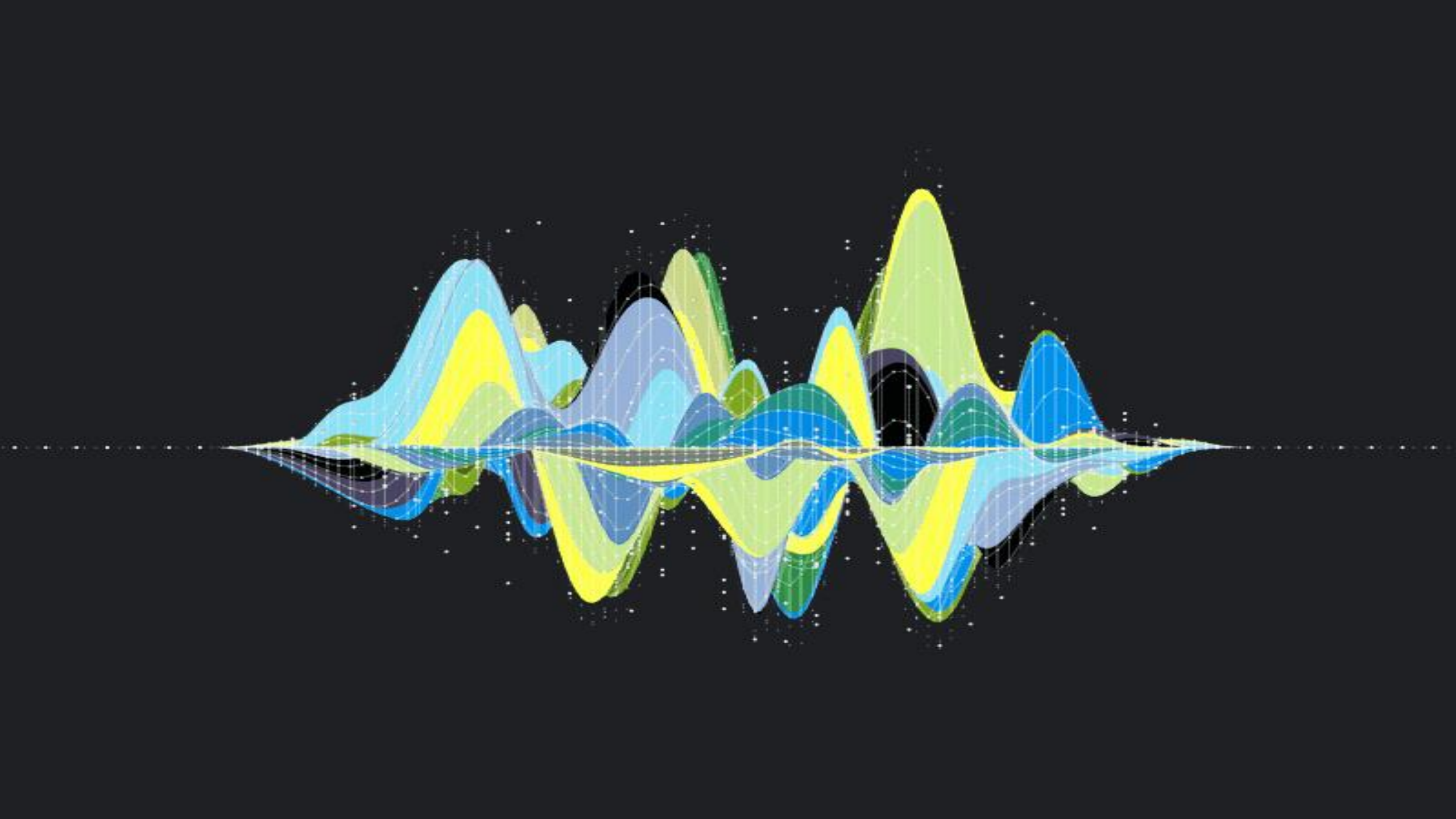
Week 7: Data Visualisation and Dashboarding

Presented by:

