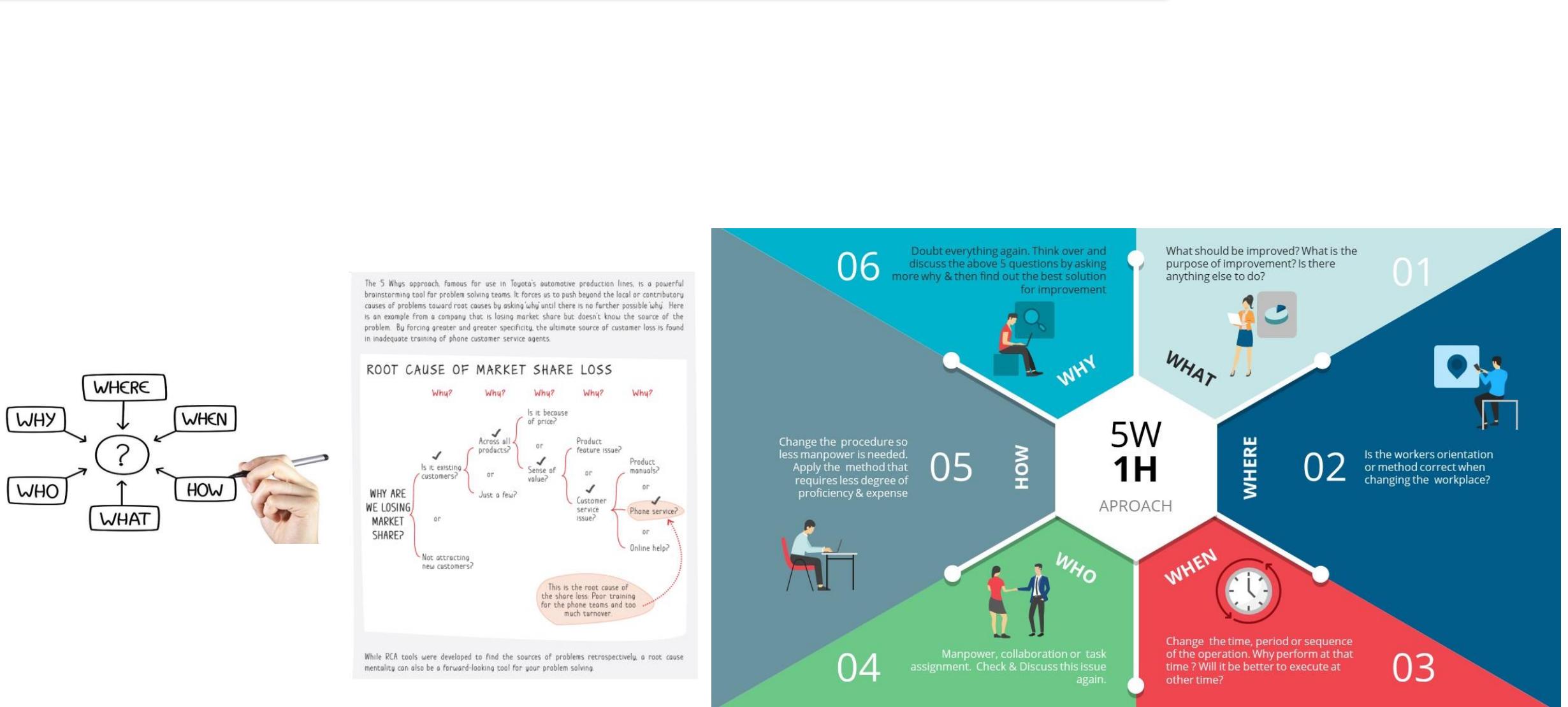
**Limits:** You can only segment one criterion at a time, and there may be dozens possible and equally likely.

**Risks:** Choosing the wrong segmentation pattern yield no results, trying many seems like guessing if miscommunicated.

**Use when:** As a complement to another structure, when there is reason to think one segment has different behavior than others, or when you want to test for the “mix effect”.

# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (4) Segmentations



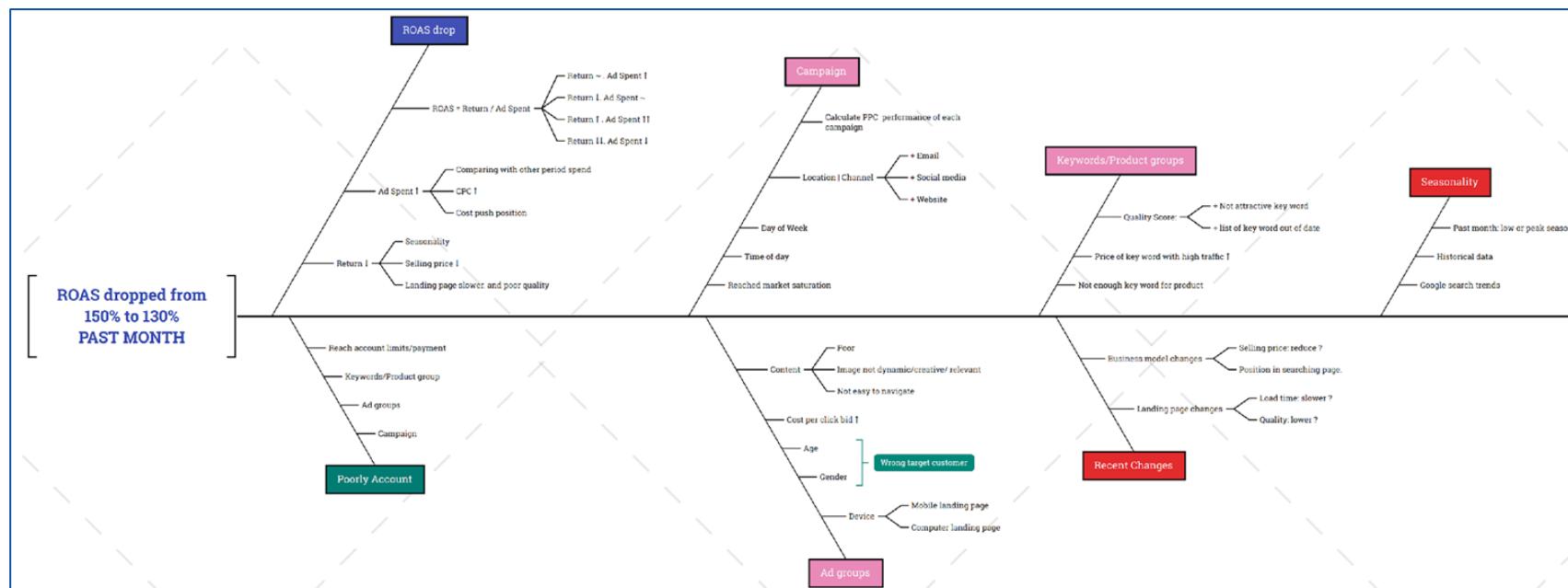
# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (4) Segmentations



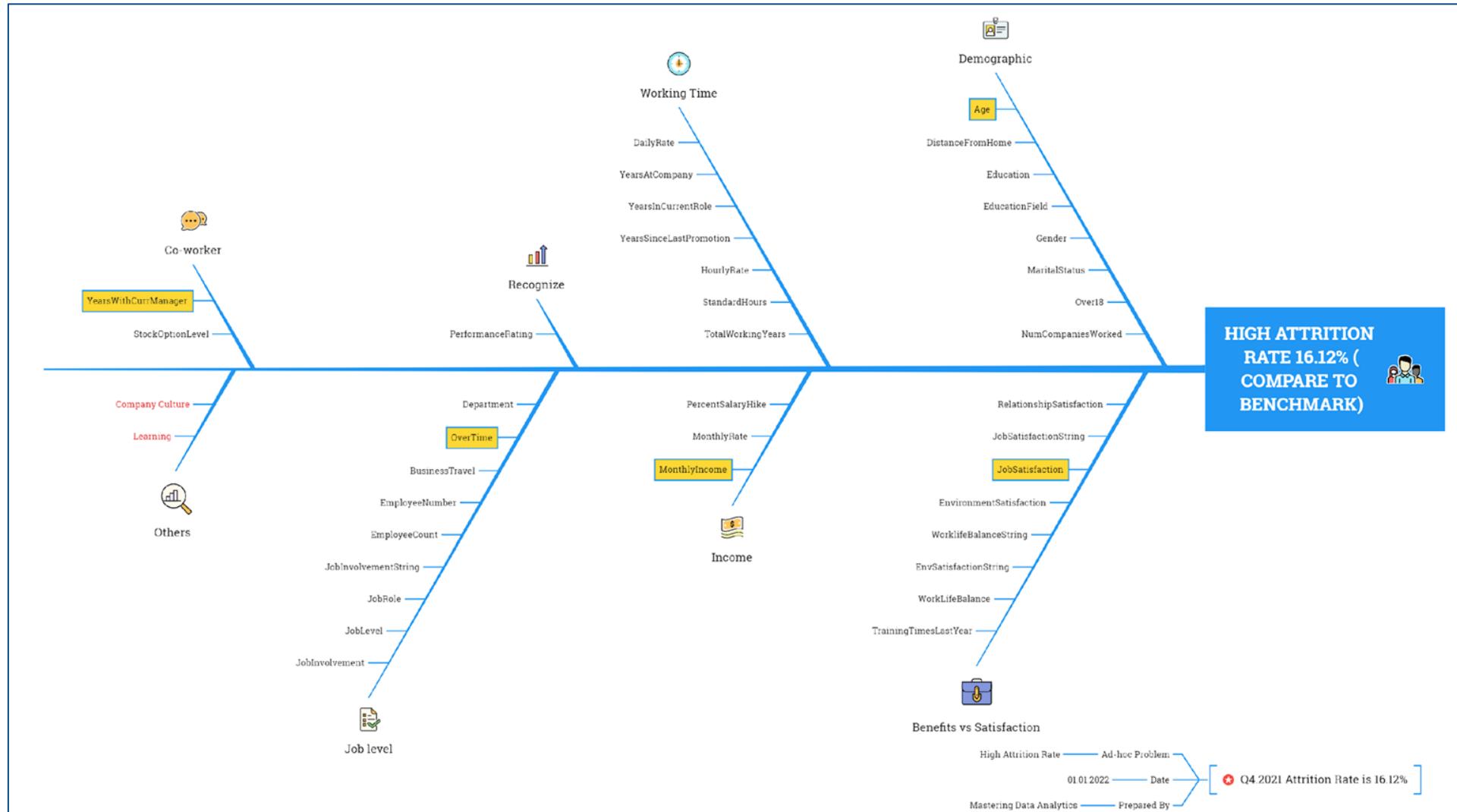
**Segmenting** is essentially **cutting a slice of the problem**. For instance, you could segment a company's customers by age group (0-20, 21-40, 41-60, 61+), by gender (male, female), by country, etc. Another example: you could segment a company's revenues by product line, by country, by type of customer, by month, etc.

