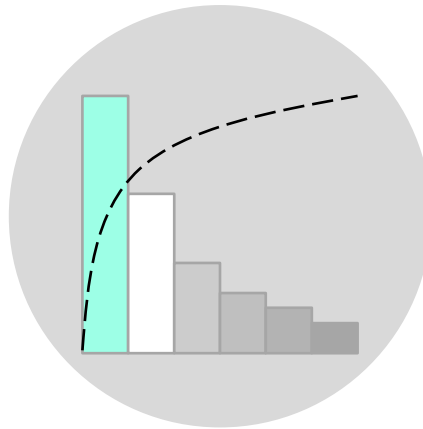


Continuous Improvement Toolkit

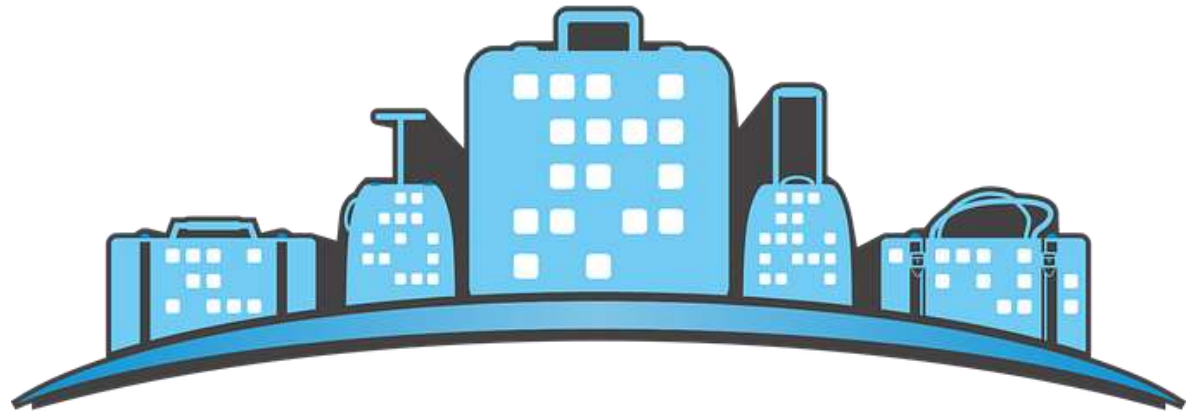
PARETO ANALYSIS



PARETO ANALYSIS

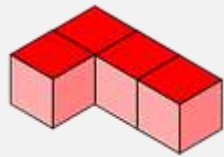
A principle that helps to focus on the most important matters to obtain the maximum benefits.

It describes a phenomenon that a small number of high values contribute more to the total than a high number of low values.

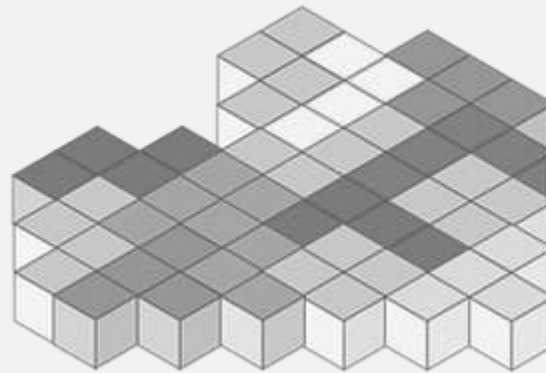


PARETO ANALYSIS

The main idea behind the Pareto analysis is to identify the “**vital few**” from the “**trivial many**”.



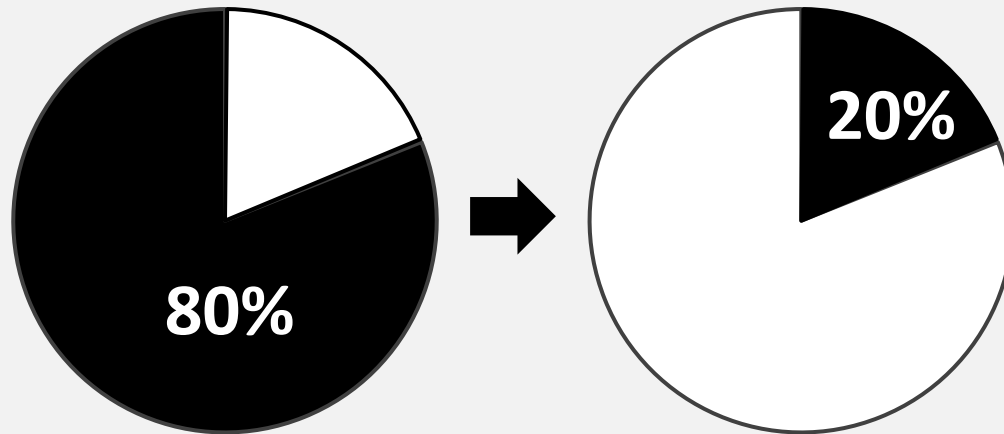
Vital Few



Trivial Many

PARETO ANALYSIS

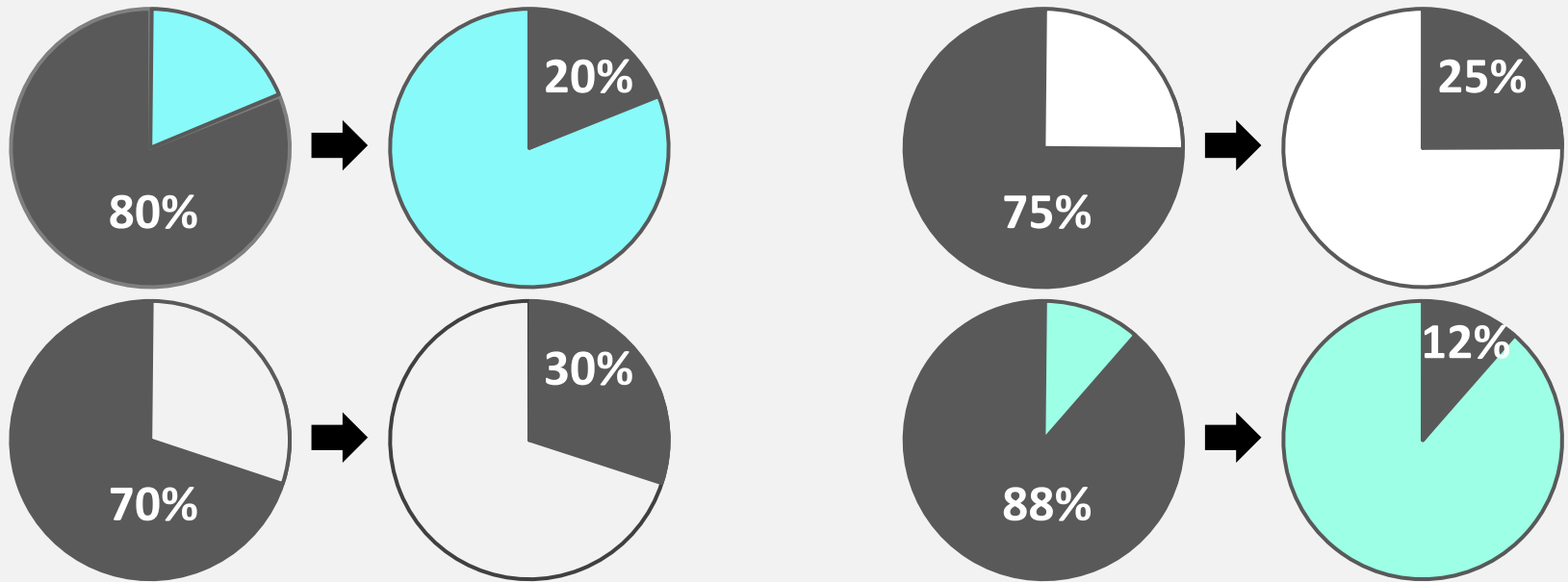
It states that roughly **80 percent** of the results come from **20 percent** of the efforts.



Similarly, 80 percent of the problems or effects comes from 20 percent of the causes

PARETO ANALYSIS

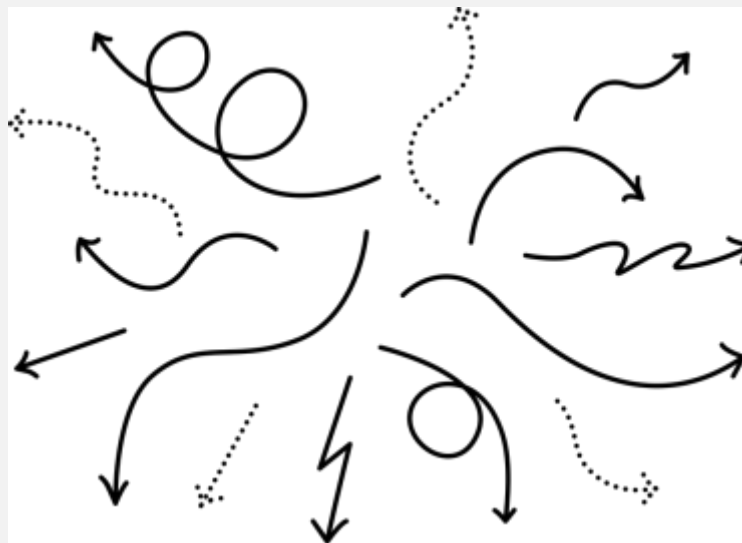
The exact percentages may **vary** in each situation.



