

Agenda: Day 1

- 1** Industry 4.0
Digital Revolution, Case Examples
- 2** What is Data?
Data Types, Different Forms of Analytics
- 3** Data Visualization
Dashboarding, Data Storytelling, and Types of Visuals
- 4** Industry Examples
Sector Analysis, Geographic Analysis, Predictive Analytics,
Operational Efficiencies, Digitizing HR
- 5** Case Study
Overview of the case study question for the course

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Section 1: Industry 4.0

Data is the new Oil

Q1 2008

ExxonMobil



PetroChina



The world uses data as the primary resource to derive value

Q1 2023



Microsoft

Alphabet

amazon.com



We've Always Had Data. Why Are We Talking About This Now?

We are in the midst of an industrial revolution

1st Industrial Revolution

- 1 1760 - ~1830
- 2 Harness the power of (steam) energy
- 3 Faster production
- 4 Result: boom in manufacturing



We've Always Had Data. Why Are We Talking About This Now?

2nd Industrial Revolution

- 1 1870 - 1914
- 2 Harness the power of electricity
- 3 Faster Transportation
- 4 Result: the world became smaller. It was also transformed our relationship to time itself because it forced us to create time zones.

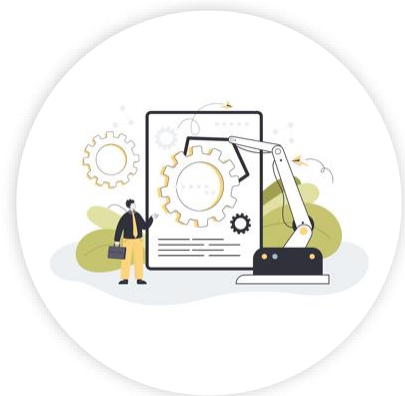


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We've Always Had Data. Why Are We Talking About This Now?

3rd Industrial Revolution:

- 1 1947 - ~2010
- 2 Harness the power of automation
- 3 Digitization Of Processes And Daily Life
- 4 Result: commoditization of automation



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We've Always Had Data. Why Are We Talking About This Now?

4th Industrial Revolution

- 1 ~2011 - present
- 2 Harness the power of information
- 3 Blockchain, AI / ML, IoT, and 3D printing
- 4 Result: ?



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Group Discussion

How do each of these Industry 4.0 disruptions impacts investment opportunities



Artificial Intelligence / Machine Learning



Blockchain



IoT



3D Printing

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MUBADALA

Mubadala builds the future of clinical trials with unlearn.ai and Science 37

ADIA

ADIA invests in quantitative research and hierarchical risk parity



Majed Al Futtaim uses AI to enhance customer experience

BlackRock

BlackRock creates and reviews more than 1 million daily risk and exposure reports on portfolios

Asset management goes digital*

- 67% Two-thirds of investment in digital is going towards the front office
- 87% In-house resources in 87% of organizations are involved in delivering digital programs
- 71% Poorly defined outcomes and lack of internal skills were major limiting factors for 71% of organizations



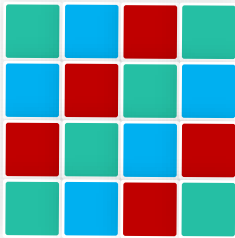
*Source: <https://kpmg.com/xx/en/home/insights/2019/02/getting-digital-right.html>



Section 2: What is Data?

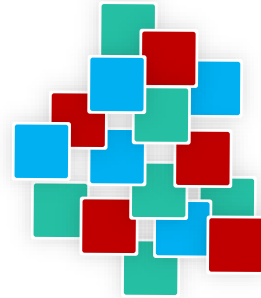
The two flavors of Data

Structured Data



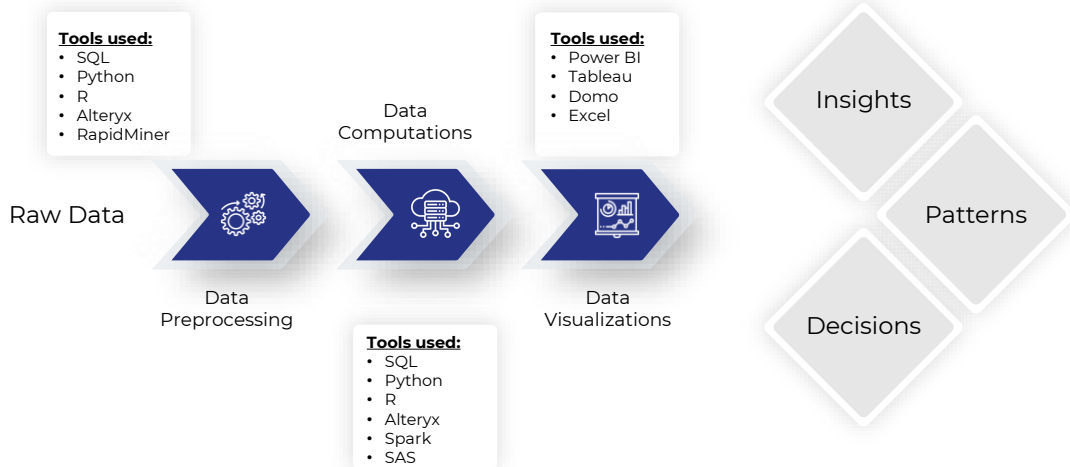
Numbers Geodata DateTime
 MCQ Unique Identifiers