\*Notice how segmenting is different than finding the mathematical drivers (the essence of the Algebraic structures) in that you have a clear criterion to slice the data here.



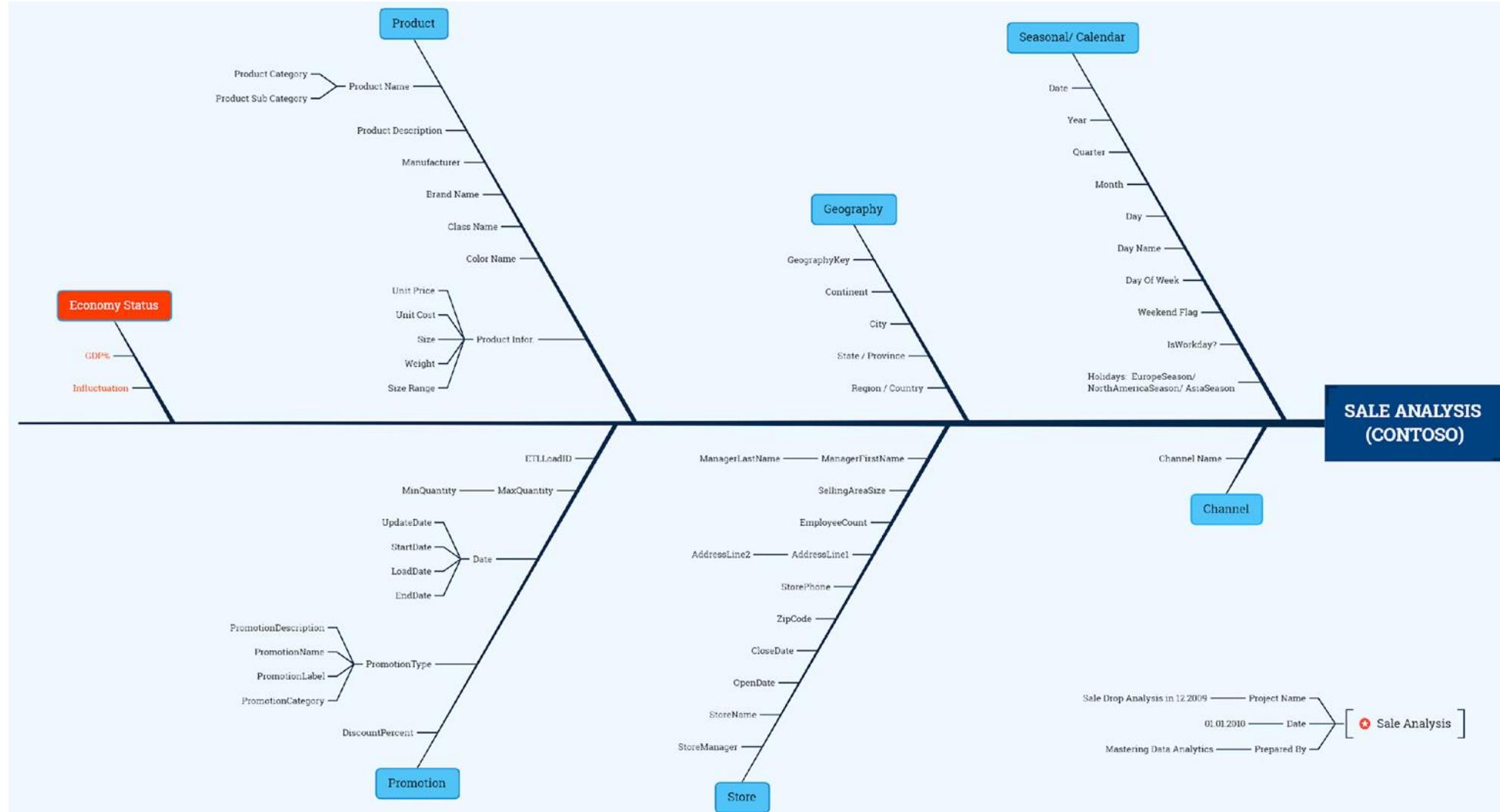
# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (4) Segmentations