In many cases, few efforts are usually responsible for most of the results, and few causes are usually responsible for most of the effects

PARETO ANALYSIS

Used by **decision makers** to identify the efforts that are most significant in order to decide which to select first.

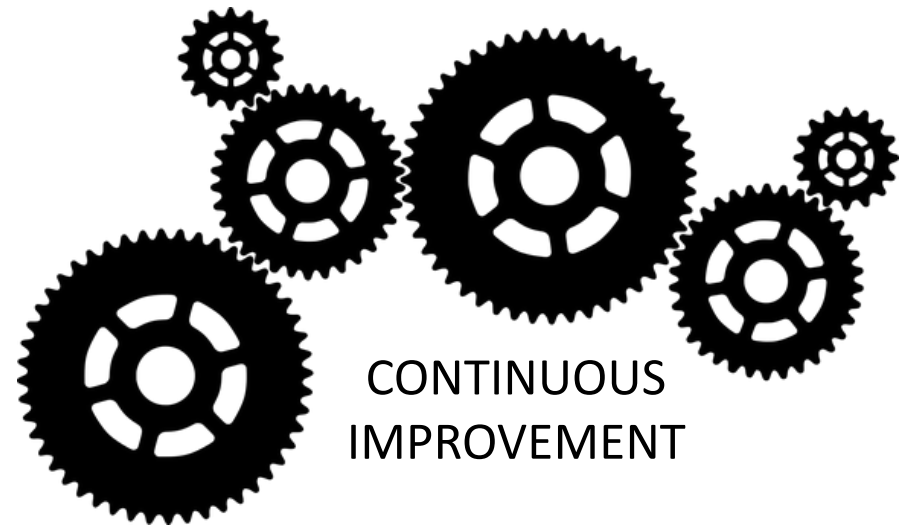


DECISION MAKING

PARETO ANALYSIS

Used in **process improvement projects** to focus on the causes that contribute most to a particular problem.

This will help prioritizing the potential causes, factors, or key process inputs of the problems being investigated.



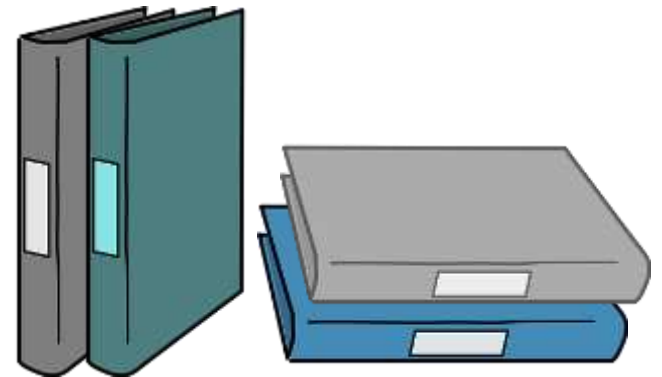
PARETO ANALYSIS

Used when **prioritizing projects** to focus on the significant projects that will bring value to the customer and the business.

Can be useful:

- ▶ During the scoping of a projects.
- ▶ When prioritizing resources.

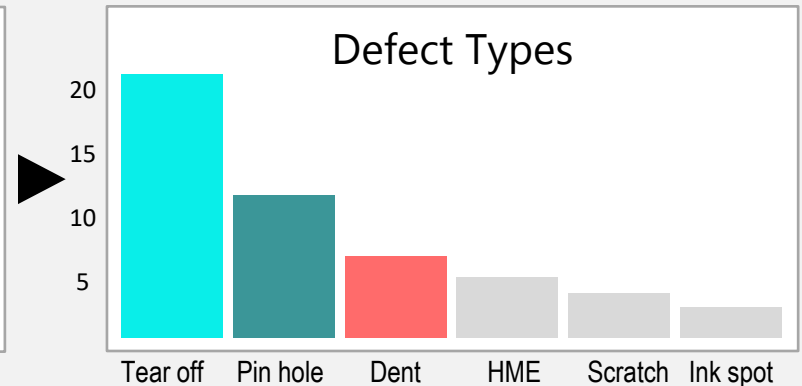
PROCESS MANAGEMENT



PARETO ANALYSIS

Helps **visualizing your data** to quickly know where to focus efforts.

Dent	Pin hole	Tear off	Tear off	Pin hole	Dent	Pin hole
Tear off	HME	Dent	Tear off	HME	Pin hole	Tear off
Dent	Tear off	HME	HME	Tear off	Tear off	Dent
Scratch	HME	Tear off	Tear off	Pin hole	Tear off	Tear off
Tear off	Pin hole	Scratch	Tear off	Pin hole	Pin hole	Pin hole
Pin hole	Tear off	Tear off	Scratch	Tear off	Ink spot	Dent
Tear off	Tear off	Tear off	Dent	Ink spot	Pin hole	Tear off



For example, if you collect data about defect types, a Pareto analysis can reveal which types are most frequent, so you can focus your efforts on solving the causes that will have the most effect

PARETO ANALYSIS

BENEFITS

Helps focusing on what really matters.

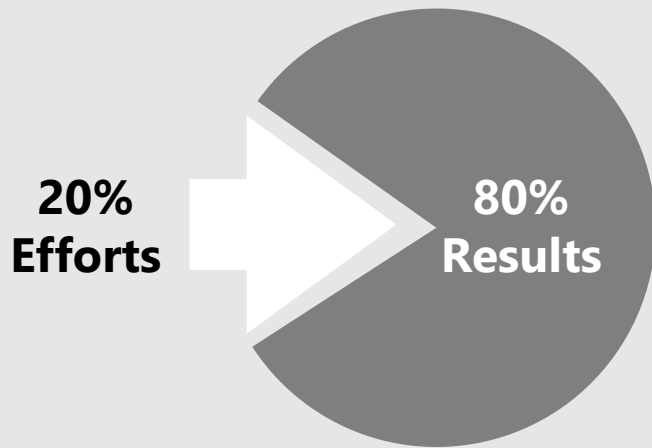
Separates the major causes of a problem from the minor ones.

Allows to measure the impact of an improvement by comparing before and after.

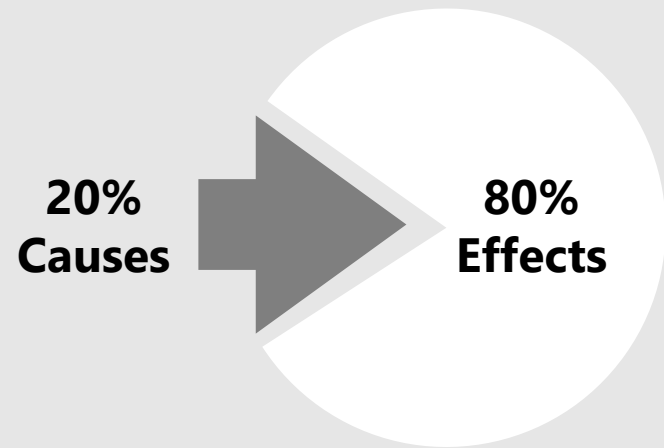
Allows to reach a consensus about what needs to be addressed first.

PARETO ANALYSIS

The Pareto principle has been found to be true in **many fields**.