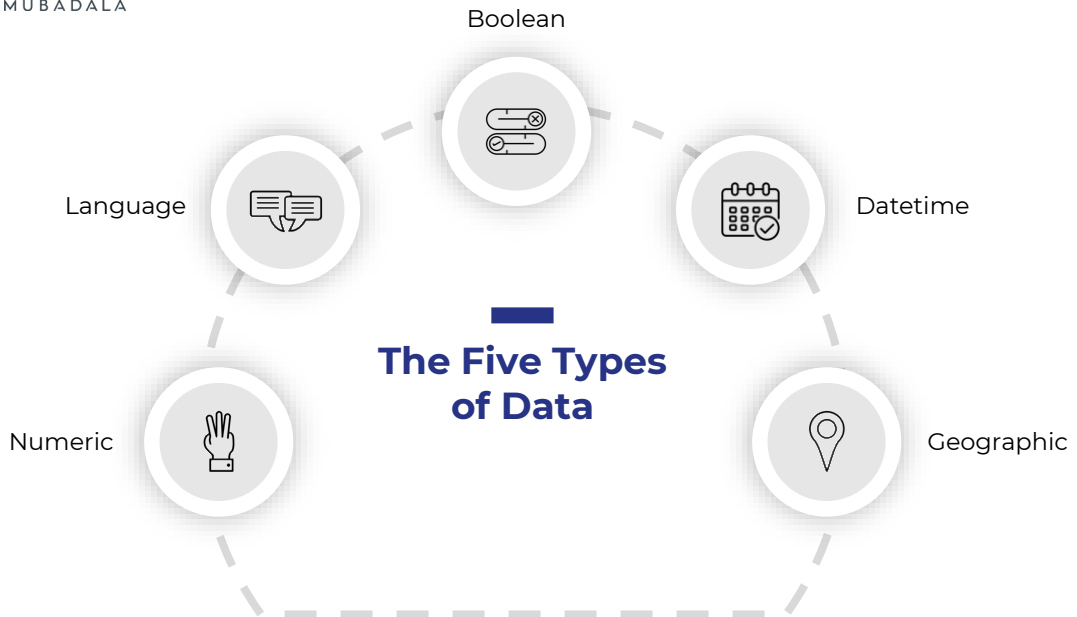
Unstructured Data



Comments Emotions Text messages
 Pictures Video Audio

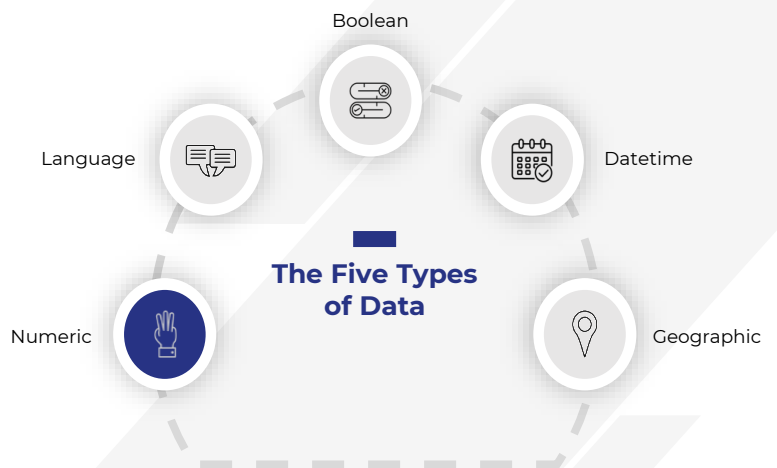
Data Analytics Process and Stack





Datatypes: Numeric

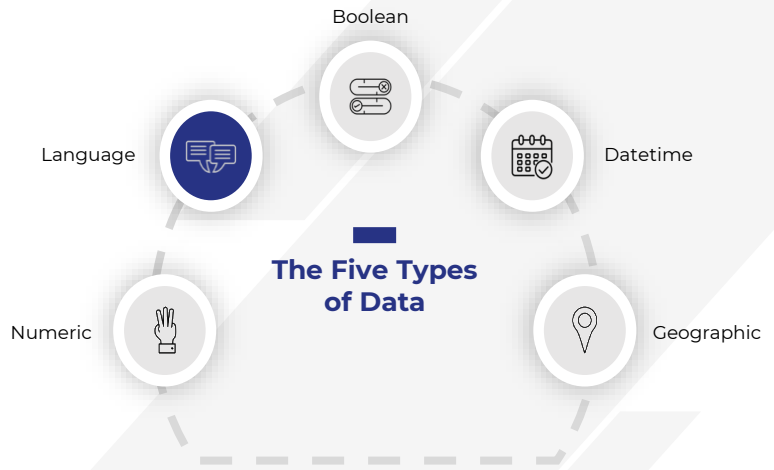
- Based on..... numbers!
- Examples of numeric data
- Sources of numeric data
- When is this useful?





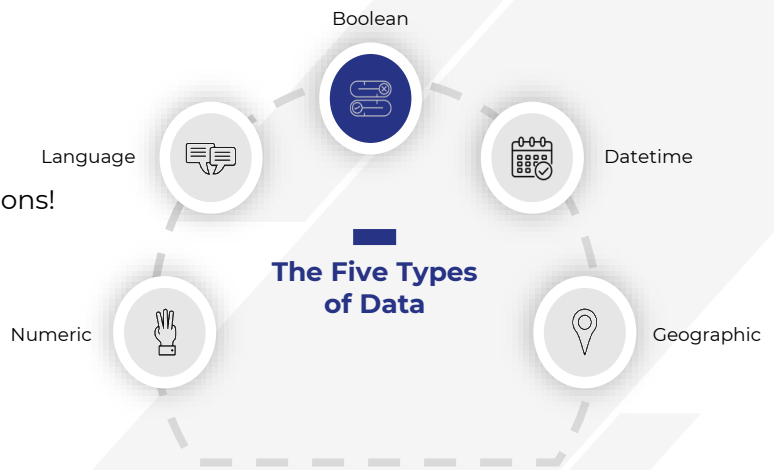
Datatypes: Language

- Based on..... words!
- Examples of linguistic data
- Sources of linguistic data
- When is this useful?