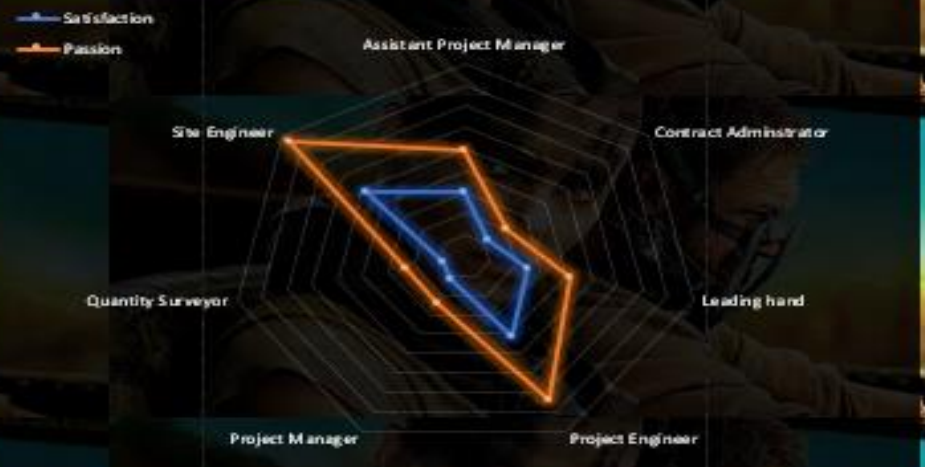
Dr. Mehdi Rajabi Asadabadi



HR Department - PineTree Construction Co

Role Performance

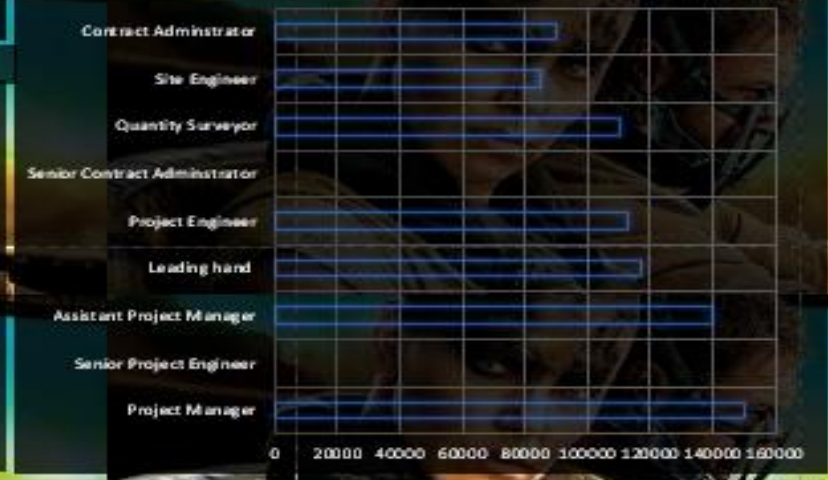
Role Satisfaction and Passion for work

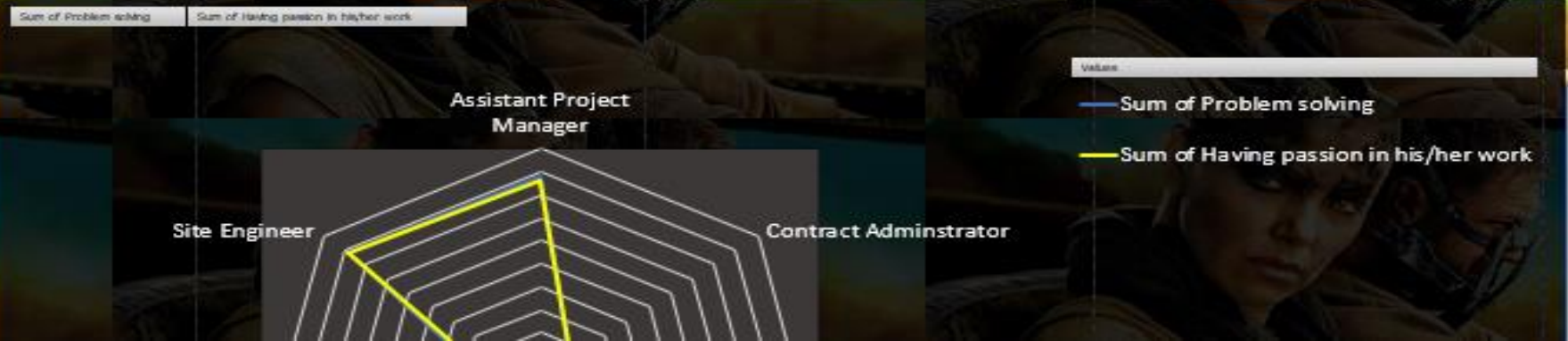


Roles in Project

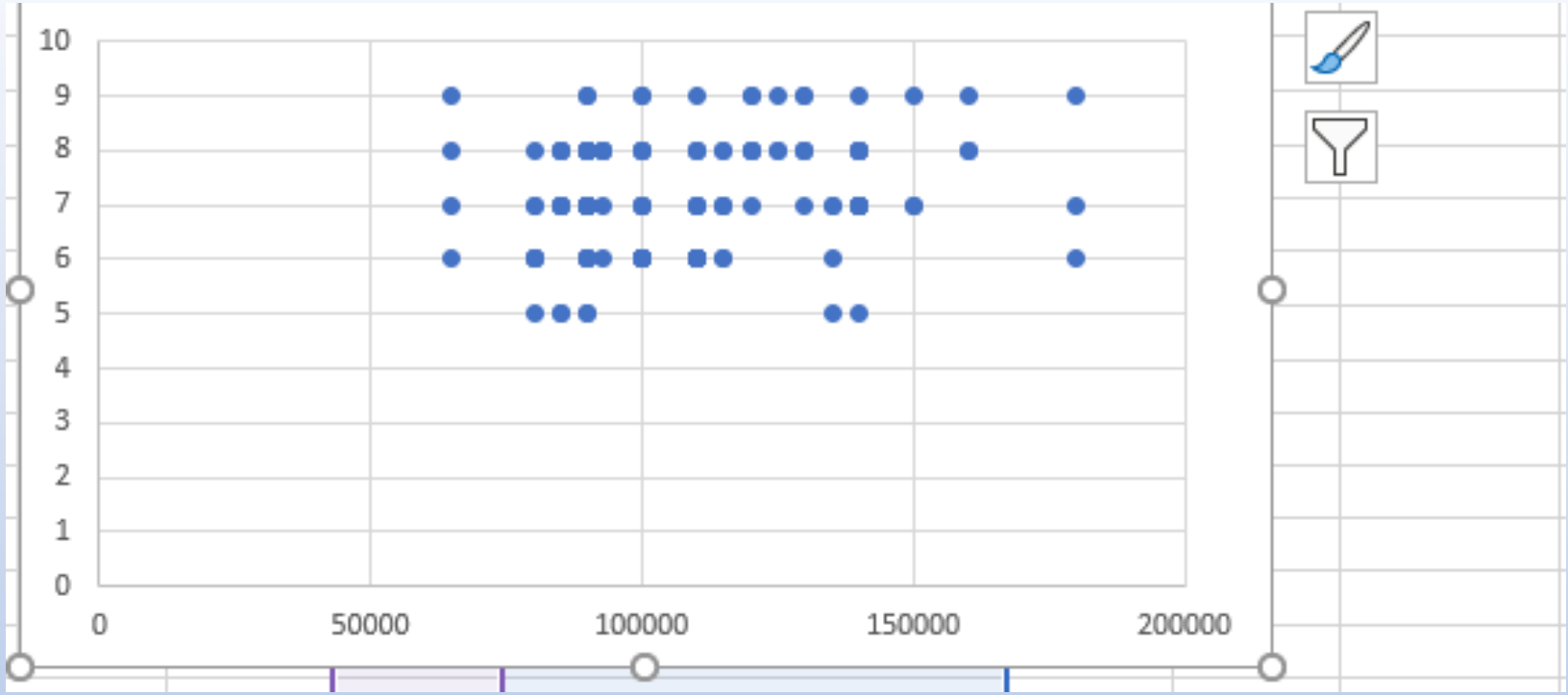
People in Roles

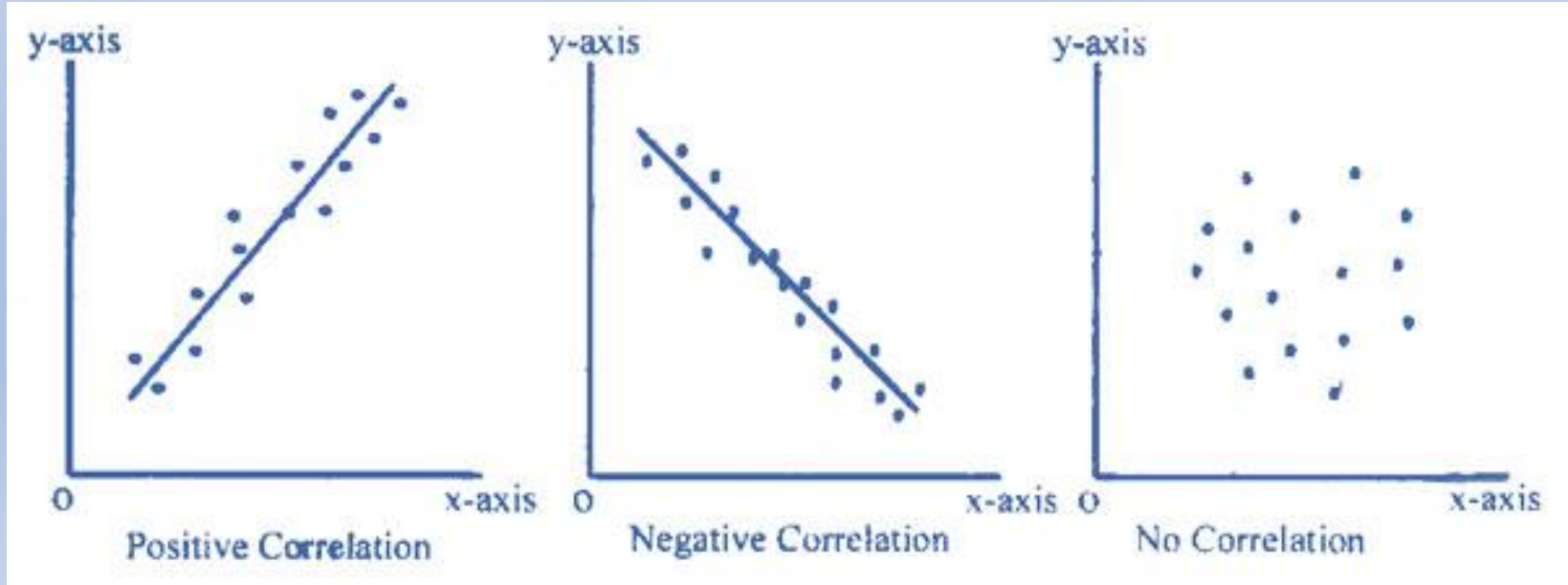
Average Salaries





AA	AB	AC
	Salary	Perfromance Level 202
	100000	
	90000	
	110000	
	120000	
	115000	
	140000	
	80000	
	65000	
	100000	
	85000	
	90000	
	110000	
	80000	
	140000	
	135000	
	110000	
	100000	
	85000	
	90000	
	110000	
	90000	
	100000	





Where visualisation is used

Changes over time : This is perhaps the most basic and common use of data visualisation, but that doesn't mean it's not valuable.

Determining frequency: Frequency is also a fairly basic use of data visualisation because it also applies to data that involves time. If time is involved, it is logical that you should determine how often the relevant events happen over time.

Determining relationships (correlations): Identifying correlations is an extremely valuable use of data visualisation. It is extremely difficult to determine the relationship between two variables without a visualisation, yet it is important to be aware of relationships in data.

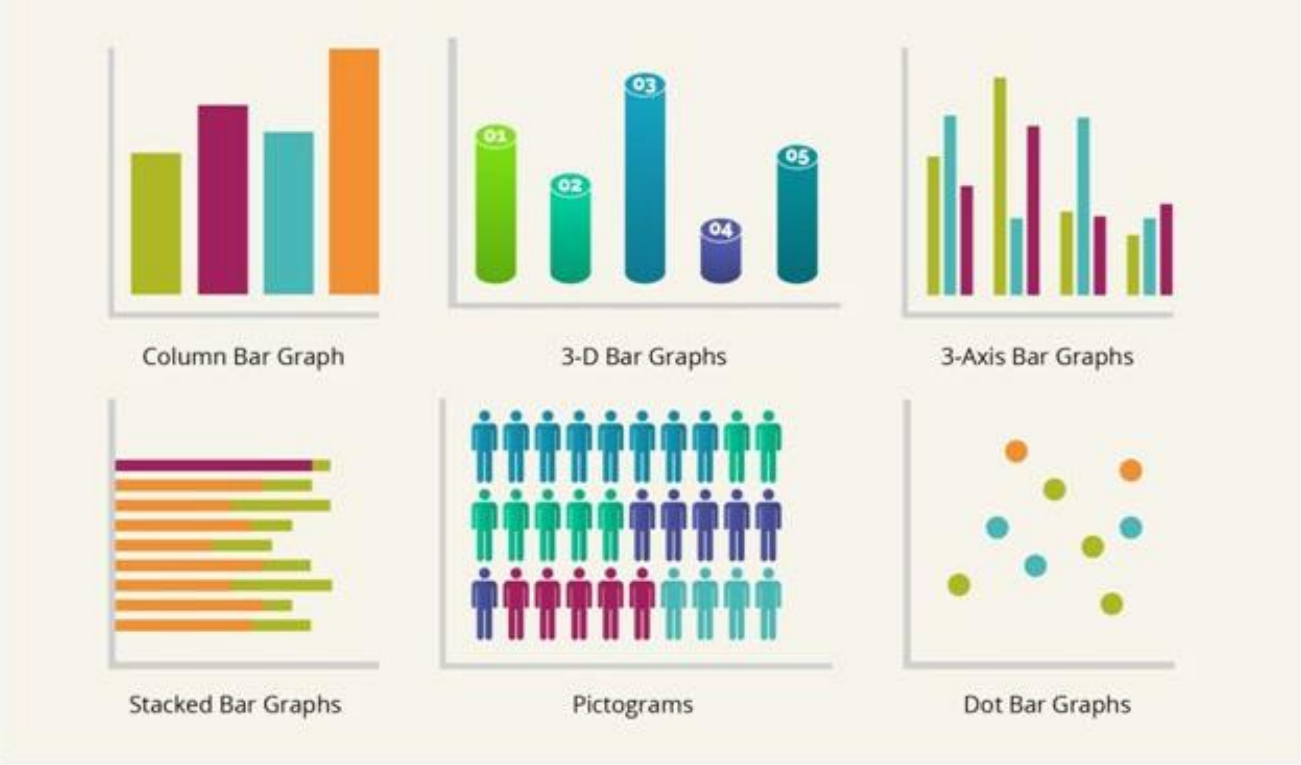
Monitoring the supply chain performance: Monitoring performance of the supply chain, where there are daily data coming from a range of suppliers can be quite challenging. This becomes much easier by looking at visualised data.

Analysing value and risk: Determining complex metrics such as value and risk requires many different variables to be factored in, making it almost impossible to see accurately with a plain spreadsheet. Data visualisation can be as simple as color-coding a formula to show which opportunities are valuable and which are risky.

Data visualisation should be…

Informative	Data visualisation should be able to convey the desired information from data to the reader.
Efficient	Data visualisation should not be ambiguous.
Appealing	Data visualisation should be captivating and visually pleasing.
Interactive and Predictive (Optional)	Data visualisations can contain variables and filters with which the users may interact to predict results of different scenarios.