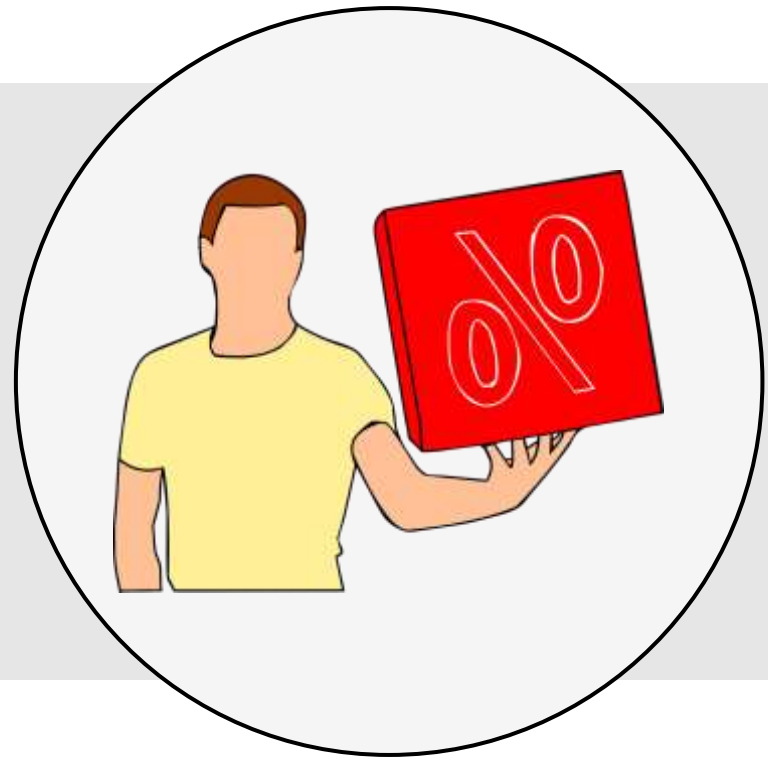
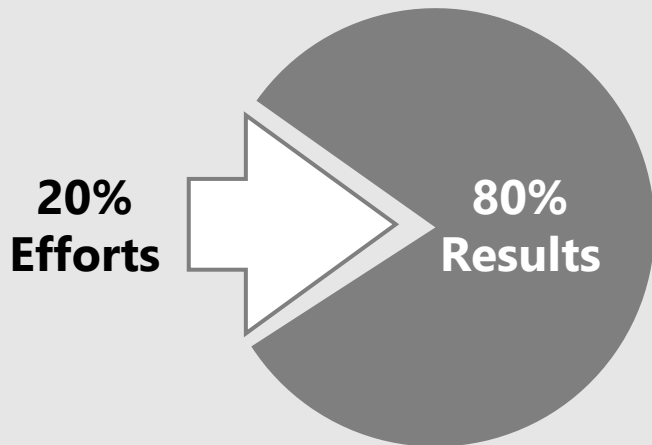
Produces >>> <<< Comes from



Produces >>> <<< Comes from

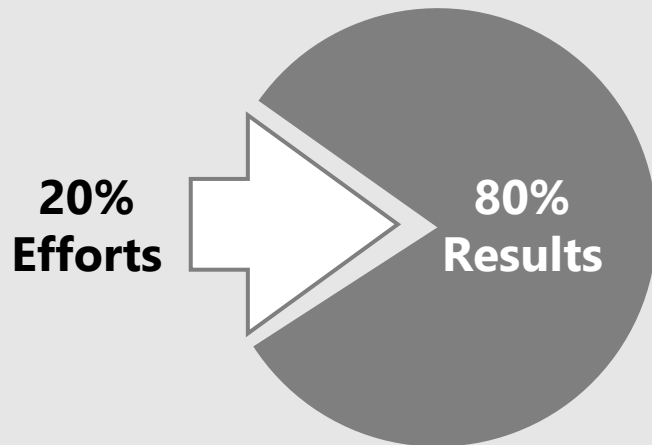
PARETO ANALYSIS

20% of a company's clients are responsible for **80%** of its revenue (Or) **80%** of the sales comes from **20%** of the clients.



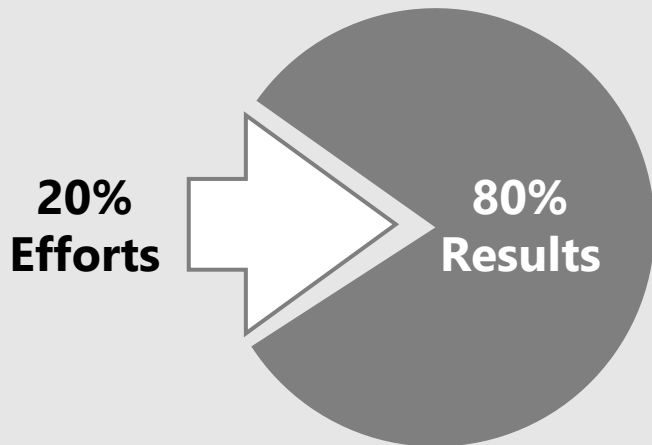
PARETO ANALYSIS

20% of the workers do **80%** of the work.



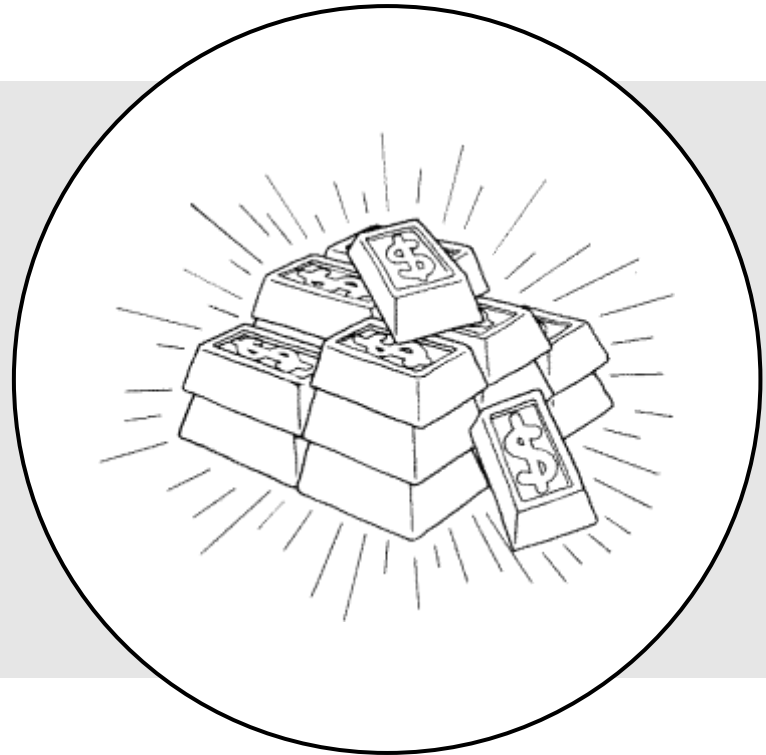
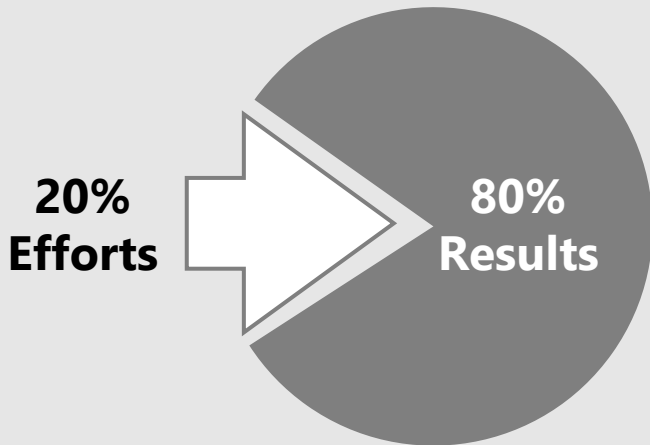
PARETO ANALYSIS

20% of the time spent on a task leads to **80%** of the results.



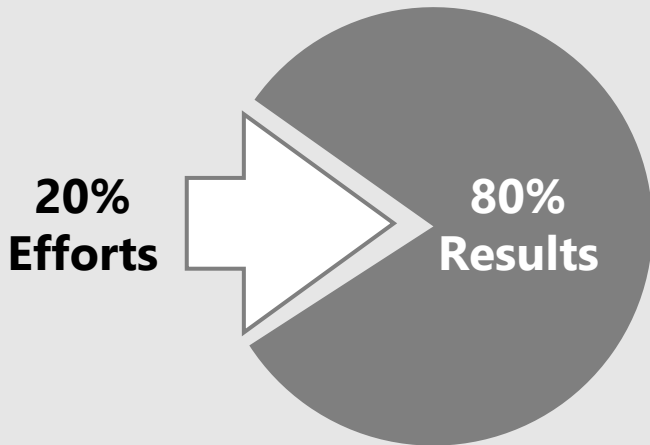
PARETO ANALYSIS

20% of the population owns **80%** of the nation's wealth.