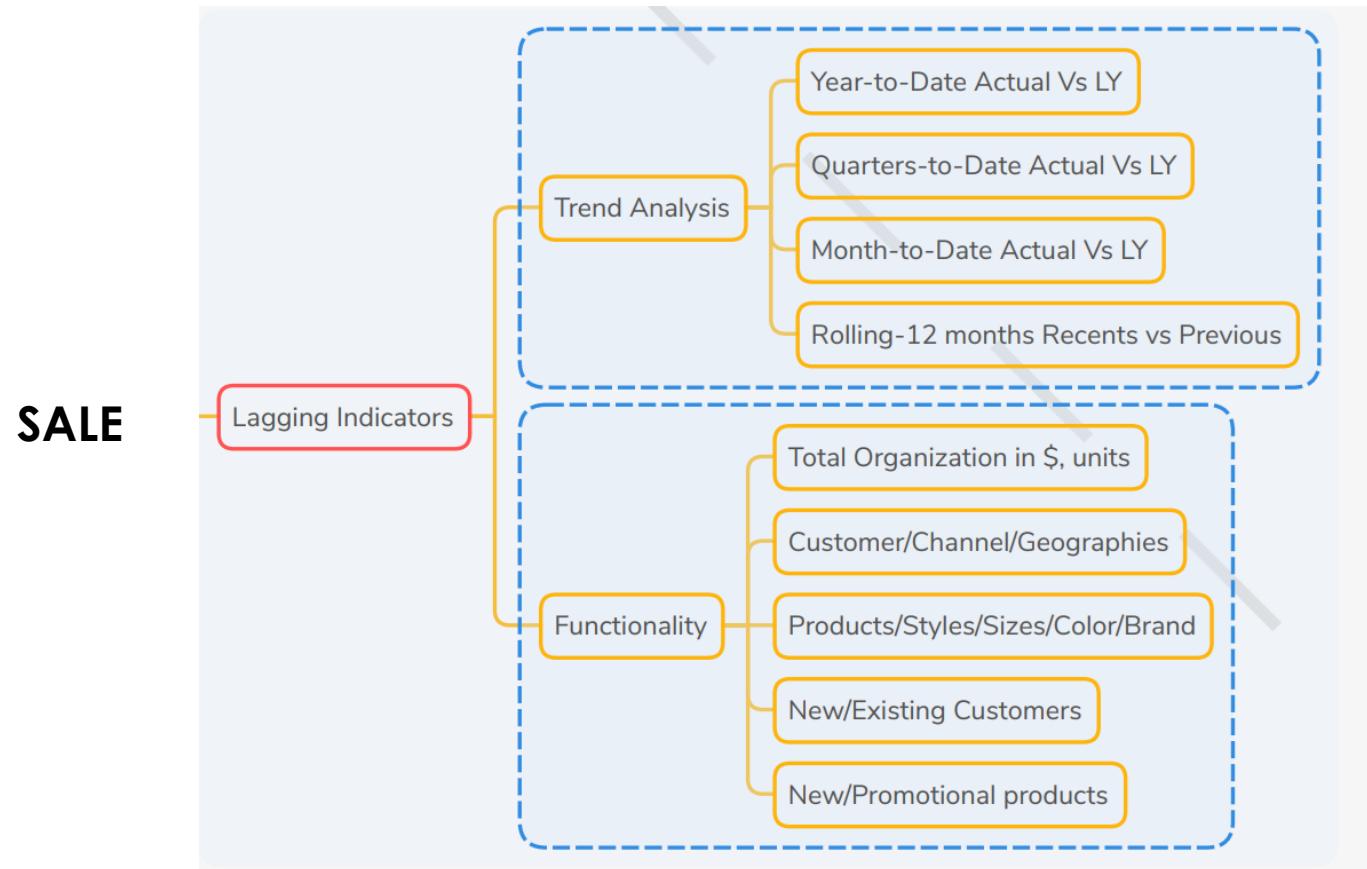
# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (4) Segmentations