Datatypes: Boolean

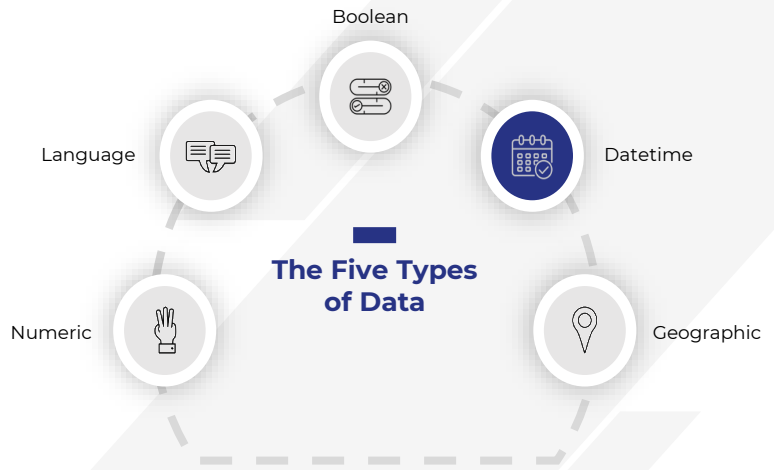
- Based on..... very specific options!
- Examples of Boolean data
- Sources of Boolean data
- When is this useful?





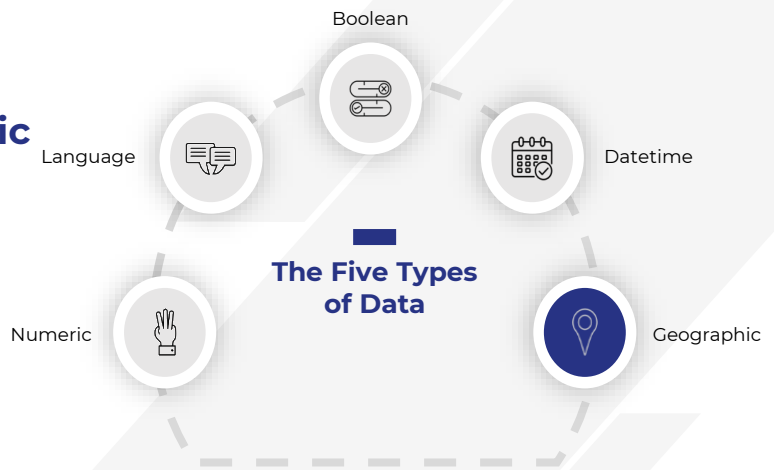
Datatypes: Datetime

- Based on..... time!
- Examples of datetime data
- Sources of datetime data
- When is this useful?

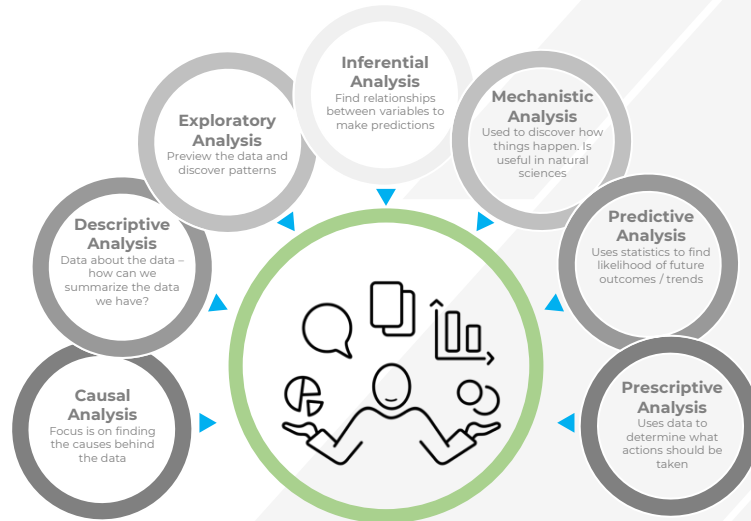


Datatypes: Geographic

- Based on..... numbers!
- Examples of numeric data
- Sources of numeric data
- When is this useful?



Types of Data Analytics



SWF + Success in Data Analytics



Identifying investment opportunities

01.

Revenue generating activities within portfolio

02.

Due diligence and risk aversion

03.

Tax compliance

04.

Operational Efficiency

05.

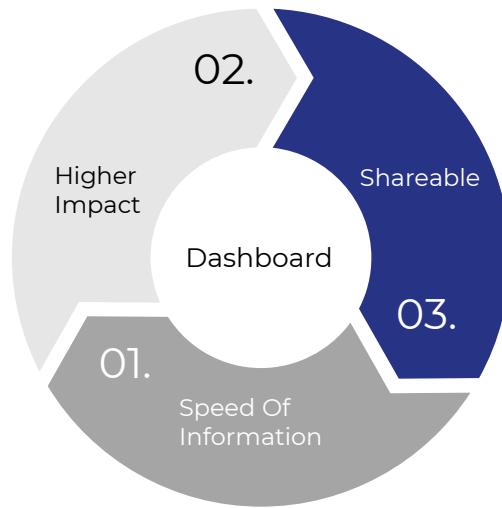
Group Discussion

- In small groups, discuss each of these analytics use cases
- How has Mubadala utilized data to achieve each of these points?
- What changes would you recommend for the future?



Section 3: Data Visualization

Why Do We Dashboard?



The Story Of Your Business

At its core, data visualization is storytelling



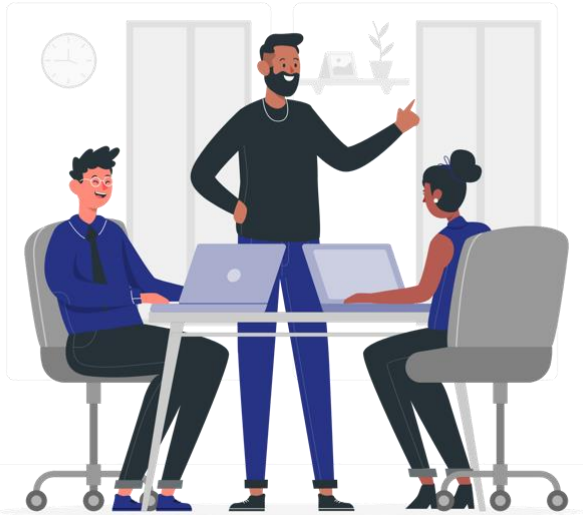
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The Story Of Your Business

We can combine the data into meaningful chunks...