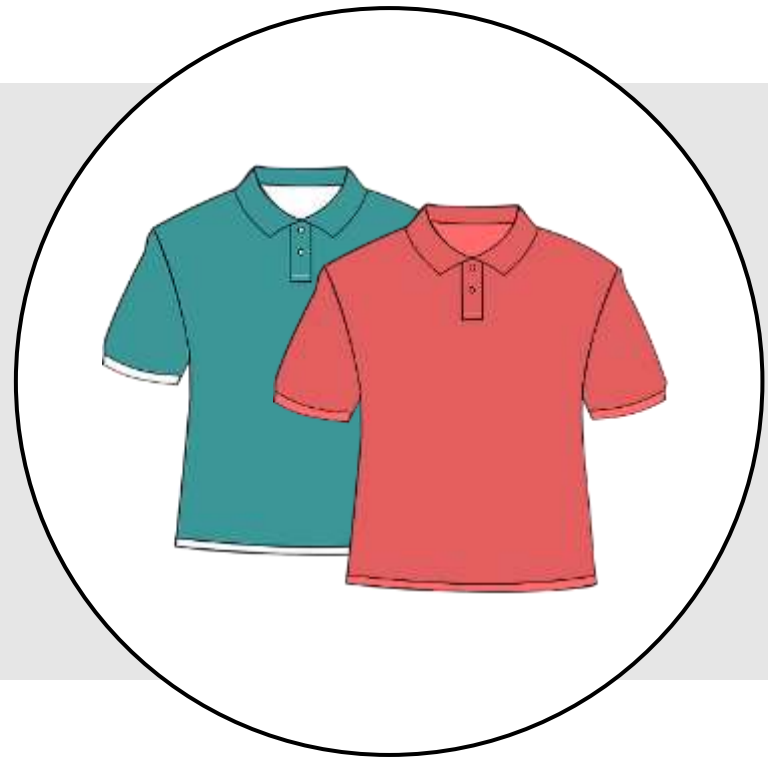
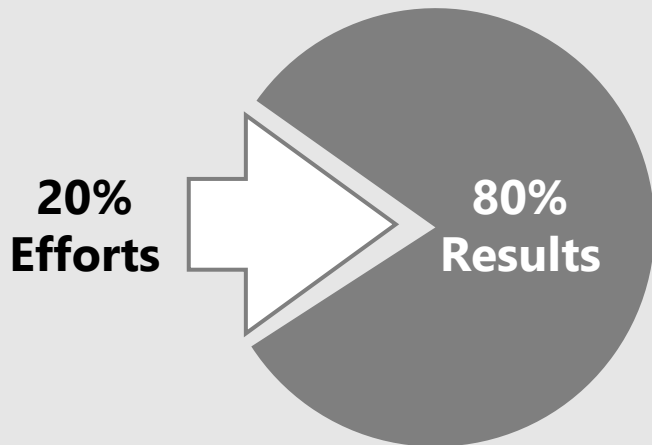
PARETO ANALYSIS

We may use **20%** of your household tools **80%** of the time.



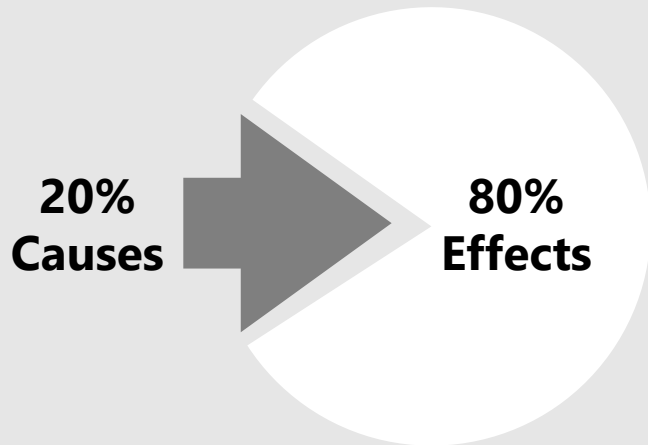
PARETO ANALYSIS

We may wear **20%** of our clothes **80%** of the time.



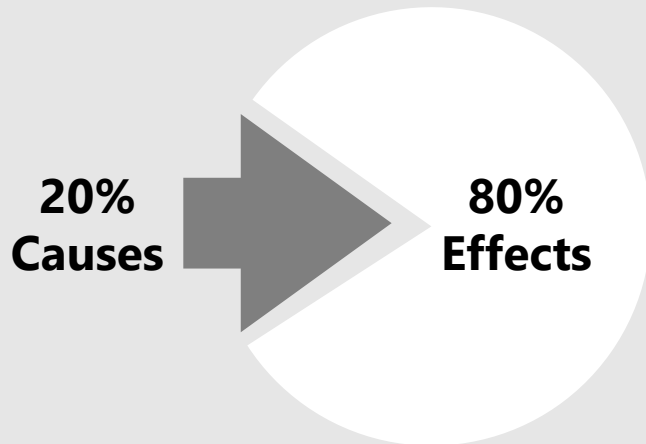
PARETO ANALYSIS

20% of the car drivers causes **80%** of the accidents.



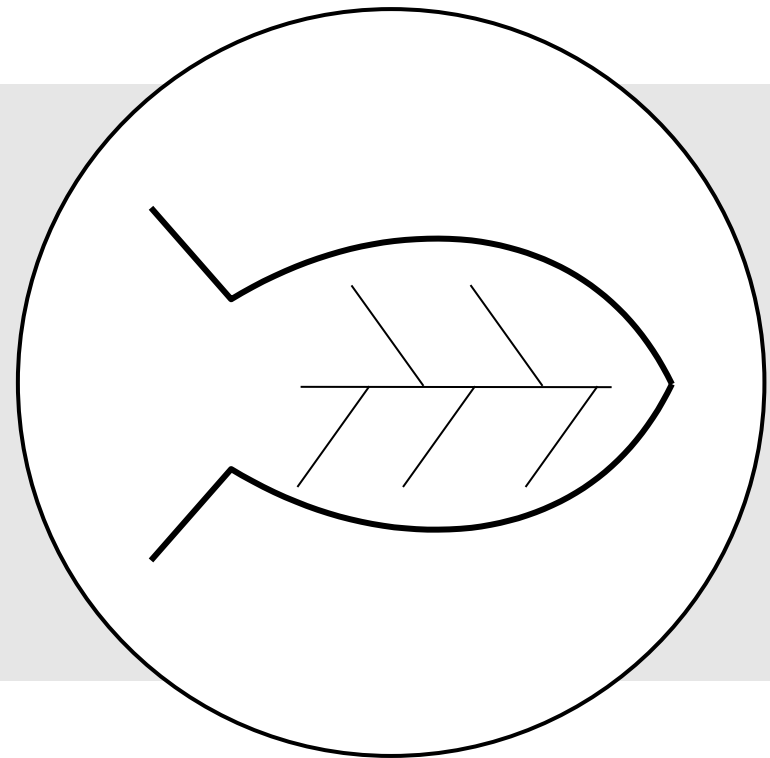
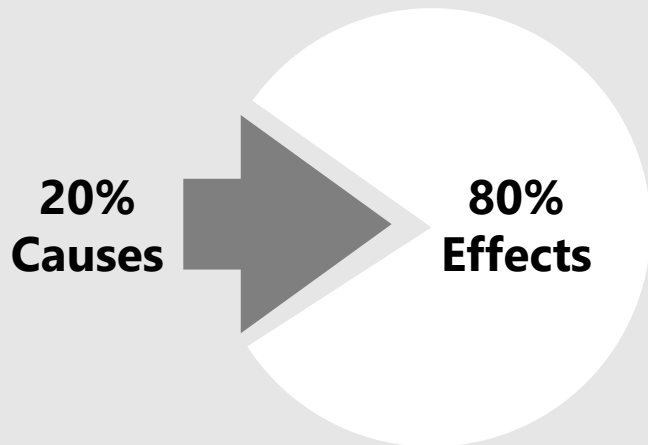
PARETO ANALYSIS

80% of customer complaints comes from **20%** of customers.



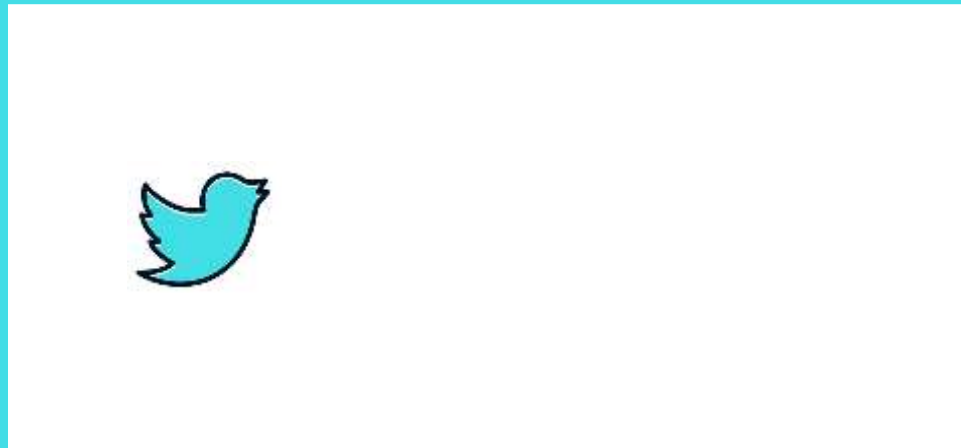
PARETO ANALYSIS

Just a **few causes** account for most of the effect in a fishbone diagram.



PARETO ANALYSIS

The most active **20%** of twitter users are responsible for **80%** of the tweets overall.