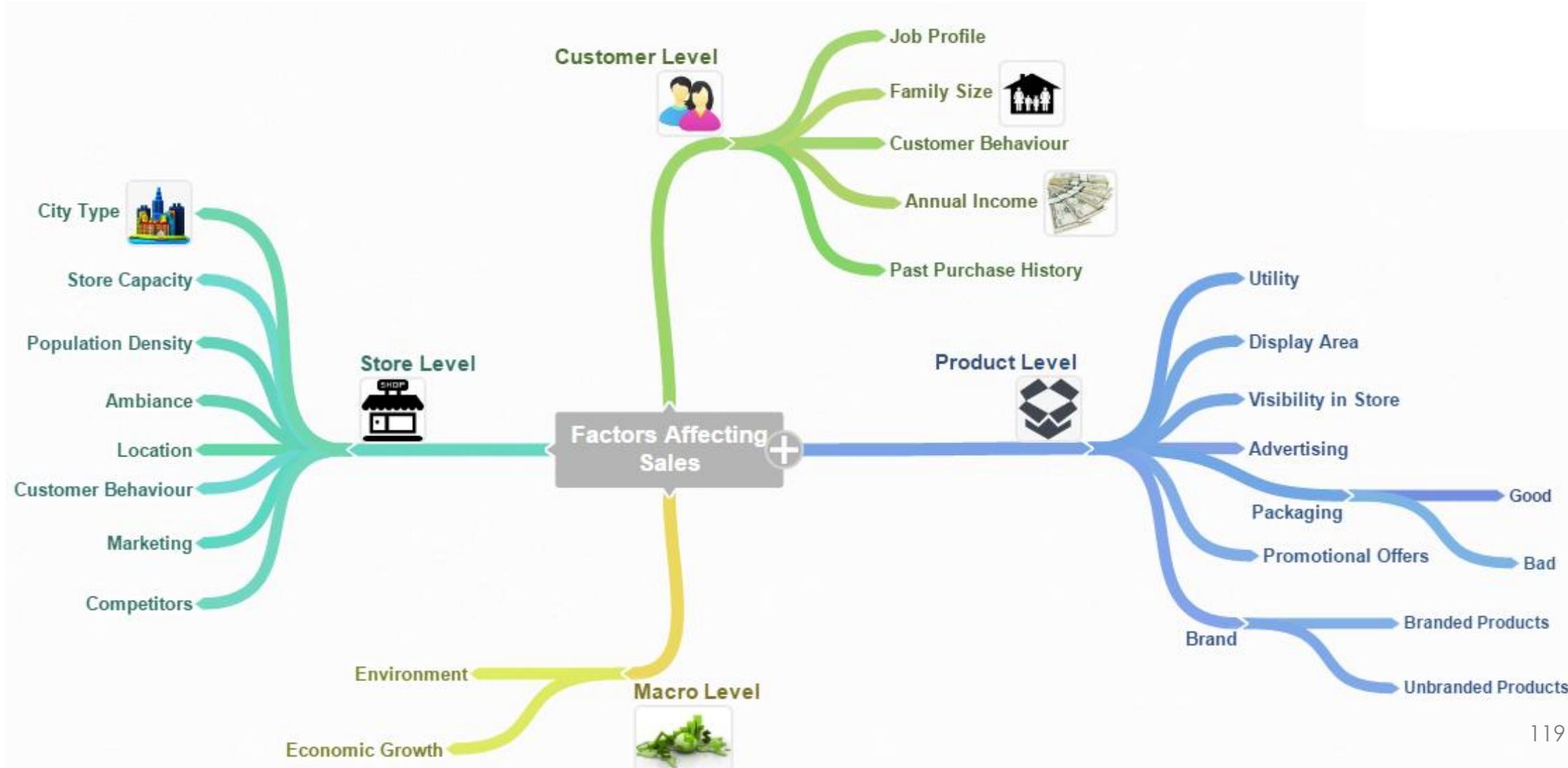
# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (4) Segmentations



# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (4) Segmentations



# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (4) Segmentations



### Store Level Hypotheses :

- 1. City type:** Stores located in urban or Tier 1 cities should have higher sales because of the higher income levels of people there.
- 2. Population Density:** Stores located in densely populated areas should have higher sales because of more demand.
- 3. Store Capacity:** Stores which are very big in size should have higher sales as they act like one-stop-shops and people would prefer getting everything from one place
- 4. Competitors:** Stores having similar establishments nearby should have less sales because of more competition.
- 5. Marketing:** Stores which have a good marketing division should have higher sales as it will be able to attract customers through the right offers and advertising.
- 6. Location:** Stores located within popular marketplaces should have higher sales because of better access to customers.
- 7. Ambiance:** Stores which are well-maintained and managed by polite and humble people are expected to have higher footfall and thus higher sales.

# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (4) Segmentations



### Product Level Hypotheses:

- 1. Brand:** Branded products should have higher sales because of higher trust in the customer.
- 2. Packaging:** Products with good packaging can attract customers and sell more.
- 3. Utility:** Daily use products should have a higher tendency to sell as compared to the specific use products.
- 4. Display Area:** Products which are given bigger shelves in the store are likely to catch attention first and sell more.
- 5. Visibility in Store:** The location of product in a store will impact sales. Ones which are right at entrance will catch the eye of customer first rather than the ones in back.
- 6. Advertising:** Better advertising of products in the store will result in higher sales in most cases.
- 7. Promotional Offers:** Products accompanied with attractive offers and discounts will sell more.

# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (4) Segmentations



### Customer Level Hypotheses

- 1. Customer Behavior:** Stores keeping the right set of products to meet the local needs of customers will have higher sales.
- 2. Job Profile:** Customer working at executive levels would have higher chances of purchasing high amount products as compared to customers working at entry or mid senior level.
- 3. Family Size:** More the number of family members, more amount will be spent by a customer to buy products
- 4. Annual Income:** Higher the annual income of a customer, customer is more likely to buy high cost products.
- 5. Past Purchase History:** Availability of this information can help us to determine the frequency of a product being purchased by a user.

# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (4) Segmentations



### Macro Level Hypotheses

- 1. Environment:** If the environment is declared safe by government, customer would be more likely to purchase products without worrying if it's environment friendly or not.
- 2. Economic Growth:** If the current economy shows a consistent growth, per capita income will rise, therefore buying power of customers will increase.

**After this step, We'll download the data and proceed with data analysis stages.**



## Root Cause Analysis

### Why is My PPC Performance Bad?

**Part I:**  
**How to Identify Root Cause**



**PPC** stands for pay-per-click, a model of internet marketing in which advertisers pay a fee each time one of their ads is clicked. Essentially, it's a way of buying visits to your site, rather than attempting to "earn" those visits organically. Search engine advertising is one of the most popular forms of **PPC**.

# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (5) Opposite Words



### 5. Opposite Words

#### *The 5 ways to be MECE – Opposite Words*



**Difficulty to learn:** ★★☆☆☆

**Limits:** No limits, this one's a wildcard.

**Risks:** Opposite word pairs is *never* the most insightful way to break down a problem, use too much and it almost sounds like cheating.

**Use when:** As a last resort if you're unable to use other methods or if the question is not important enough to deserve more than a simple, quick structure. Notice you'll impress no interviewer by using this method.

# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (5) Opposite Words



### 5. Opposite Words

Two appropriate times to use it are when you need a **quick structure just to organize speech** and when you **can't find another type of structure to work with**.



Task #1: Ask "BI" if they have hard data on customer leaving for each of 8 reasons

Task #2: Ask "Marketing" for data on customer satisfaction and market shifts

Task #3: Find reports or talk to Experts to get data on "new trend" growth in customers to see if numbers add

Task #4: Talk to "Finance" and see our cancellations policy and numbers

Task #5: Talk to "Infrastructure" to understand if there were divestments and to "Product" to see if we've cancelled some of our plans

Task #6: Ask "IT" and "Operations" for potential systems and process disruptions

# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – (5) Opposite Words



### Step #2: Break down the 1<sup>st</sup> layer using one of the 5 Ways to be MECE

Be careful with what you choose – this will define the quality of the rest of your Issue Tree

#### Opposite Words

How to improve the quality of new recruits in a small consulting firm?