He could just see the bundle of blankets on the step of number four

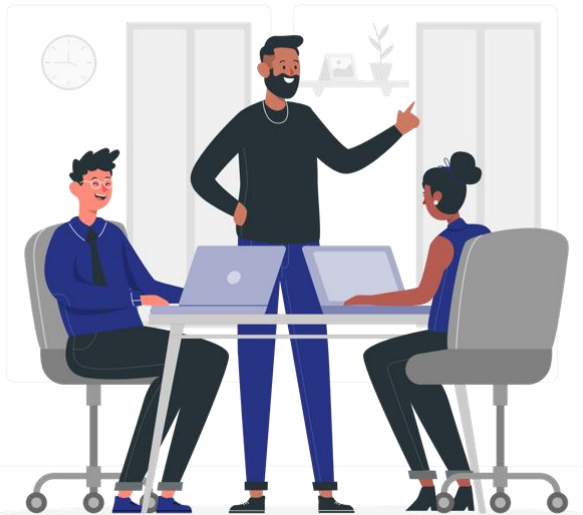
... but we still need context



The Story Of Your Business

With context, we can derive meaning out of some of the data

Dumbledore turned and walked back down the street. On the corner he stopped and took out the silver Put-Outer. He clicked it once, and twelve balls of light sped back to their street lamps so that Privet Drive glowed suddenly orange and he could make out a tabby cat slinking around the corner at the other end of the street. He could just see the bundle of blankets on the step of number four.



The Story Of Your Business

Combining all of the meaningful parts gives us the story

Dumbledore turned and walked back down the street. On the corner he stopped and took out the silver Put-Outer. He clicked it once, and twelve balls of light sped back to their street lamps so that Privet Drive glowed suddenly orange and he could make out a tabby cat slinking around the corner at the other end of the street. He could just see the bundle of blankets on the step of number four.

"Good luck, Harry," he murmured. He turned on his heel and with a swish of his cloak, he was gone.

A breeze ruffled the neat hedges of Privet Drive, which lay silent and tidy under the inky sky, the very last place you would expect astonishing things to happen. Harry Potter rolled over inside his blankets without waking up. One small hand closed on the letter beside him and he slept on, not knowing he was special, not knowing he was famous, not knowing he would be woken in a few hours' time by Mrs. Dursley's scream as she opened the front door to put out the milk bottles, nor that he would spend the next few weeks being prodded and pinched by his cousin Dudley. . . . He couldn't know that at this very moment, people meeting in secret all over the country were holding up their glasses and saying in hushed voices: "To Harry Potter — the boy who lived!"

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Types of Visuals

What are our variables?



Dependent variables

- These are variables that we control
- Appear in the x-axis of graphs
- E.g. Branches, Employees



Independent variables

- These are generated as a result of the dependent variable, and therefore are not in our control.
- This is what we are measuring and appear in the y-axis
- E.g. Revenue



What are we trying to show?

- Comparison
- Proportion
- Relationship

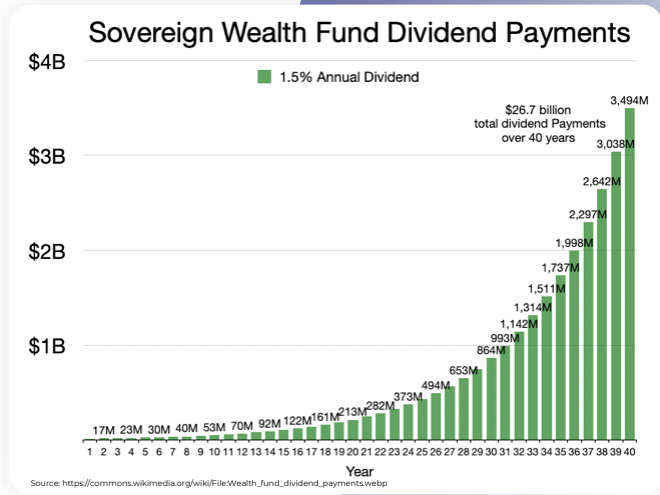
29

Types of Visuals: Comparison

Comparing Two Variables

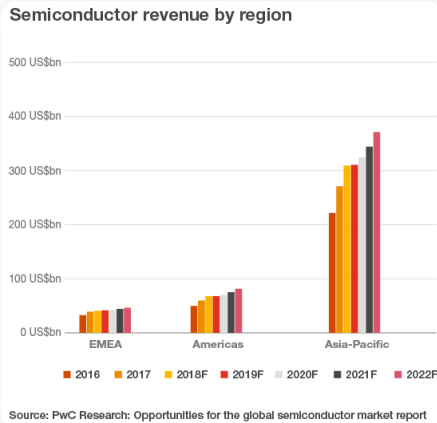
Dependent Variable:

Independent Variable:

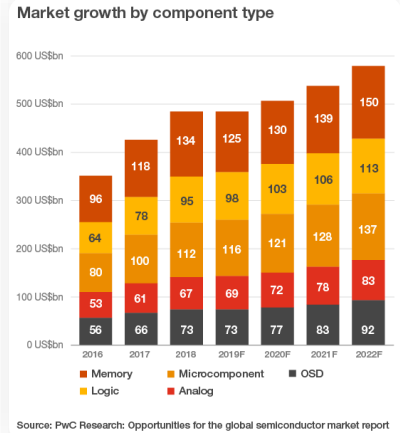


Types of Visuals: Comparison

Comparing more than two variables

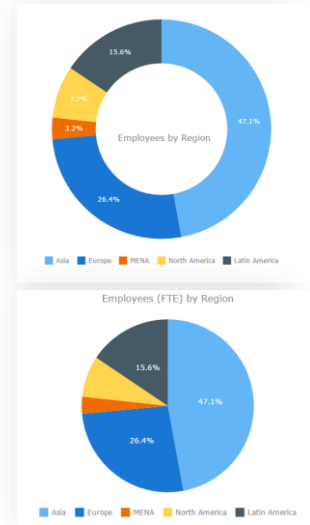
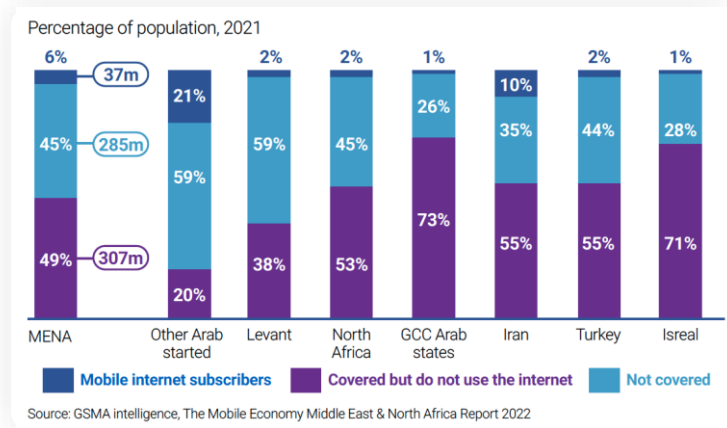


Dependent Variable:
Independent Variable:



Dependent Variable:
Independent Variable:

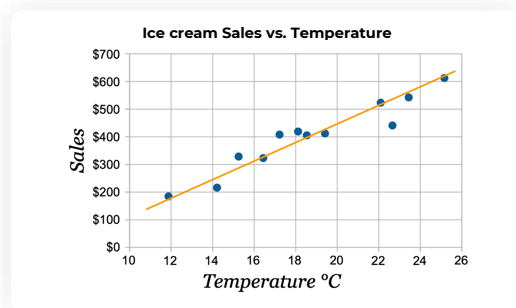
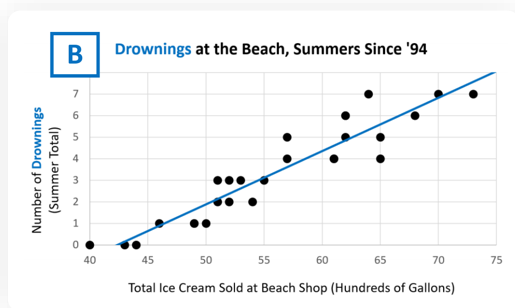
Types of Visuals: Proportion



Dependent Variable:
Independent Variable:

Types of Visuals: Correlation

Illustrates relationship between two variables

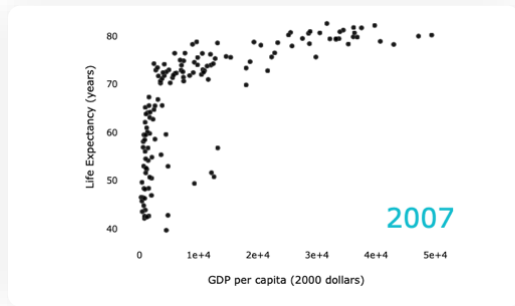


- A causes B
- B causes A
- C causes A and B

Correlation ≠ Causation

Types of Visuals: Bubble Charts

Investigate correlation across 3 or 4 dimensions

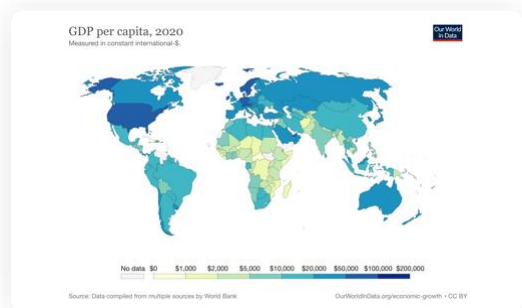
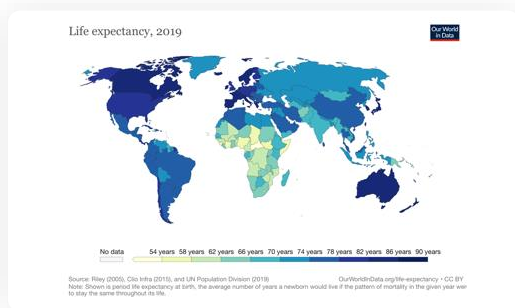


Life expectancy vs. GDP per Capita

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Types of Visuals: Geographic

Investigate correlation across 3 or 4 dimensions



Can be very visually evocative
Allows for interesting comparisons
Focus on one key takeaway per visual

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Section 4: Industry Examples