80%

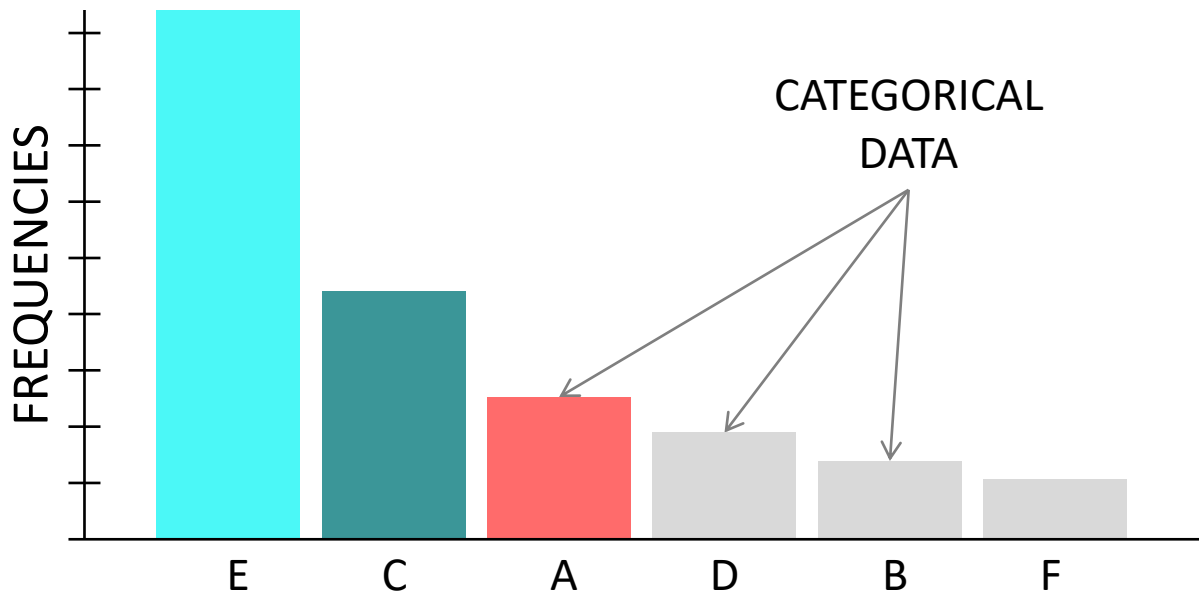


20%

PARETO ANALYSIS

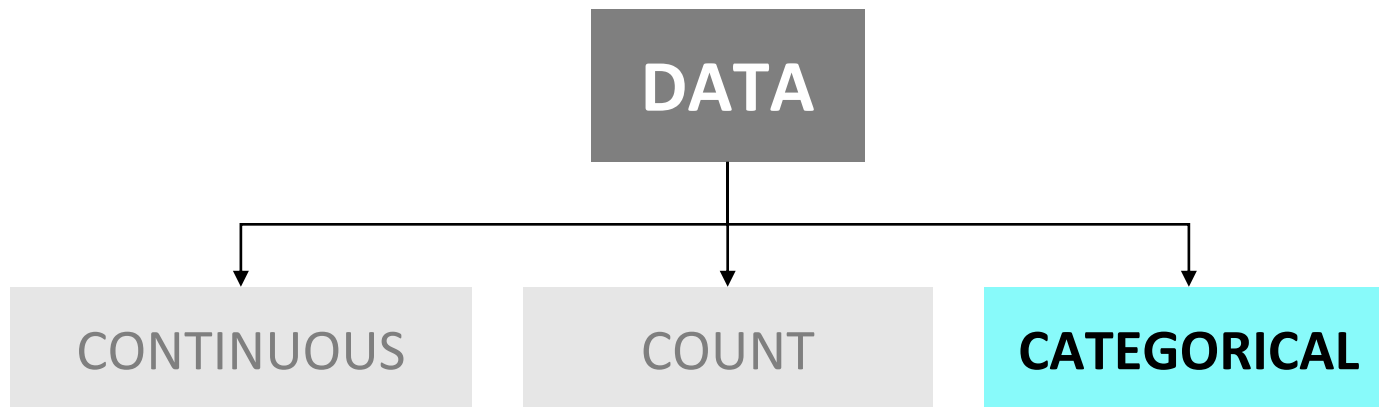
Pareto Chart

A special type of **bar chart** that plots the frequencies of categorical data.



PARETO ANALYSIS

Categorical data – the lowest level of data that results from classifying people, things or events.

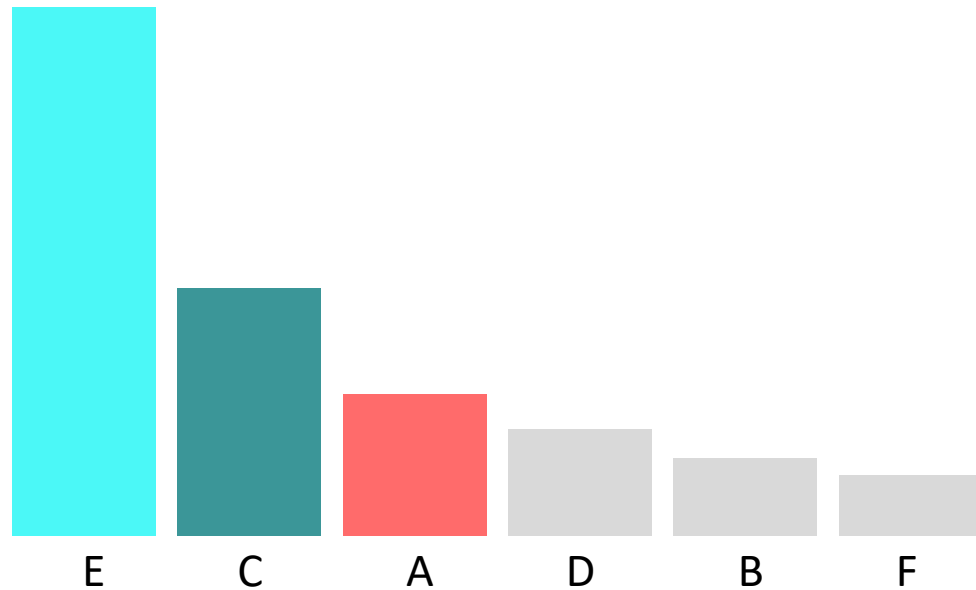


Examples: geographical location, weather, color, device type, blood type, bank account type, type of error or defect, and time of the day

PARETO ANALYSIS

Pareto Chart

The **vertical axis** represents the frequencies of categorical data

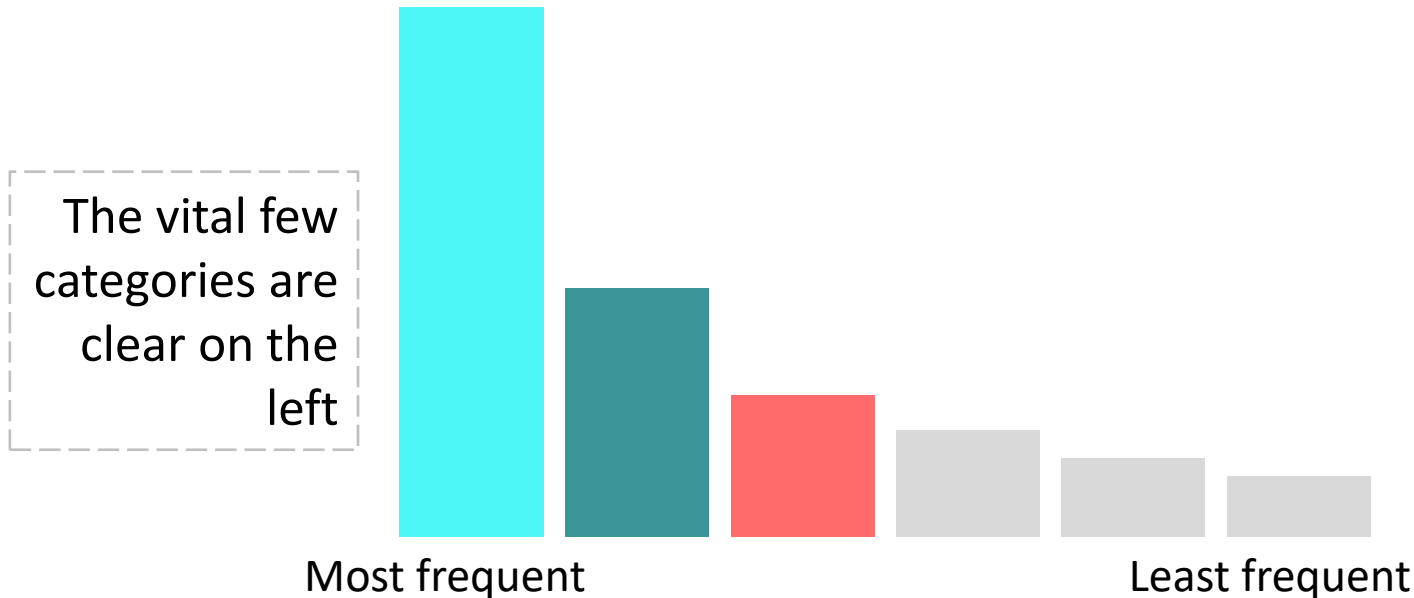


Labels of categories

The **horizontal axis** represents the categorical data which could be the problems, or causes