Different types of graphs



Column /Bar charts are used to present separate values, especially the differences between these values. They can be used for comparison purpose.

- **Advantages**: summarise a large dataset in visual form; easily compare two or three data sets; better clarify trends than do tables; estimate key values at a glance.
- **Variations**: 3-D Bar Graphs; 3-Axis Bar Graphs; Stacked Bar Graphs ; Line/Dot Bar Graphs; Histograms; Pictograms.

In a meeting with CEO, you become in charge of improving the performance of the production lines of the company.

Let’s evaluate the performance of production line 1

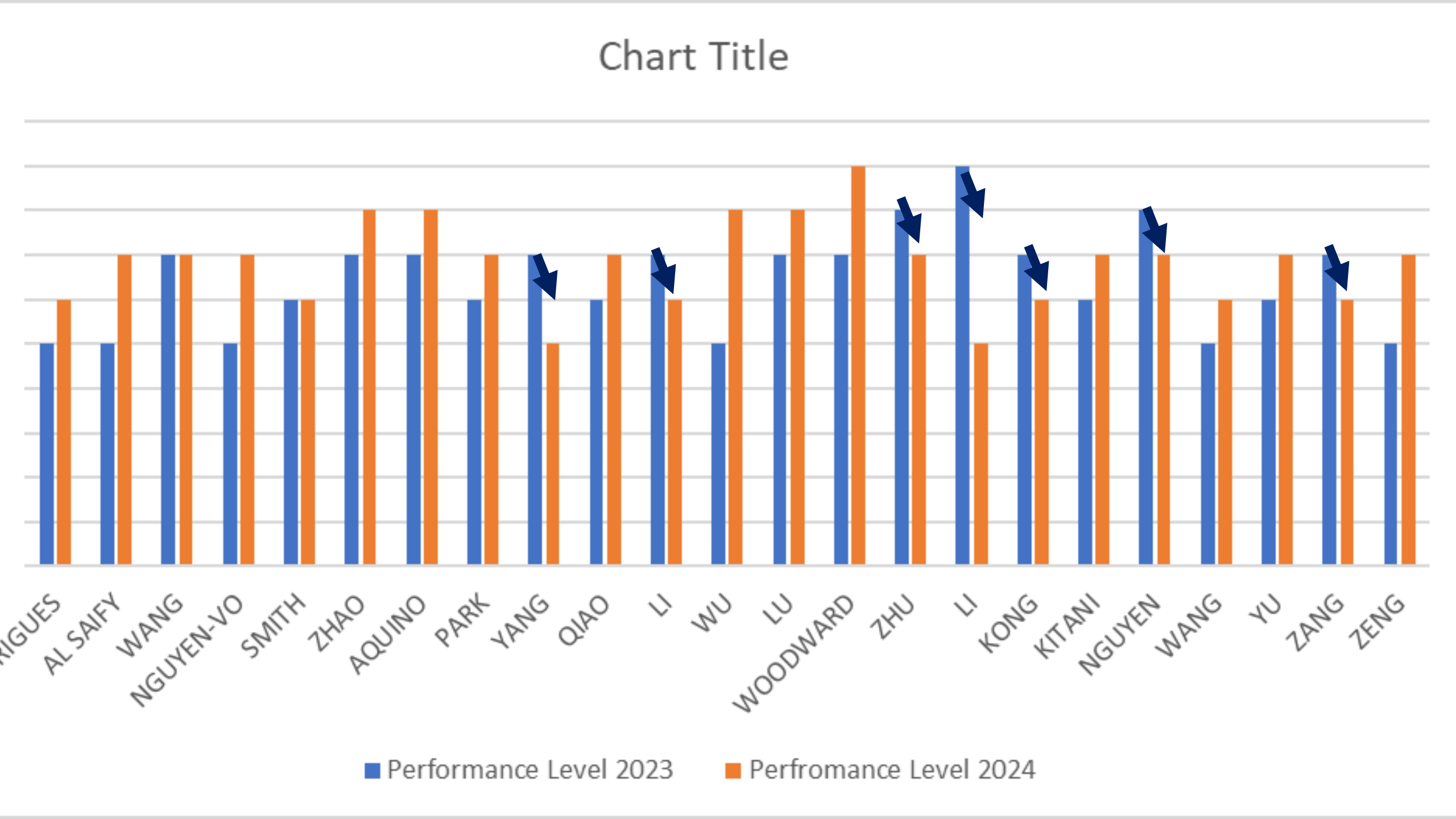
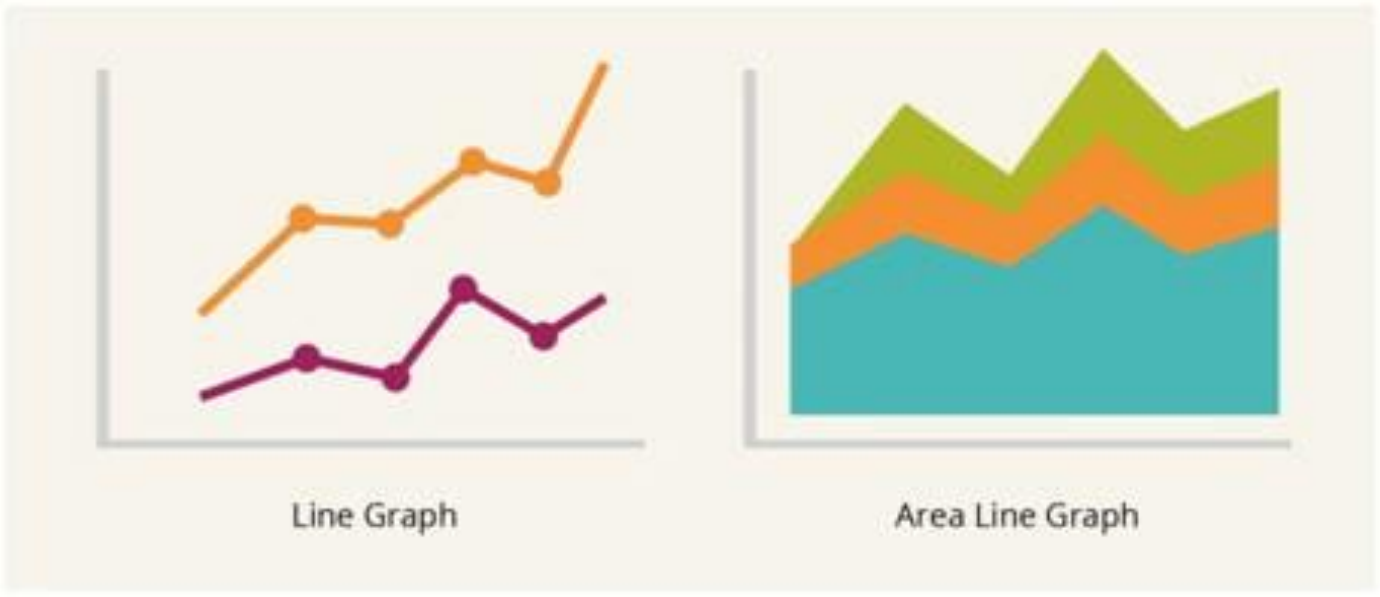


Chart Title
RIGUES
AL SAIFY
WANG
NGUYEN-VO
SMITH
ZHAO
AQUINO
PARK
YANG
QIAO
LI
WU
LU
WOODWARD
ZHU
LI
KONG
KITANI
NGUYEN
WANG
YU
ZANG
ZENG
Performance Level 2023
Perfromance Level 2024

So, as a manager, you can do this with different production lines and compare, evaluate, and **find ways to improve their performances**

Naturally, some people outperform each year. So, only if you try **to pick those who are not improving** and try to motivate them, you will keep doing better.

Line Charts



Show how a value changes over time, though the independent variable can really be anything. Since they are most commonly used to visually represent trends over time, **line charts are sometimes referred to as time-series** charts.

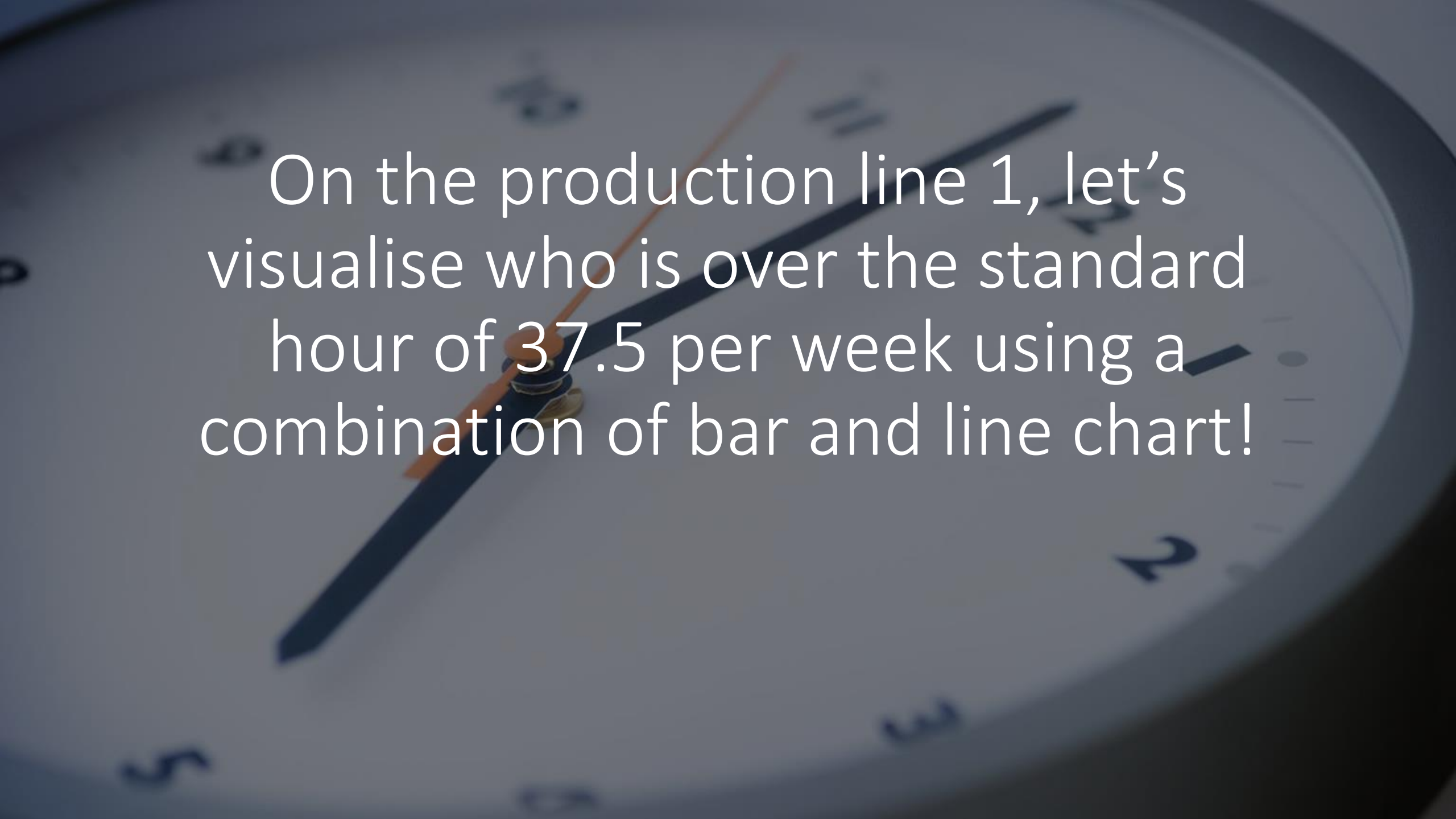
- **Advantages**: show trends and relationships between data better than other graphs; compare trends in different groups of a variable; clearly show error values in the data; Usually simple to read and understand