#### Process Structure

How to improve the quality by changing the recruiting pool?

How to improve the quality with no change to the recruiting pool?

#### Segmentation

How to improve the quality of our applicants?

How to improve our selection process?

How to improve our hires after the offer but before they start?

#### Conceptual framework

#### Conceptual framework

How can we get smarter people?

How can we get people who work harder?

How can we get people with the right experience?

How can we get people with the right cultural fit?

Which structure would you choose as a 1<sup>st</sup> layer and why?

# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – Combine Structures

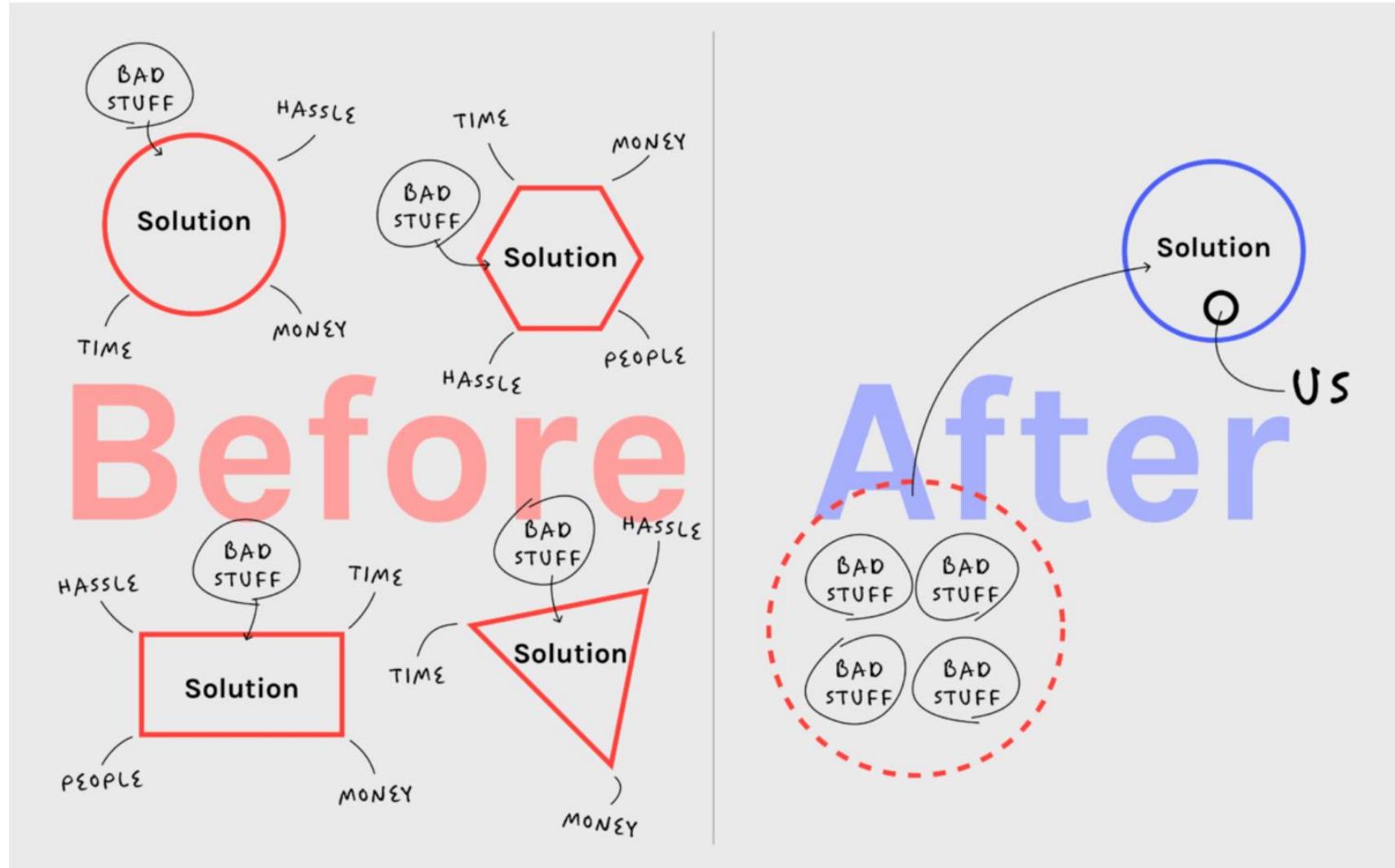


**Step #3: Create a 2<sup>nd</sup> layer (and further) by breaking down each bucket into another “mini MECE structure” from the 5 Ways to be MECE**