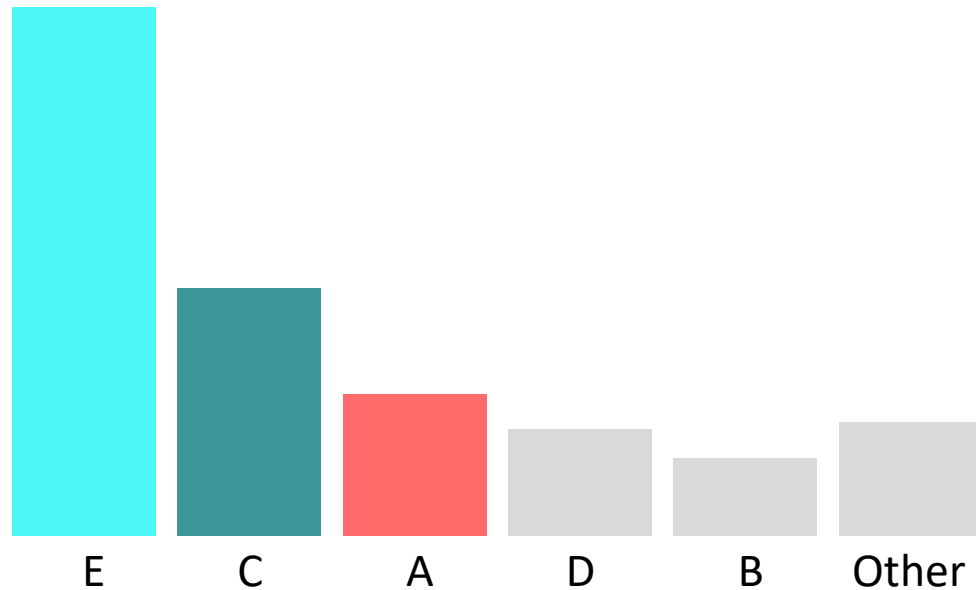
PARETO ANALYSIS

The bars are arranged in order of frequency from **left to right**.



PARETO ANALYSIS

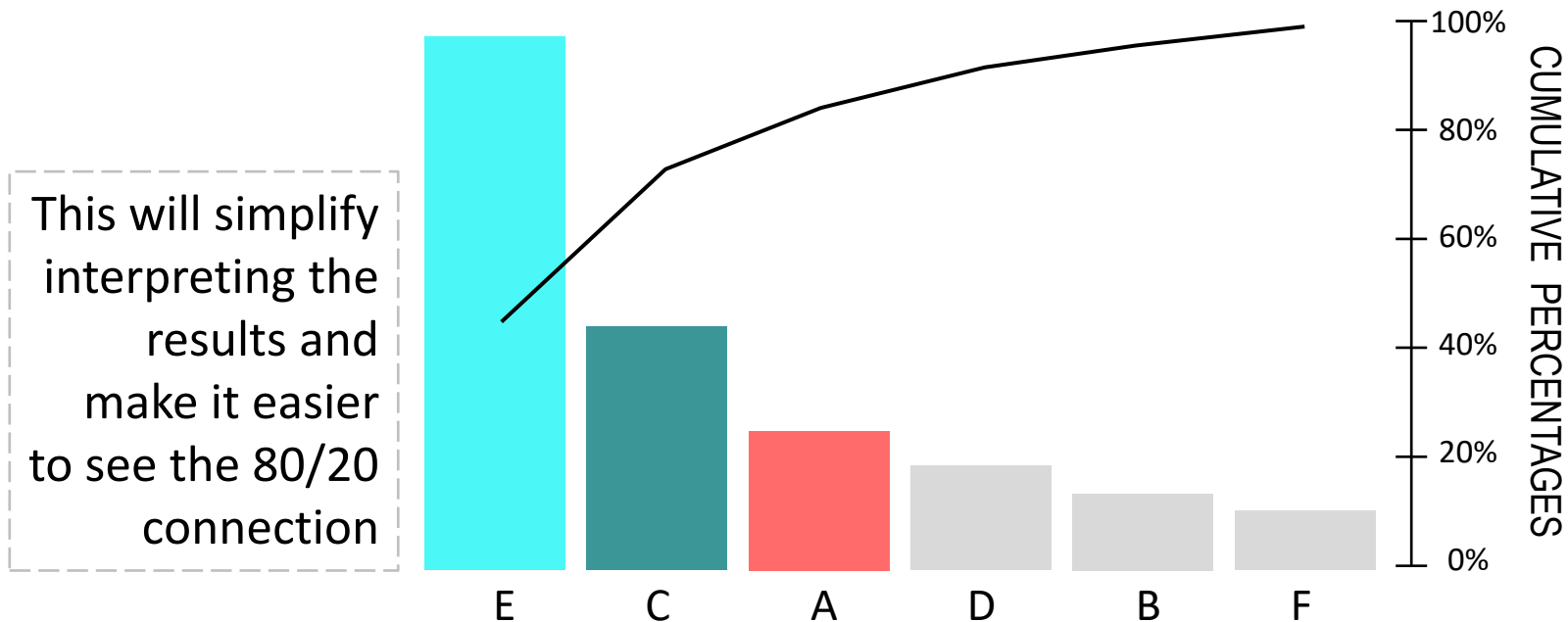
If you have too many categories, you may **group** those small and infrequent ones under the 'Other' category.



The 'Other' category is often placed on the last bar on the right

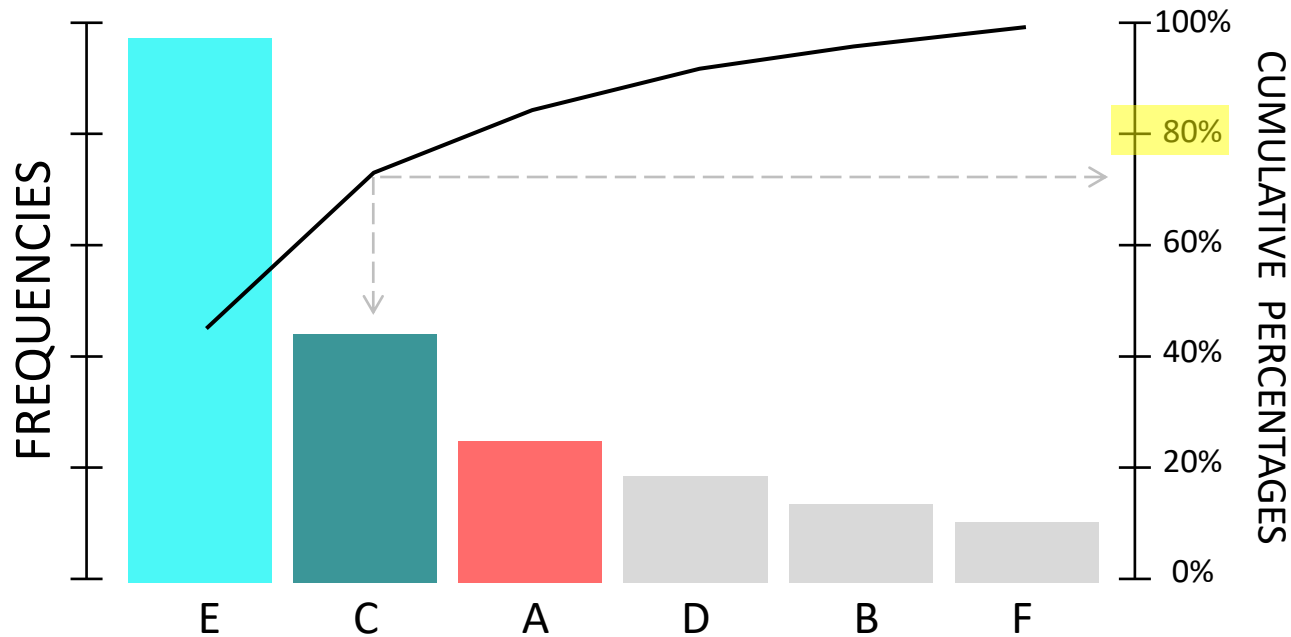
PARETO ANALYSIS

You may optionally have a **cumulative frequency curve** above the bars and a right vertical axis to represents the cumulative percentages.



PARETO ANALYSIS

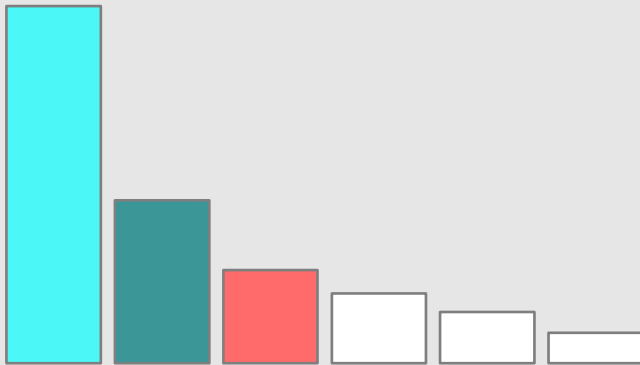
Focus your efforts on those categories whose vertical bars account for about **80 percent** of the result.