$903,000

Up 6.2% ↑

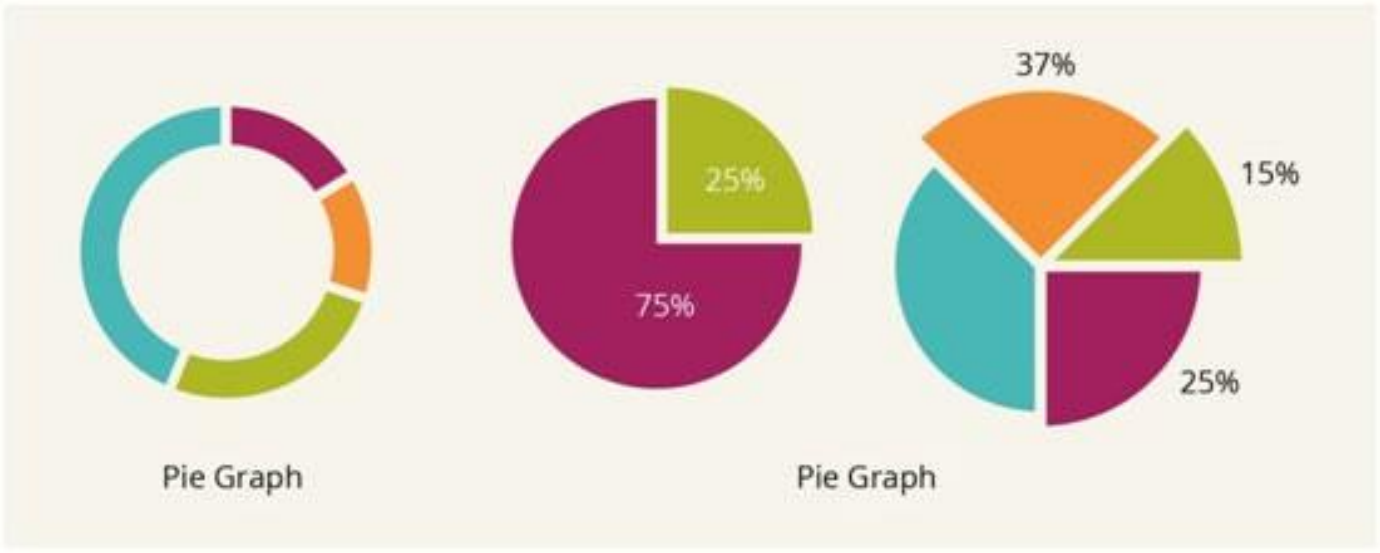
Source: realestate.com.au

5 year median price trend



On the production line 1, let’s visualise who is over the standard hour of 37.5 per week using a combination of bar and line chart!

Pie Chart

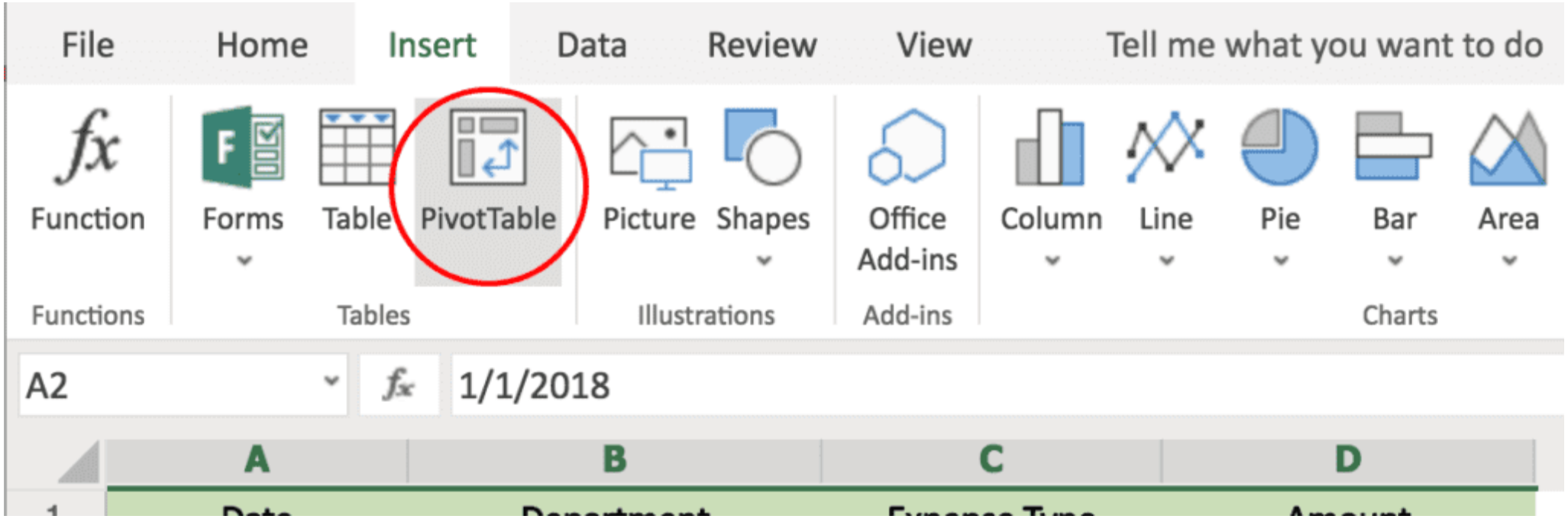


Typically used to summarise categorical data, or mostly percentile value.

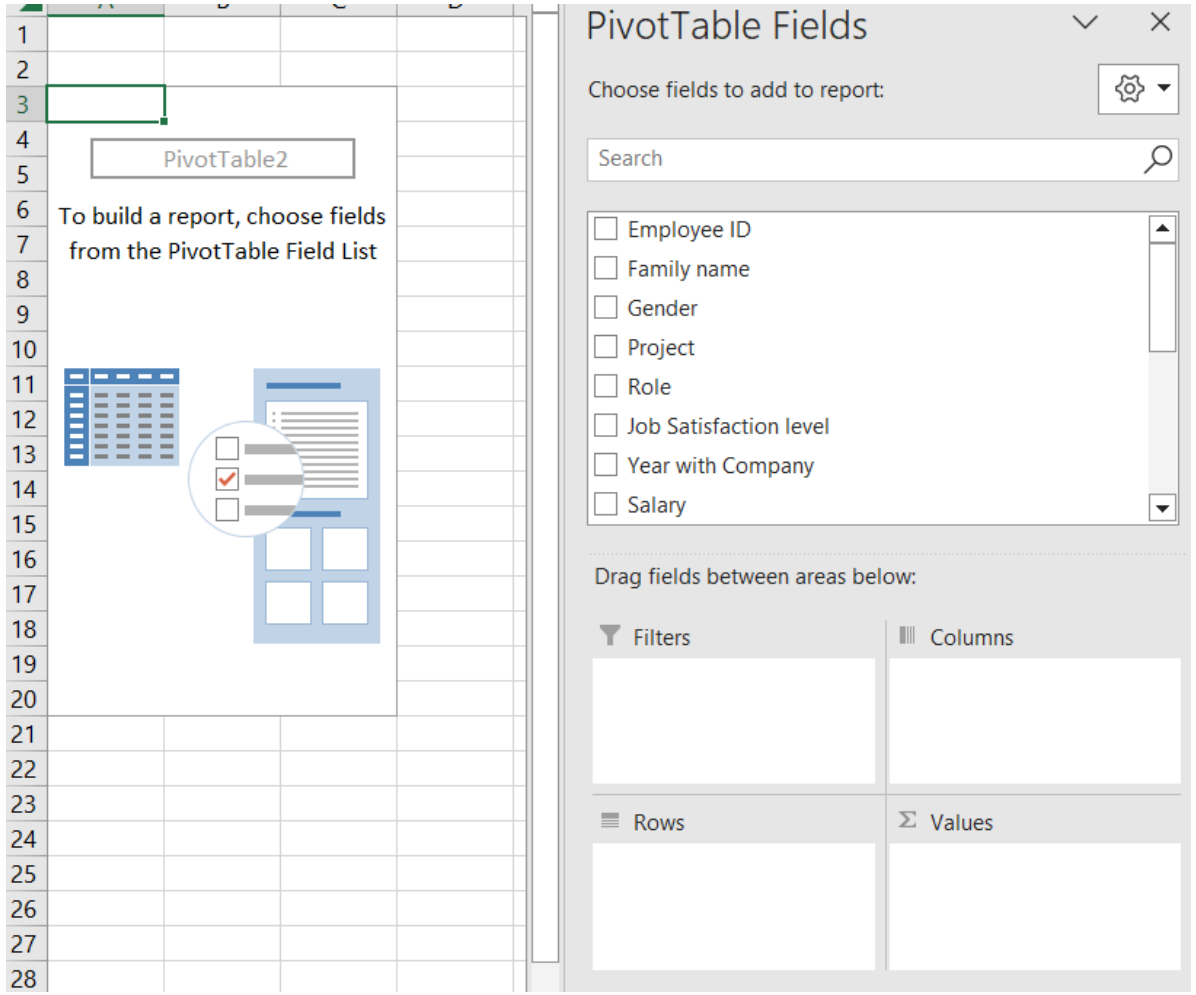
- **Advantages:**
- It provides an excellent visual concept of a whole; clear comparison of different components,
- It exposes information by the visual separation of a segment
- It is easy to label.