MUBADALA



EMERGING MARKET
FINANCIAL TRAINING



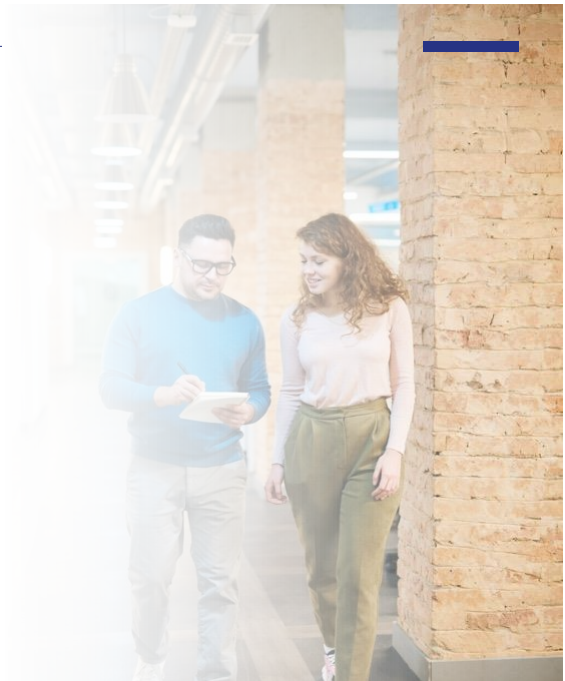
EMERGING MARKET



MUBADALA

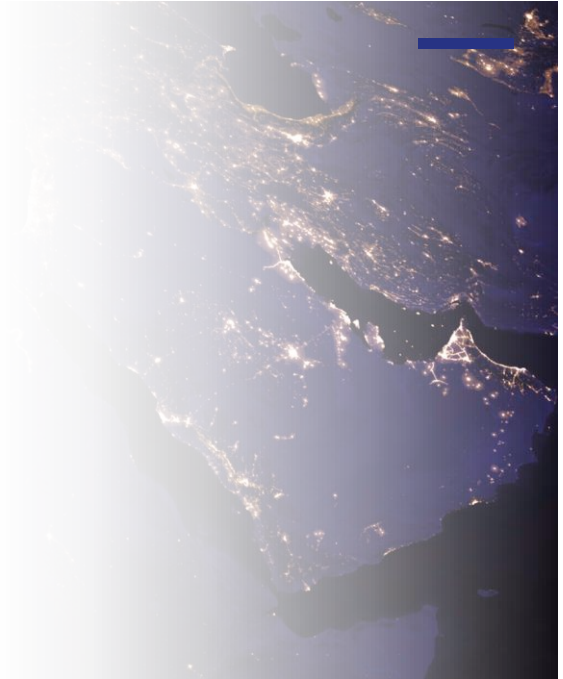
Sector Analytics

- ✔ Using financial and macroeconomic metrics, organizations can project expected performances in a given sector.
- ✔ Requires a holistic approach to data analytics:
 - Demographic insights
 - Salary / spending power
 - Time series analysis to assess actual business cycle
 - Financial modeling, potentially using machine learning
- ✔ Access to the right data (and verifying it!) can present challenges.

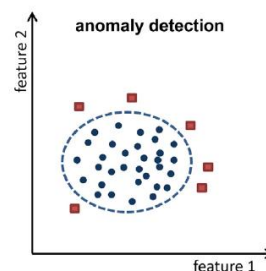
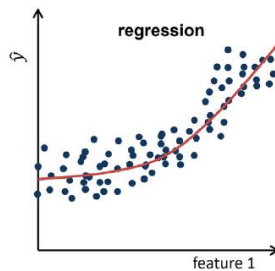
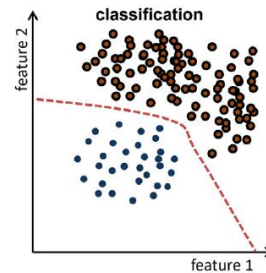
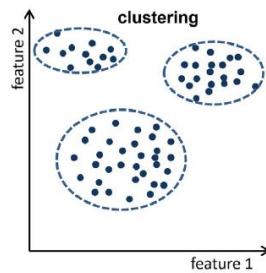


Geographic Segmentation

- ✓ Crucial aspect behind growing a portfolio
- ✓ If we control for demographics and GDP, what role does the physical location play in financial performance?
- ✓ Areas of consideration include:
 - Communication preferences
 - Major industries within a territory
 - Level of interconnectedness with other geographies



Predictive Analytics



Group Exercise

How can Mubadala use predictive analytics?



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Blackrock utilizes data science to maximize growth

1 Using Big Data to yield Big Results

- Every month, Blackrock's data team processes more than 30,000 datasets.
- This allows their investment team to be more agile when responding to the market.

2 Blackrock uses ML to forecast market reaction

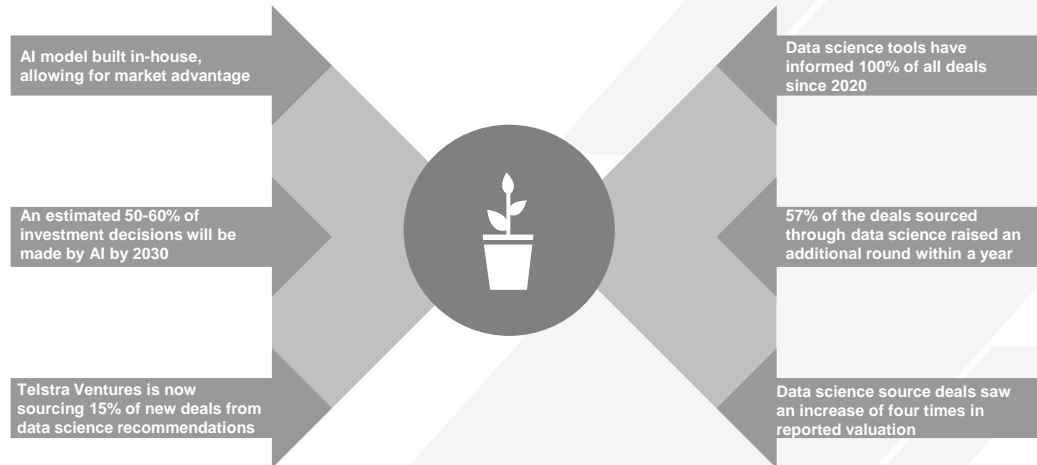
Blackrock uses NLP and large language models to analyze text documents, such as earnings calls, to forecast market reaction.

3 AI itself is a growth opportunity

In addition to using data science and AI, Blackrock invests in companies developing tools in this space.