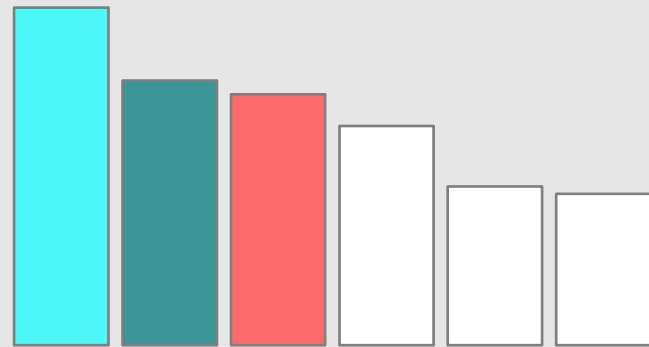
PARETO ANALYSIS

Pareto Pattern

Which of the below best illustrates the Pareto pattern?



A

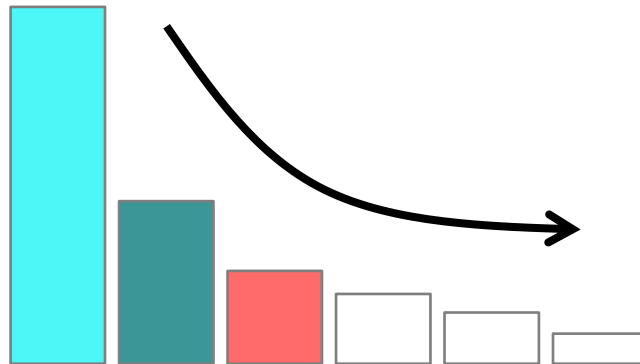


B

PARETO ANALYSIS

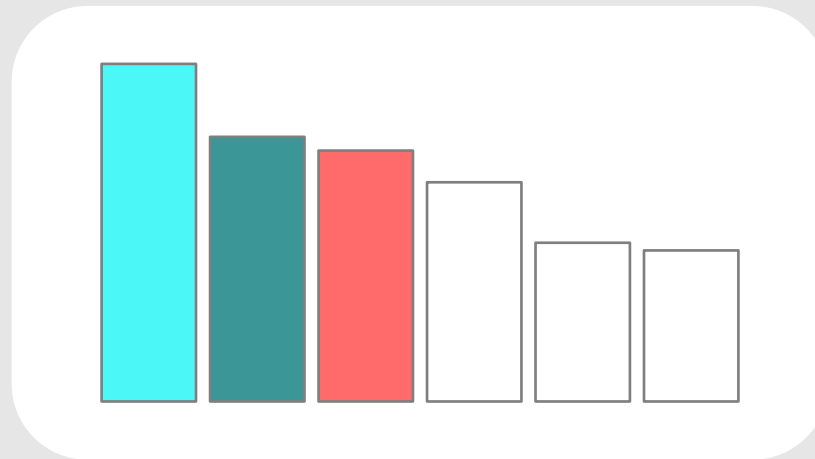
If the resulted chart clearly illustrates a Pareto pattern, this suggests that only few causes account for about 80% of the problem.

This means that there is a **Pareto effect**, and you can focus your efforts on tackling these few cause.



PARETO ANALYSIS

However, if no Pareto pattern is found, we cannot say that some causes are more important than others.



Make sure that your Pareto chart contains **enough data** to be meaningful

PARETO ANALYSIS

How to Construct a Pareto Chart?

With your team, **define the problem** and identify the possible causes (using brainstorming or similar technique)

Decide the measurement method to be used for comparison (frequency, cost, time, etc.)

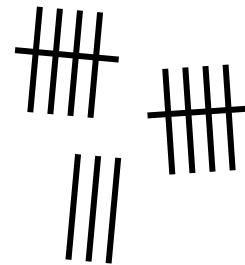


PARETO ANALYSIS

How to Construct a Pareto Chart?

Collect then record the categorical data to be analyzed

Calculate the frequencies of the categorical data

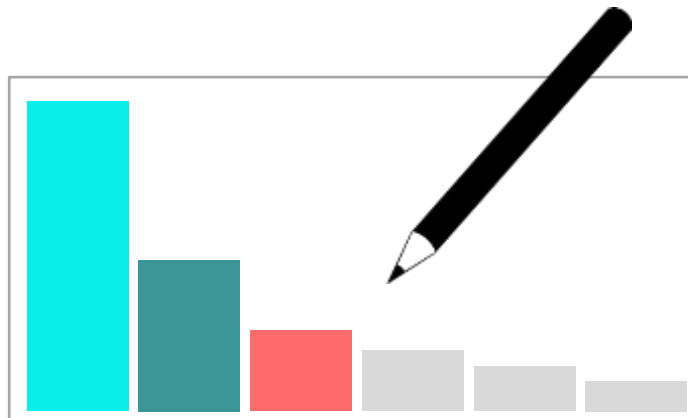


PARETO ANALYSIS

How to Construct a Pareto Chart?

Draw a horizontal line and place vertical bars above it to indicate the frequencies of the categories

Draw a vertical line on the left of the chart to place the **frequencies** to the left of the line

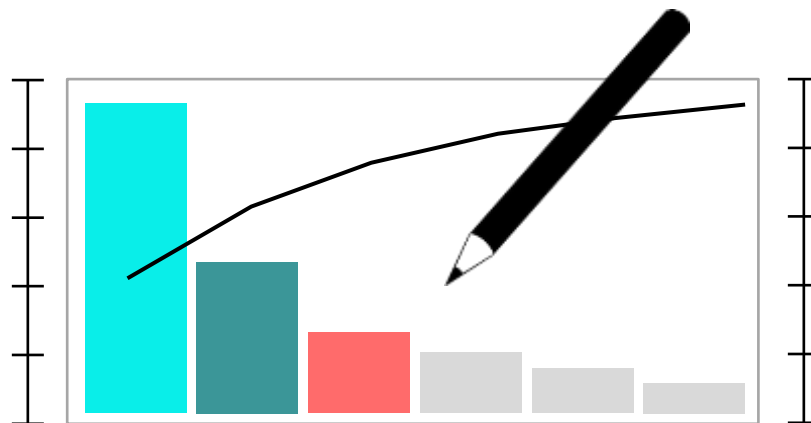


PARETO ANALYSIS

How to Construct a Pareto Chart?

Sort the categories in order of frequency of occurrence with the largest on the left

Calculate then draw the **cumulative frequency curve** and the cumulative percentage line



PARETO ANALYSIS

How to Construct a Pareto Chart?

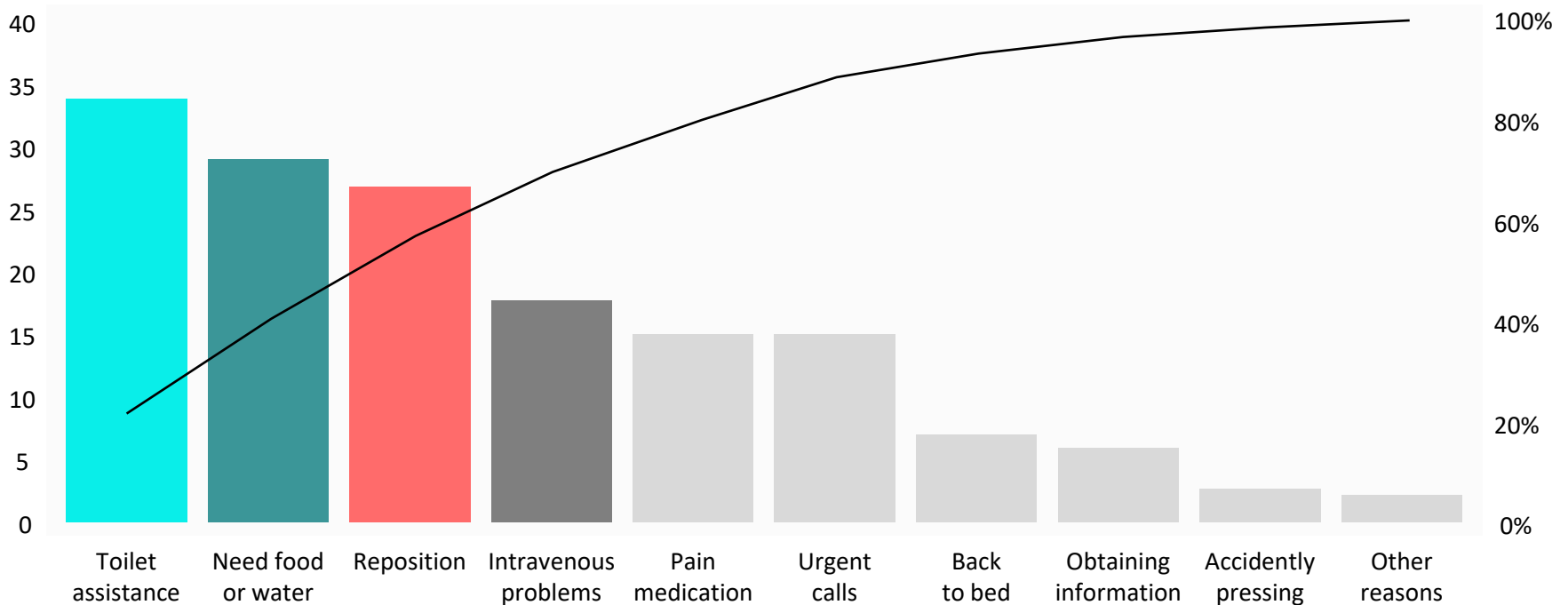
If you observe a **Pareto effect**, focus your improvement efforts on those few categories whose vertical bars account for most