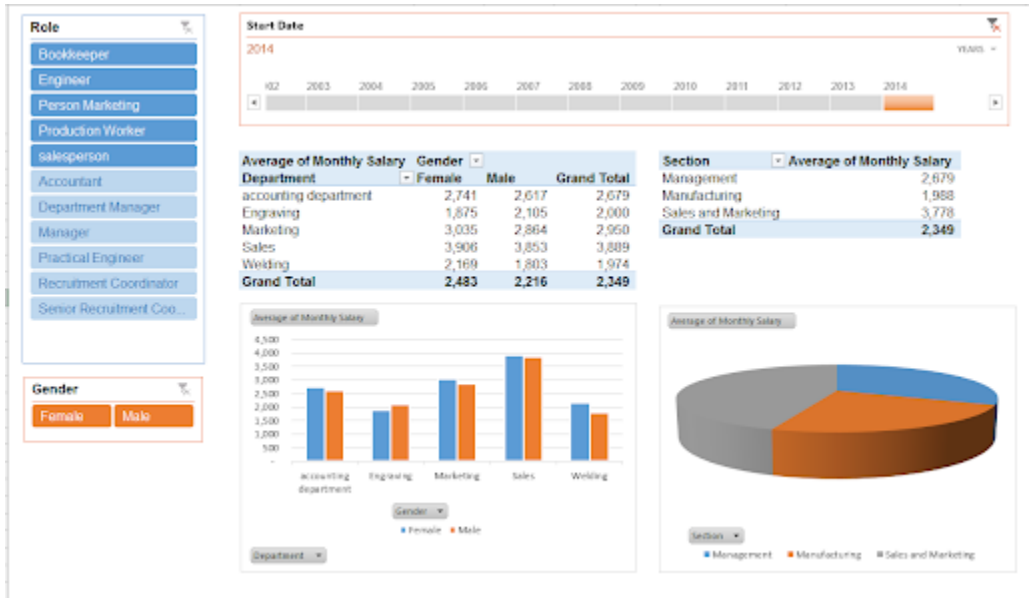
- **Variations:** Donut Graph

Pivot tables



Pivot tables





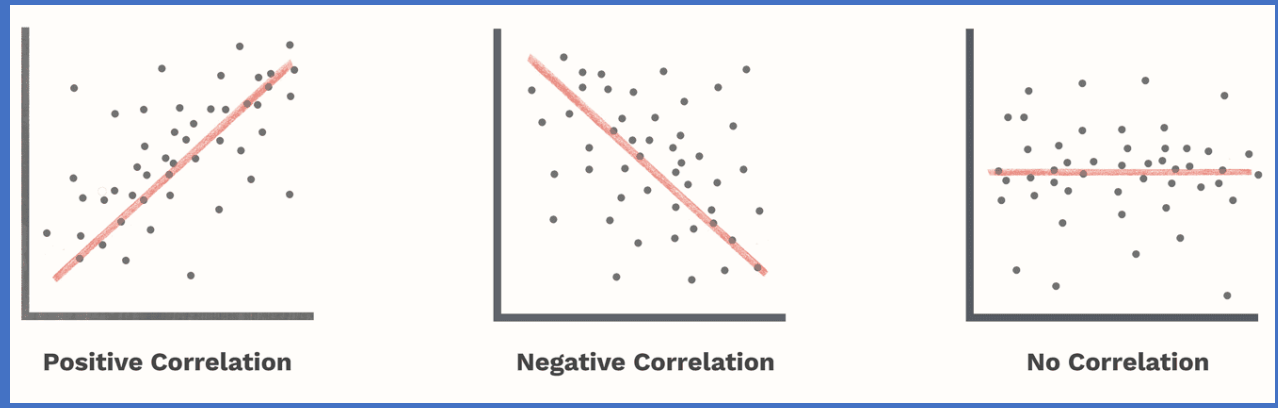
Scatter plots

It is particularly useful when one of the variables (represented by the y-axis) is dependent on the other (represented by the x-axis). The resulting pattern (after all the points have been plotted) will indicate the strength of the correlation between two variables.

- **Advantages**: Clearly indicates data correlation (illustrates positive, negative, strong, weak relationships); method of illustration non-linear patterns; shows spread of data, outliers; clearly demonstrate atypical relationships; used for data extrapolation and interpolation

- **Disadvantages**: impossible to label data points, hard to find out exact values; error bars and too many data points can quickly make graph unreadable; cannot show relationship between more than two variables at once.

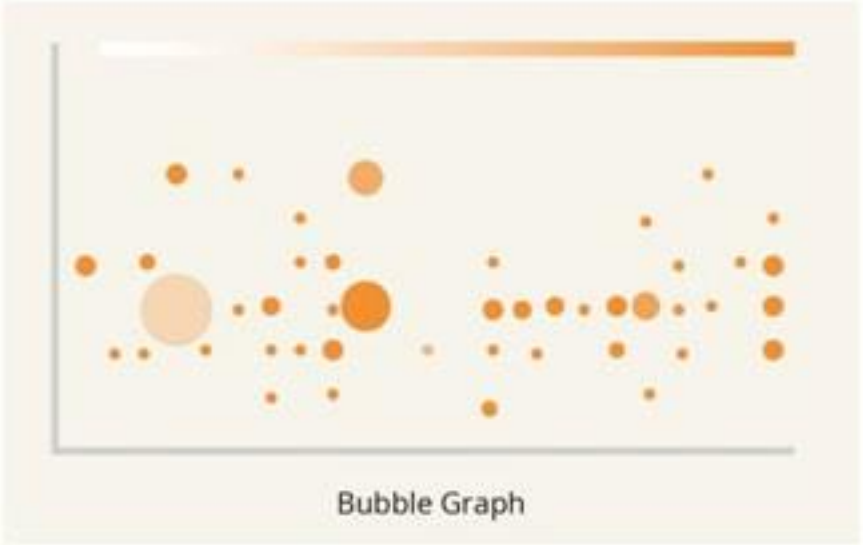
Perfromance Level 2024
10
9
8
7
6
5
4
3
2
1
0
0
50000
100000
150000
200000


Positive Correlation
Negative Correlation
No Correlation

Bubble graph

Bubble graphs are useful for comparing the relationships between data objects in 3 numeric-data dimensions: the x-axis data, the y-axis data, and data represented by the bubble size. Bubble charts are often used in business to visualise the relationships between alternatives investment in dimensions such as cost, value, and risk.

- **Advantages**: display three variables without using 3D graphs; visual size makes it very easy to make relative comparisons; Conveys same information as a line graph
- **Disadvantages**: due to circle sizes, can be difficult to ascertain actual values; difficult to read and understand; cannot be used to display a lot of data.

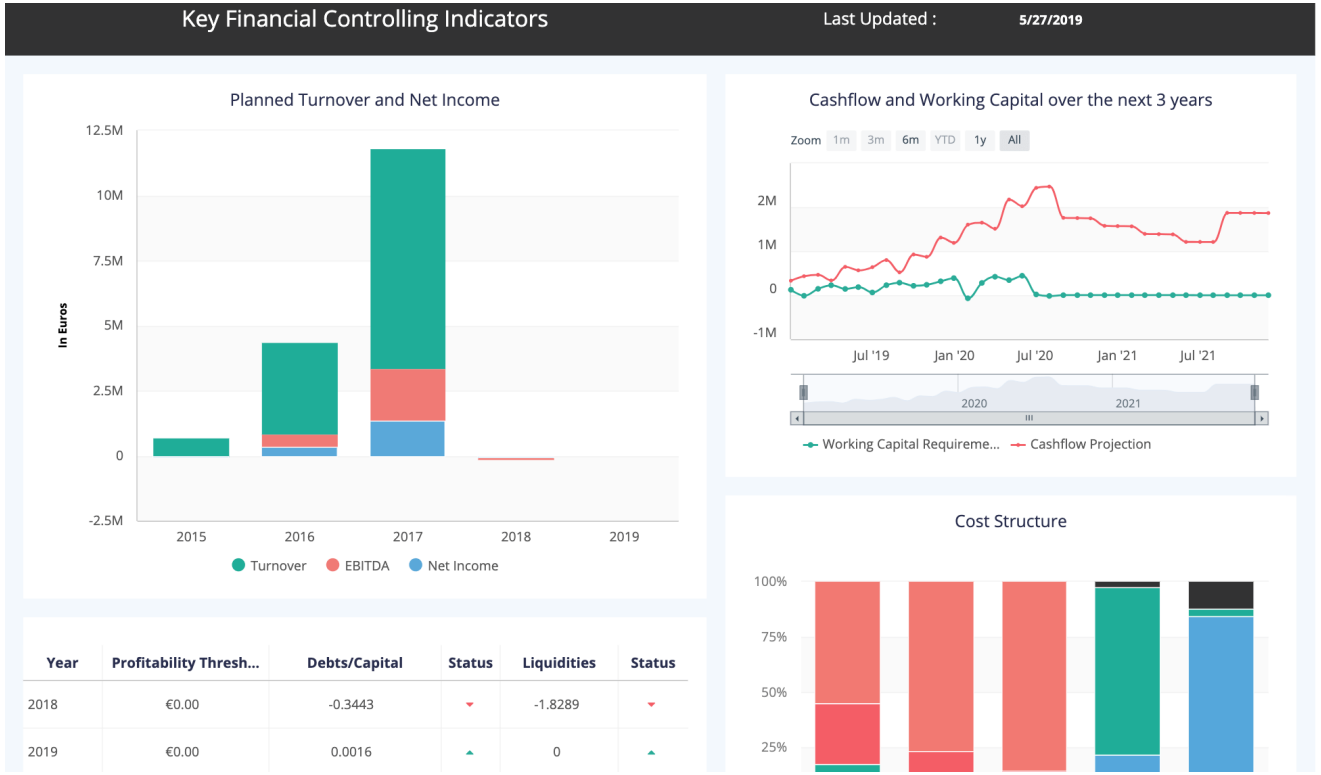


Radar Chart (Spider chart)