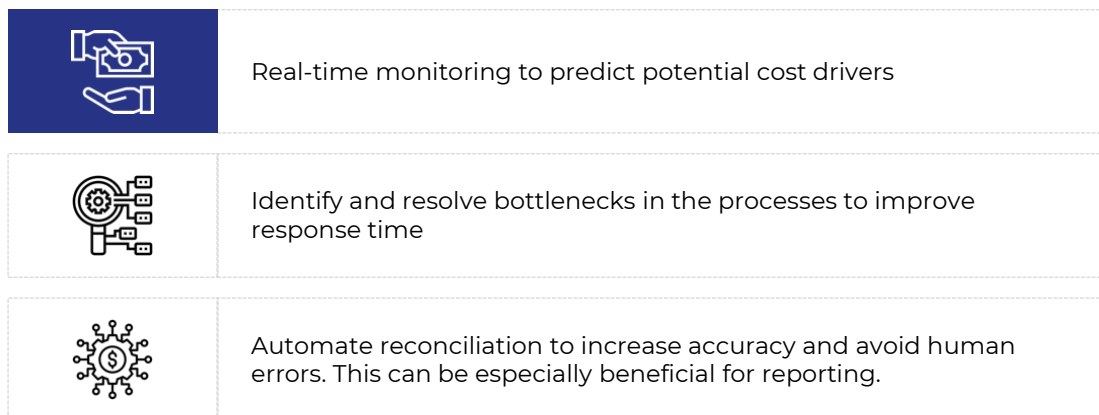
41

Telstra Ventures drives growth with data science



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Operational Efficiencies



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Group Exercise

Provide one example of how Mubadala can use data to boost operations

Real-time monitoring

Process optimization

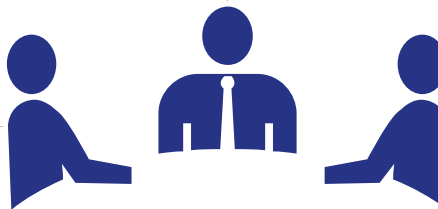
Compliance & Reporting

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Digitizing HR

Transforming the environment

- Digitizing the workspace is a key focus for many organizations
- Digital communication, such as chatbots and Slack



Transforming the function

- Use of AI in the hiring process
- Data analytics to manage employee retention
- Master data management of employee records

Transforming people

- Fostering a culture of innovation and self-disruption
- Ensuring employees are upskilled for a more digital future

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Section 5: Case Study



Case Study Question

- Management has requested an overview of Mubadala's portfolio. Please prepare a dashboard in Excel using the dataset provided.
- Using this dashboard, what recommendations would you give management?





Day 2

May 2024



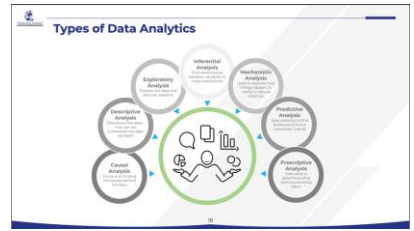
Agenda: Day 2

- 1** Review of Day 1
Industry 4.0, What is Data?, Industry Examples, Case Study
- 2** Excel Deep Dive
Overview of Data, Data Cleansing and Preparation, Pivot Tables, Principles of Data Visualizations
- 3** Presentations
Presenting your dashboard
- 4** Final Class Assessment

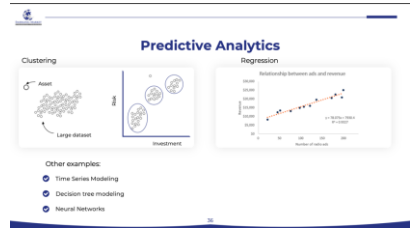
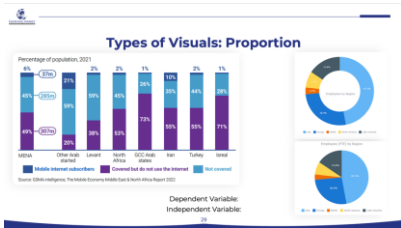
Group Discussion

How do each of these Industry 4.0 disruptions impacts investment opportunities

- Artificial Intelligence / Machine Learning
- Blockchain
- IoT
- 3D Printing



Review of Day 1



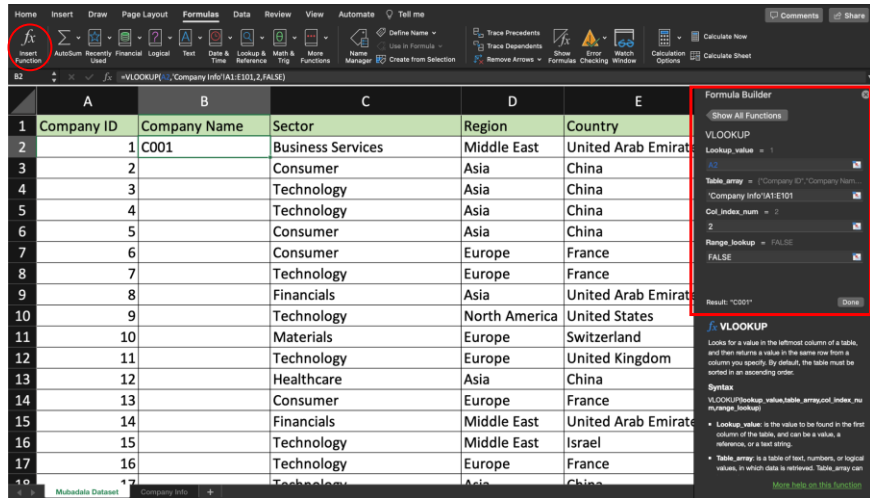
Case Study Question

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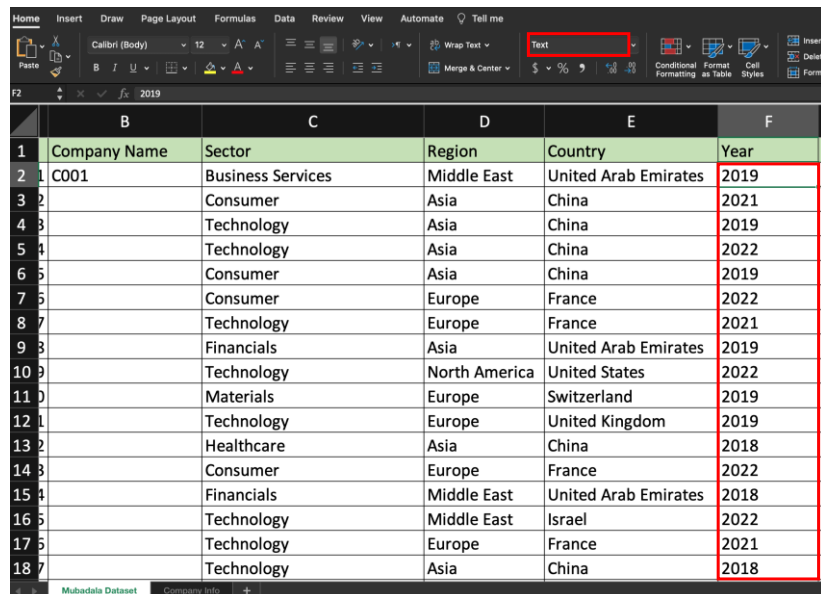
VLOOKUP