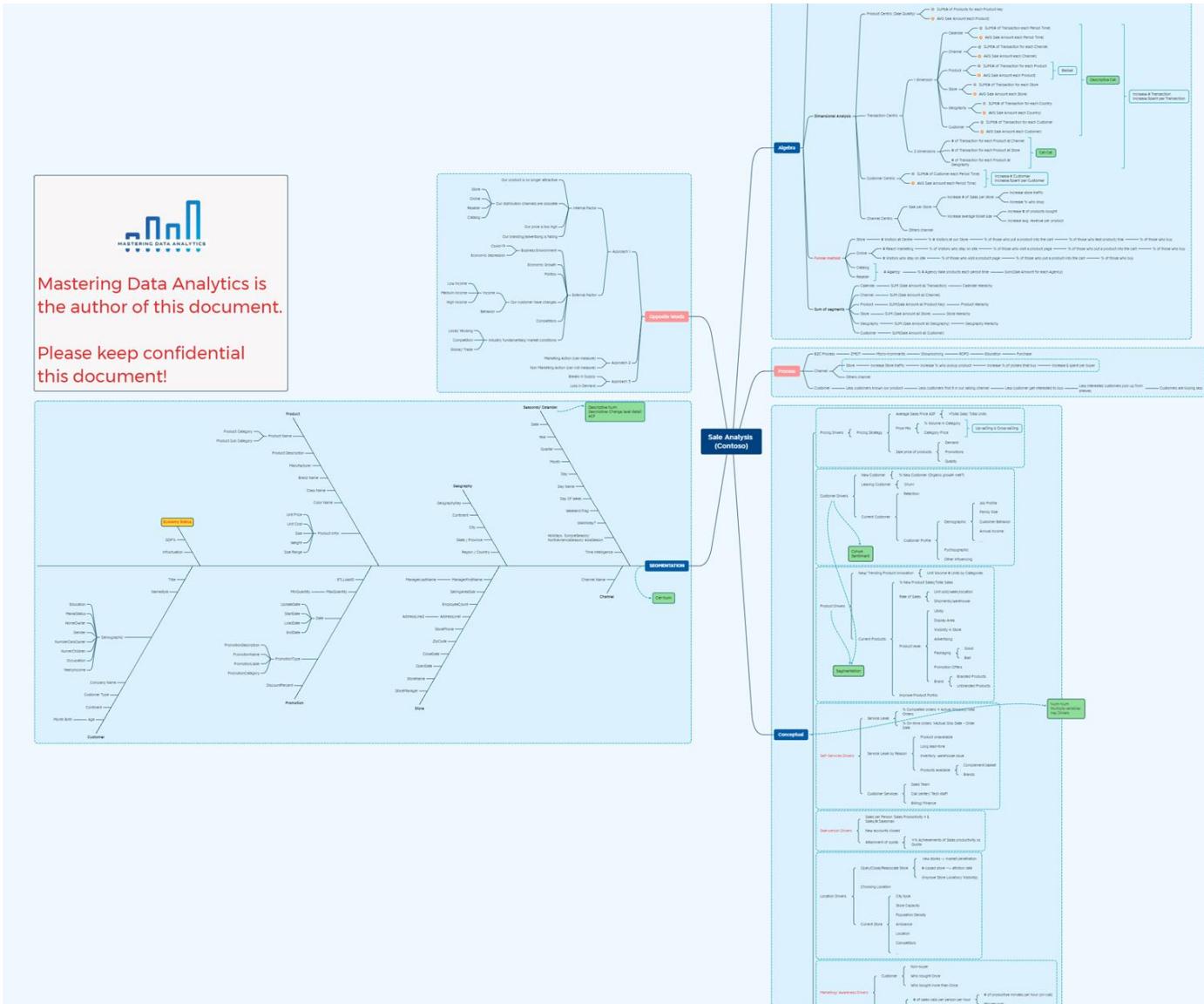
# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – Combine Structures



# Data Analytics Problem Solving

## Part 2: Techniques to build Logic Trees – Combine Structures





# McKinsey&Company



"Problem solving is the core skill for the twenty-first century. Now, finally, we have a guide to doing it right that any of us can follow."  
-Dominic Barton, Global Managing Partner Emeritus, McKinsey & Company



## BULLETPROOF PROBLEM SOLVING

THE ONE SKILL THAT  
**CHANGES EVERYTHING**

CHARLES CONN  
ROBERT McLEAN

WILEY



# THANK YOU