A Radar charts are very useful when comparing performance/measurement **results from different sources.** Obviously, the greater the area covered by the plot, the greater the overall value. Through comparison and analysis, people can figure out their current situation: improving or falling behind.

- **Advantages:** primary way of displaying **more than two or three values at once**; excellent way to get a "feel" for data;
- **Disadvantages:** cannot compare more than two or three different plots at once; without colouring, can be difficult to tell which points belong to which; **too many axis makes it difficult to read** less intuitive than other graph types

Dashboarding: Chart vs. Dashboard



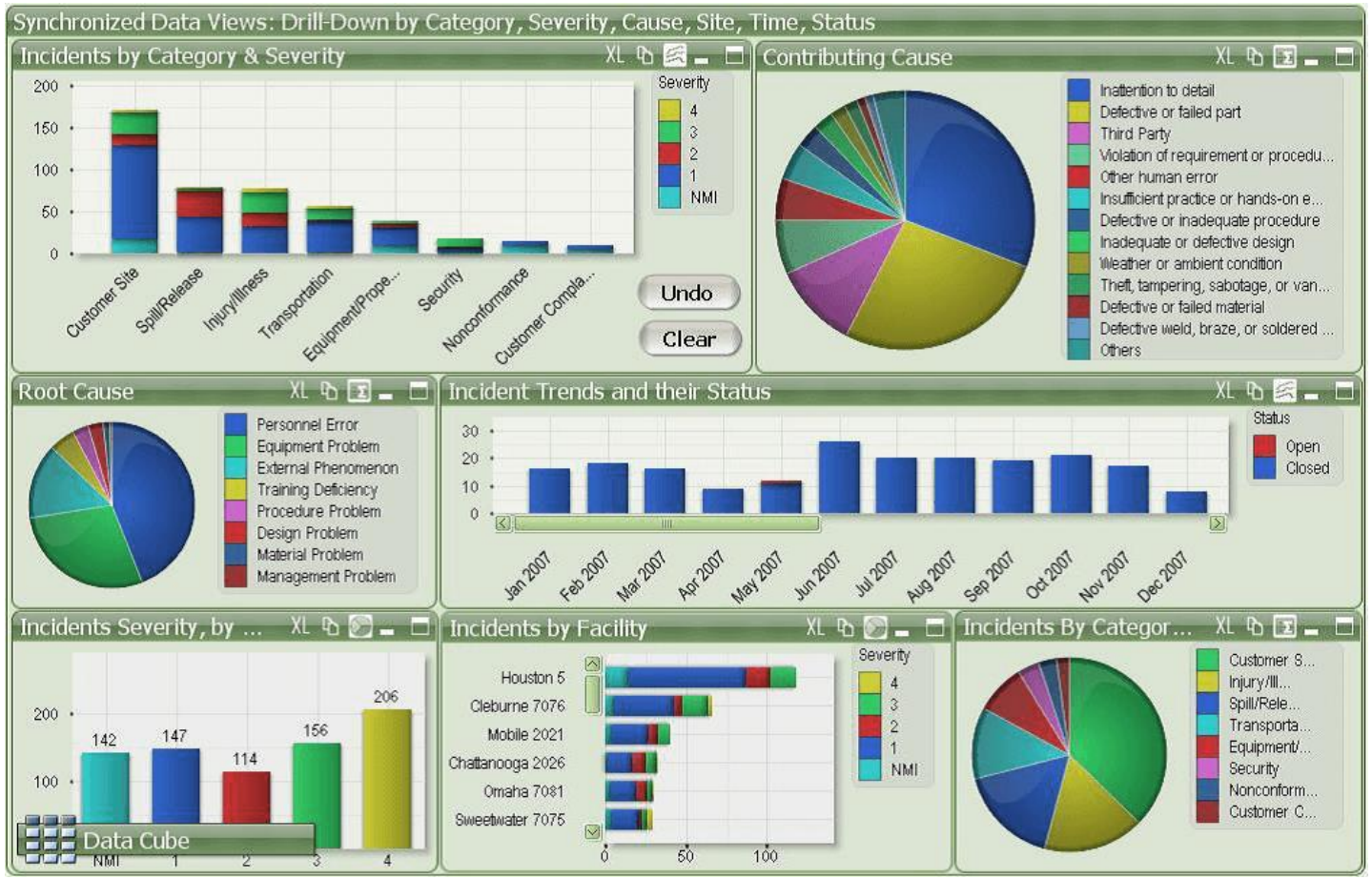
A chart or a graph:

- **A chart**, or a graph, is the display of a specific information (**a chapter of a story**).

A dashboard:

- A dashboard is a **collection of these** (chapters come together to tell a story)
- Your dashboard **needs to narrate a story**; it needs to have a goal, and some objectives.
- It is arranged on a single screen so the information can be monitored at a glance

Dashboarding

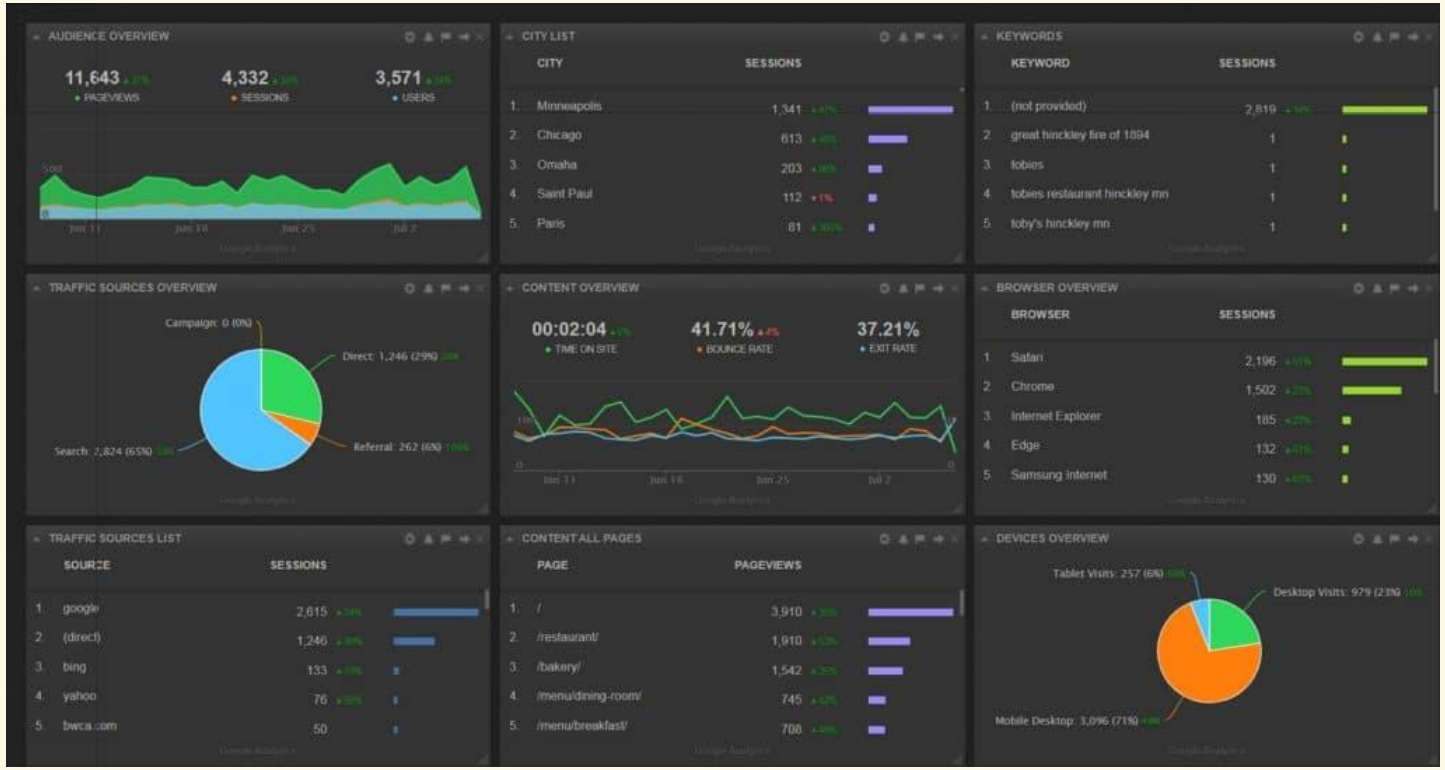


A dashboard:

- **Usually brings data from different data sets, or different part of a big data together** to visualise them and tell a story.
- Data that are brought together need to be **related and connected**
- Where you have, include the display **Key Performance Indicators (KPIs).**

Note: All charts in Excel change as you change the source of data. This helps your dashboard to be updated as data is updated.