- Although typically feared, this is one of the most powerful tools in excel
- When in doubt, say it out loud



Data Types

- Take special care to make sure you are using the correct data type
- You and excel might be seeing two different things



Calculations

- Our data is just the starting point
- We will need to include our own calculations to answer the case study

Create a new column



| J | K | L | M | N | O |
|---------------|---------------|---------------|---------------|---------------|----------------|
| Dividend 2018 | Dividend 2019 | Dividend 2020 | Dividend 2021 | Dividend 2022 | Total Dividend |
| 213 | 232 | 237 | 254 | 262 | =SUM(J49:N49) |

Pivot Tables

- Pivot tables are a necessary bridge between raw data and visualization

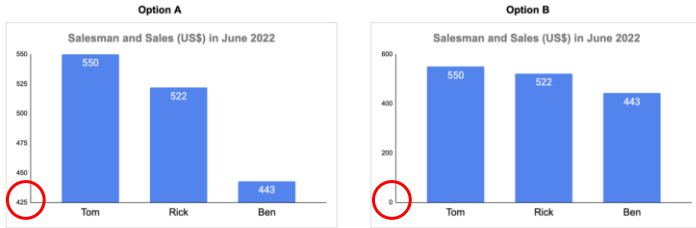
The screenshot displays an Excel interface with a PivotTable and a PivotTable Fields task pane. The PivotTable has 'Row Labels' and 'Count of Company Name'. The data is as follows:

| Row Labels | Count of Company Name |
|------------------------------|-----------------------|
| Business Services | 1 |
| Consumer | 6 |
| Energy | 5 |
| Financials | 18 |
| Healthcare | 10 |
| Industries | 2 |
| Life Sciences | 4 |
| Materials | 4 |
| Real Estate & Infrastructure | 28 |
| Technology | 20 |
| Utilities | 1 |
| Grand Total | 99 |

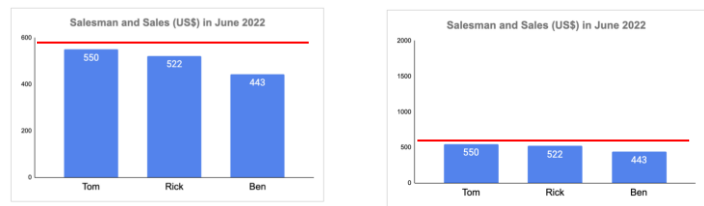
The PivotTable Fields task pane shows 'Sector' in the Rows area and 'Count of Comp...' in the Values area. The chart area shows a horizontal bar chart titled 'Total' with the same data as the PivotTable.

Principles of Data Visualization

Ensure your axes start from zero



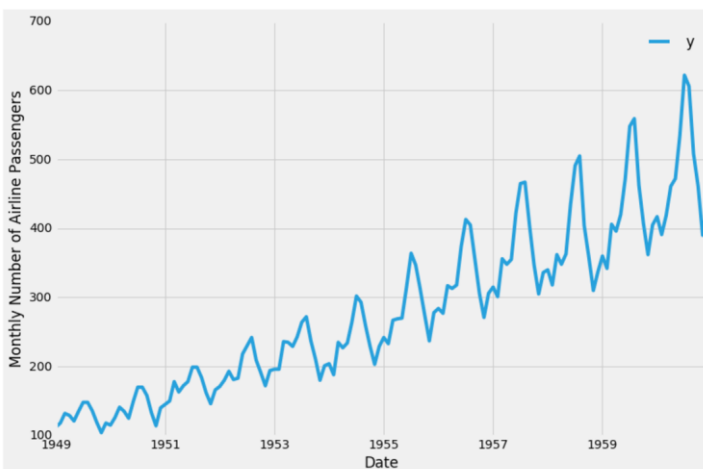
The scale of the y-axis matters



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Principles of Data Visualization

Reduce Clutter



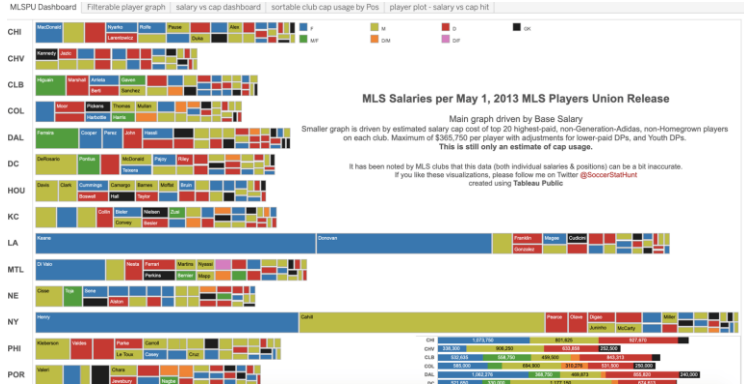
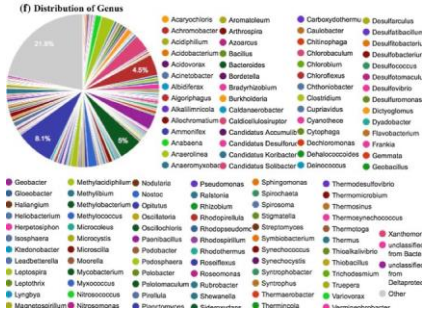
Name 6 changes that would make this more readable:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

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Principles of Data Visualization

With colors, less is more



Principles of Data Visualization

With colors, less is more