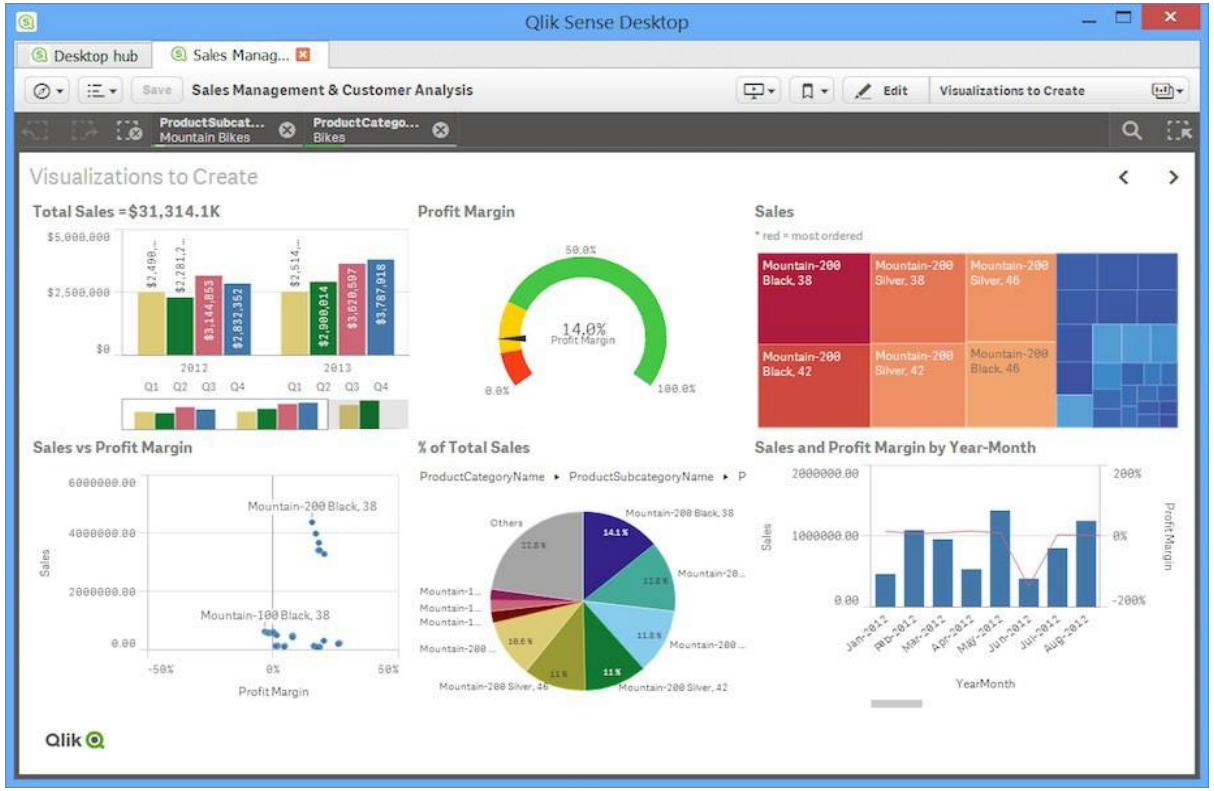
Characteristics of Dashboards

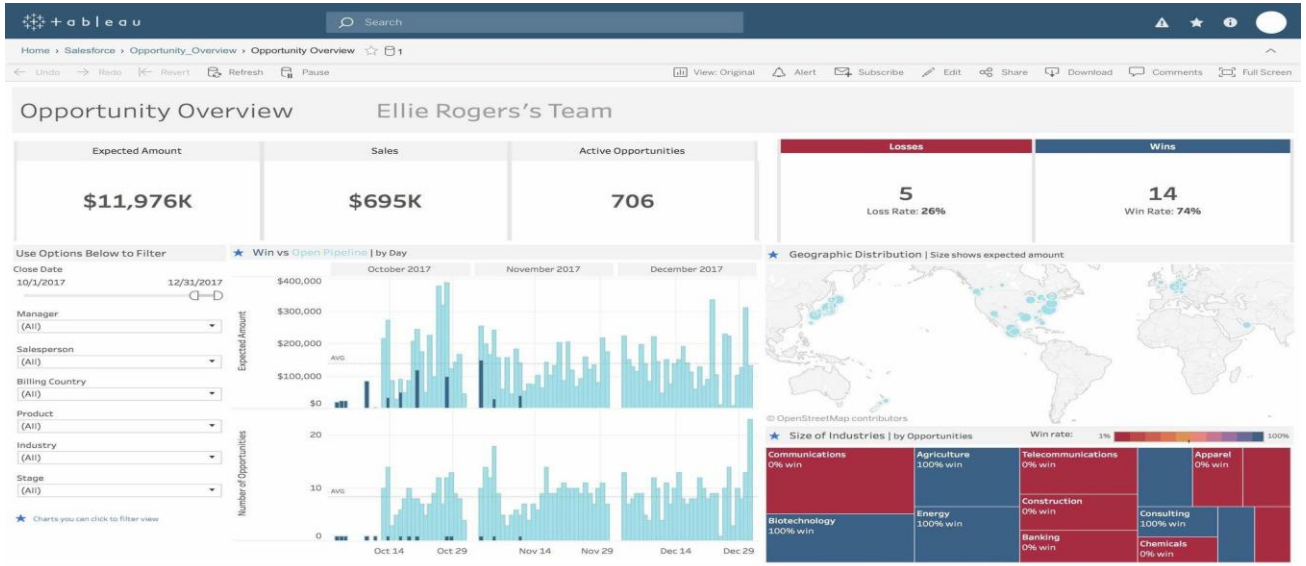


- Customisable
- Interactive
- Real-Time monitoring
- All of the data is in one place
- Get everyone on the same page
- They are capable of gaining viewers focus

Other Data visualisation & dashboarding tools

- PowerBI,
- QlikView
- Tableau





Dashboard in Excel

- It is an enhanced form of Data Visualisation.
- A data source for creating Excel dashboards can be Spreadsheets, Text Files, Web Pages, Organizational Database.

Examples:

https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467b48e9ecf6

http://www.cidrap.umn.edu/covid-19/maps-visuals

D-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU)

: (M/D/YYYY)
, 5:20 PM

Total Cases	Total Deaths	Total Vaccine Doses Administered
480,115,822	6,121,156	10,868,565,572

28-Day Cases	28-Day Deaths	28-Day Vaccine Doses Administered
45,462,311	181,049	392,836,869

eaths by
/Sovereignty

00 | 6,955
| 14,899

80 | 2,208
42,258

50 | 4,907
| 127,599

82 | 3,591
| 142,664

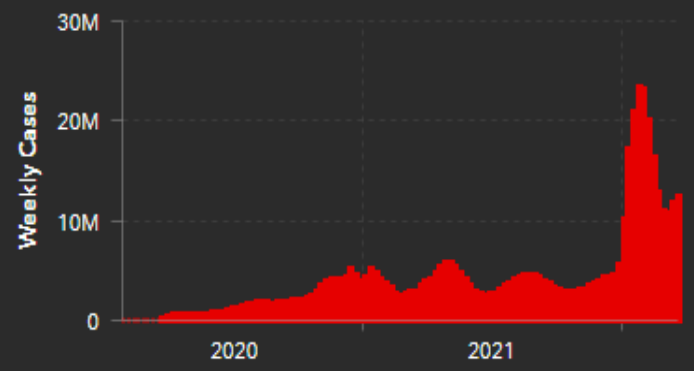
67 | 3,249
| 165,046

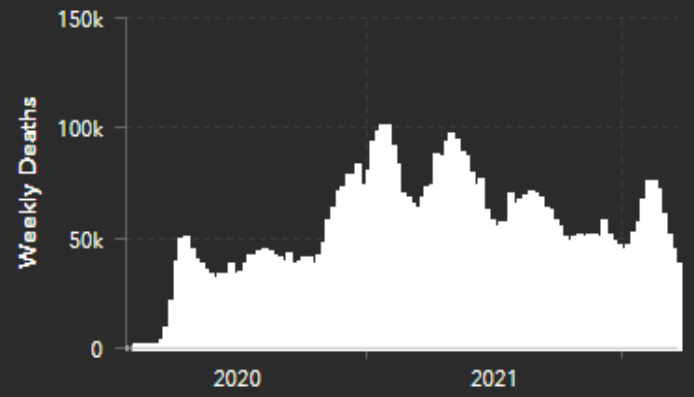
31 | 4,284
| 158,700

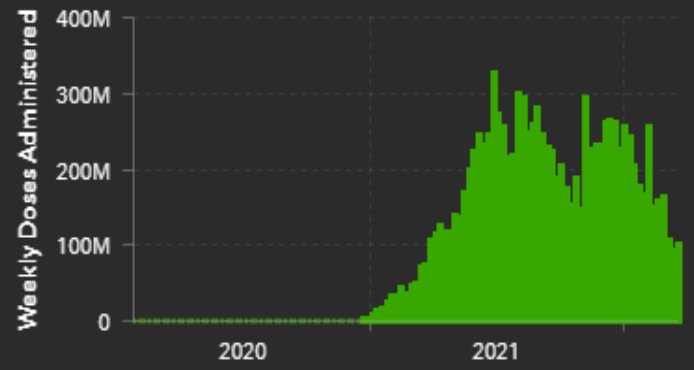
58 | 16,515
| 359,693

Esri, FAO, NOAA

Powered by Esri







n0

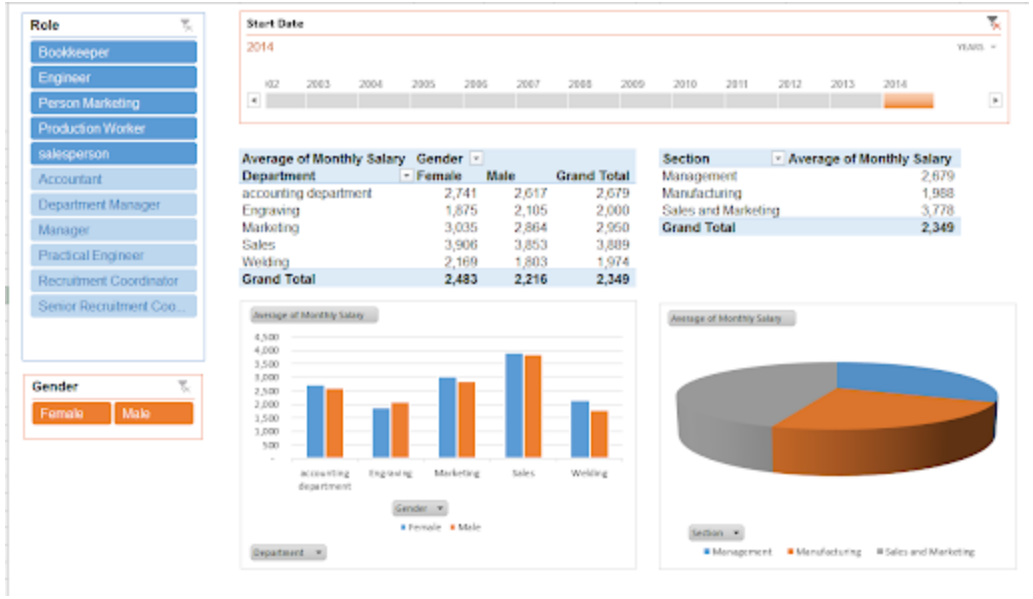
28-Day | Totals | Incidence | Case-Fatality Ratio | Global Vaccinations | US Vaccinations | Terms of Use

Weekly | 28-Day

Sales Data in Dashboard
Sale Department, Perth
Be Creative and Patient to Design Dashboards
Created By
Mehdi Rajabi Asadabadi
Sum of Units Sold
Total
22%
22%
28%
28%
Season
Autumn
Spring
Summer
Winter
(blank)
Sum of Discount Applied
Sum of Units Sold
Albany
Armadale
Broome
Bunbury
Busselton
Esperance
Fremantle
Geraldton
Joondalup
Kalgoorlie
Karratha
Mandurah
Midland
Port Hedland
Rockingham
(blank)
Values
Sum of Discount Applied
Sum of Units Sold
Store Name
Sum of Sale Price
Total
(blank)
Toys & Games
Outdoor & Sports
Home Essentials
Groceries
Electronics
Books
Beauty & Health
Apparel
56000 58000 60000 62000 64000 66000
Product Category
Total
Sum of Discount Applied
Sum of Units Sold
Product ID
Sum of Units Sold
Total
14000
13500
13000
12500
12000
11500
11000
Store Name
Count of Product Category
Total
Product Category
Apparel
Beauty & Health
Books
Electronics
Groceries
Home Essentials
Outdoor & Sports
Store N...
Albany
Armadale
Broome
Bunbury
Busselton
Esperance
Season
Autumn
Spring
Summer
Winter
Product ...
Apparel
Beauty & ...
Books
Electronics
Groceries
Home Ess...
Outdoor & ...
Toys & Ga...

Once you change anything in your master dataset, you can refresh, and all your tables and chart will be updated.

So, using these Pivot Table based Charts, you can create an interactive dashboards!



The Importance of Monitoring Supply Chain Performance

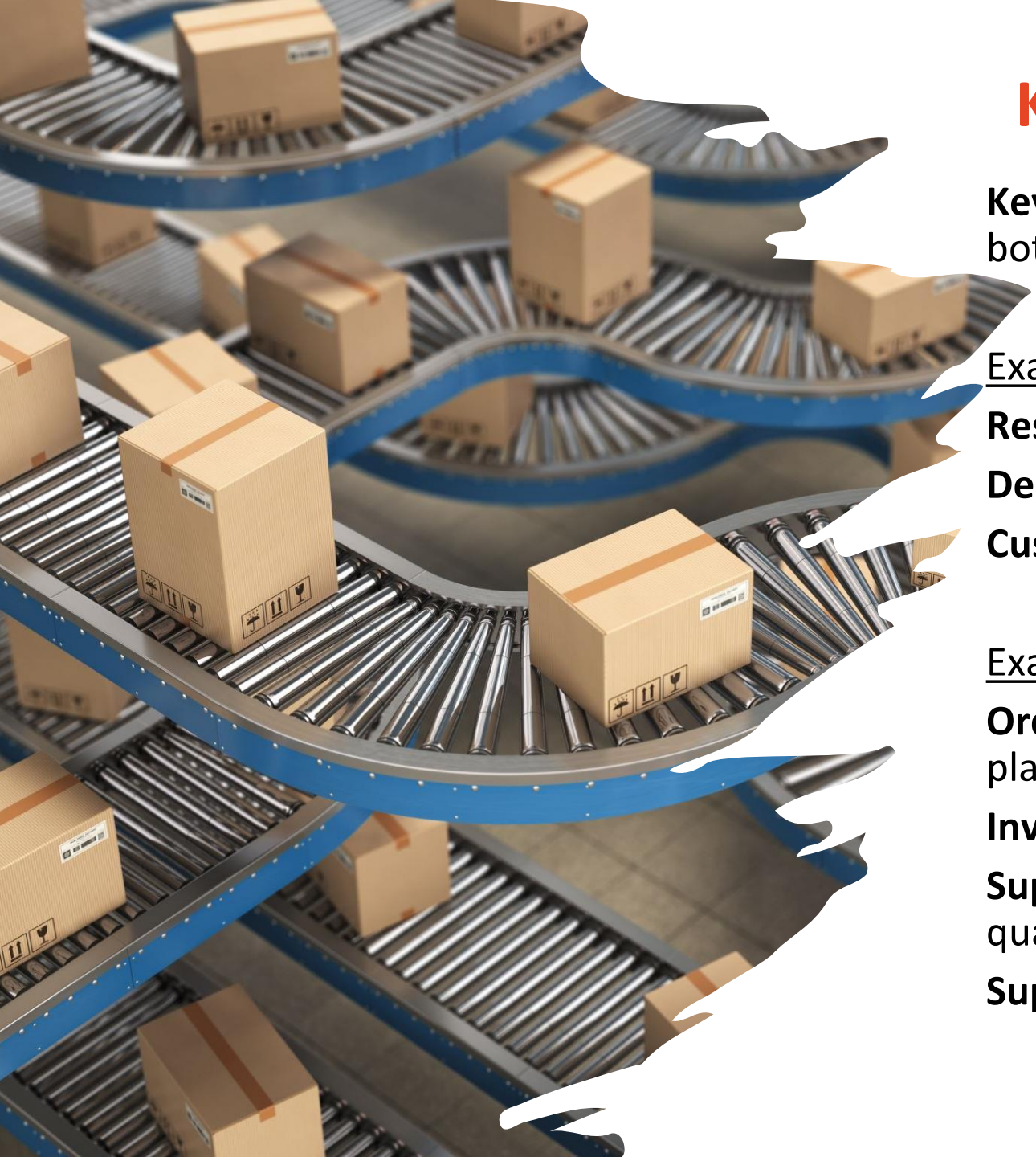
Cost Reduction: By identifying areas of waste and inefficiency, organisations can reduce costs.

Customer Satisfaction: Ensuring availability of inventory, on-time delivery and product quality

Risk Mitigation: Measuring performance helps identify and mitigate risks.

Supplier Relationships: Effective performance measurement enhances communication and collaboration with suppliers and enhances the chance of establishing long-term relationships with them.

Monitoring Supply Chain Performance: Key Performance Indicators (KPIs)



Key Performance Indicators (KPIs)

Key Performance Indicators (KPIs) are essential for both **supply chains** and **service chains** (often included in SLA)

Examples in Service Chains:

Response Time

Delivery Time

Customer Complaint Rates

Examples in Supply Chains:

Order Fulfillment Cycle Time: The time from order placement to delivery.

Inventory Turnover: How quickly inventory is sold or used.

Supplier Performance: Metrics related to supplier reliability, quality, and lead times.

Supply Chain Cost: Total cost of supply chain operations.

KPIs need to have some sort of formulas to compute specific values

Perfect Order Measurement (POM):

- The percentage of orders that arrive complete, on time, damage-free, and with a correct invoice.
- POM=(%Complete)×(%On time)×(%Damage free)×(%Correctly invoiced)

Cash to Cash Cycle Time (CCC):

- Measures the time it takes to convert inventory and accounts receivable into cash.
- CCC = Days Inventory Outstanding + Days Sales Outstanding - Days Payable Outstanding

Inventory Turnover (IT):

- Indicates how efficiently inventory is managed.
- IT = Cost of Goods Sold / Average Inventory

Lead Time:

- The time from placing an order to receiving it.
- Lead Time = Time of Order Placement to Receipt

Freight Cost per Unit Shipped:

- Measures shipping costs per unit.
- Freight Cost per Unit Shipped = Total Freight Costs / Total Units Shipped

KPI Example: Inventory Turnover (IT):
(the higher the ratio, the better)

Inventory turnover=

(cost of all goods sold)/(value of average inventory)

PROBLEM
The YouRace Company builds racing cars. In 2022, the **total cost of cars sold** was $3 million. Its total inventory holding changed throughout the year, but **the average inventory holding** was worth $250,000.

At the end of 2023, it implemented just-in-time principles to improve its inventory performance. In 2023, its sales increased and **the cost of cars was** $4.5 million, while **the average inventory holding** was $300 000.

Answer:

- Inventory turnover in2022=3,000,000/250,000=12
- Inventory turnover in 2023=4,500,000/300,000=15

An Effective Dashboard May Include Key Performance Indicators (KPIs) to facilitate Efficient Monitoring of the Performance of your Supply Chain.