These causes are likely to have the greatest impact on the process output



PARETO ANALYSIS

E.g. Reasons Why Patients use Call Bells in a Hospital



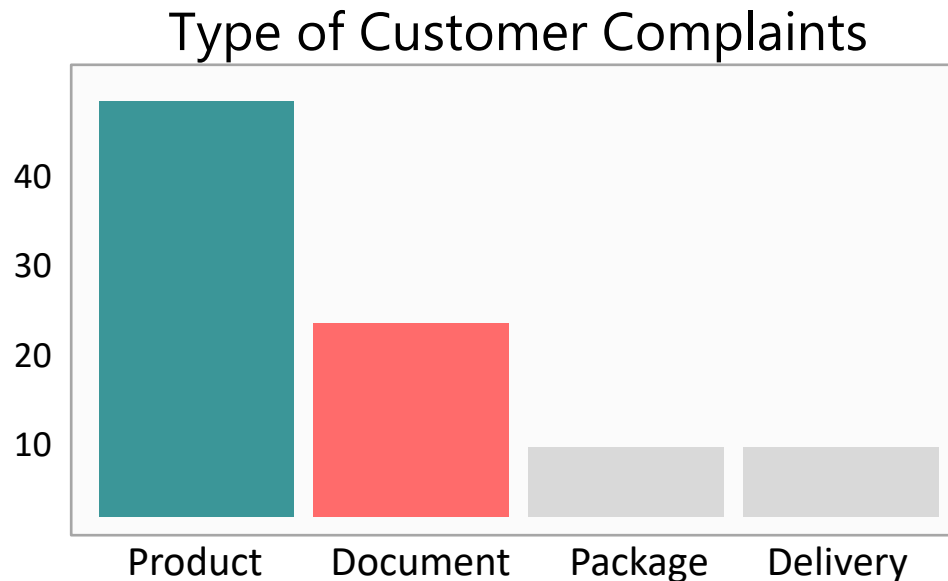
The Pareto effect can be seen here to a degree.
The first four factors (40%) account for about 70% of the effect

PARETO ANALYSIS

E.g.

Customer Complaints in a Factory

A factory team has conducted a Pareto analysis to address the rising number of complaints from the customer perspective in a way management can understand.



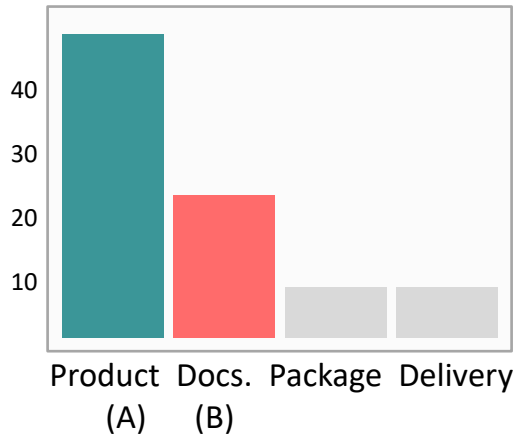
PARETO ANALYSIS

E.g.

Customer Complaints in a Factory

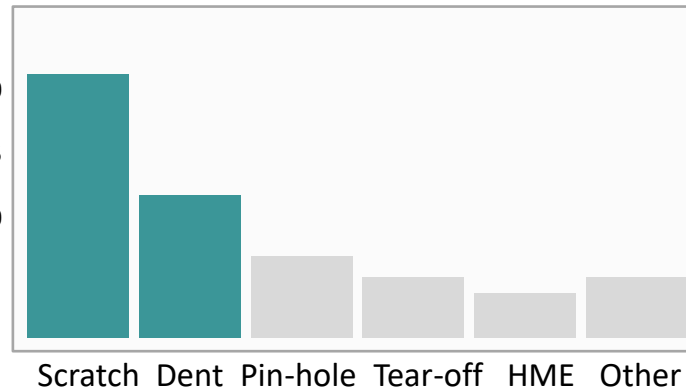
The main categories are too generic and can be divided into sub-categories

Type of Customer Complaints



Components of the problem

Type of Product Complaints



Sub-components of problem A

Type of Document Complaints



Sub-components of problem B

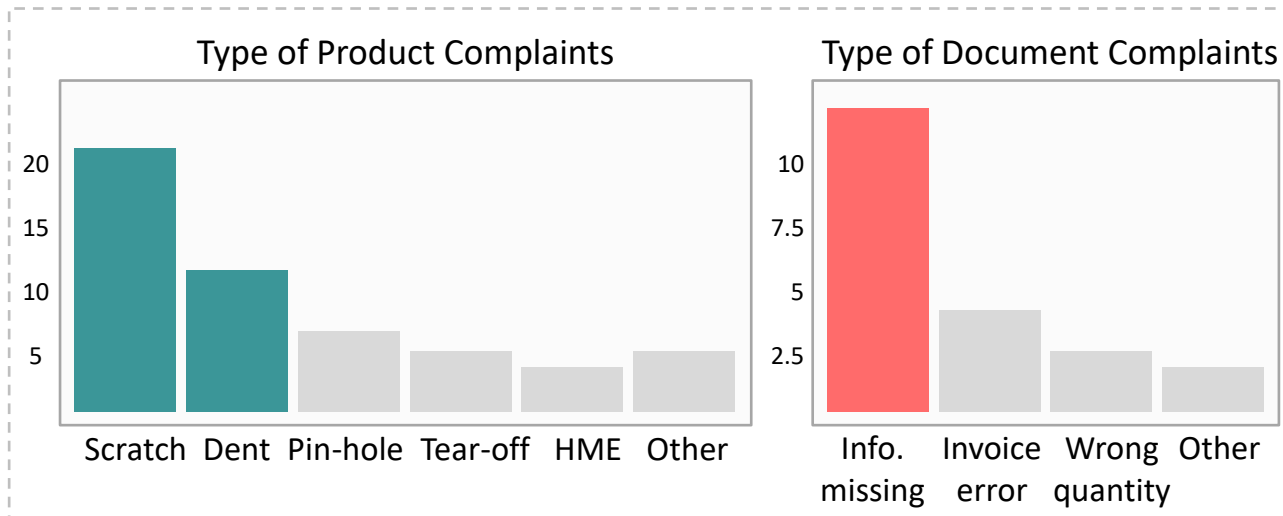
The Pareto chart has further been analyzed and the main categories where specific problems occur most often have been sub-categorized

PARETO ANALYSIS

E.g.

Customer Complaints in a Factory

The result suggests that there are three sub-categories that occur most often. Note that it is possible to merge the two charts into one.

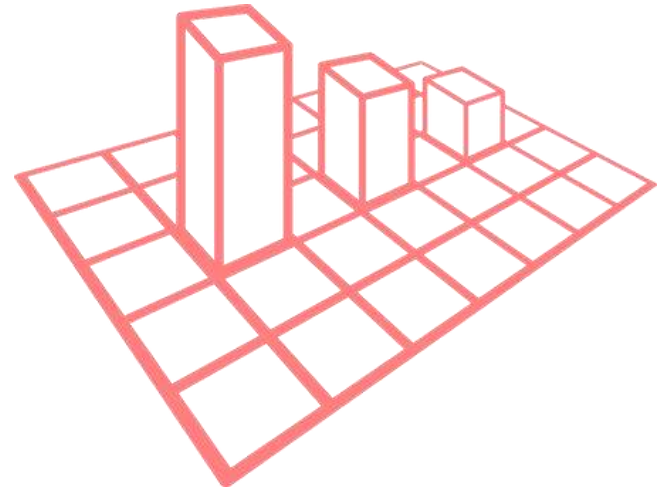


PARETO ANALYSIS

Further Information

The Pareto Principle was named after the Italian economist Vilfredo Pareto.

Joseph Juran has applied the Pareto principle to quality management for business production.



PARETO ANALYSIS

Further Information

In your analysis, consider using contextual data, metadata and the columns that contain textual data.

Databases often contain lots of categorical data about the environment from which the data is taken.

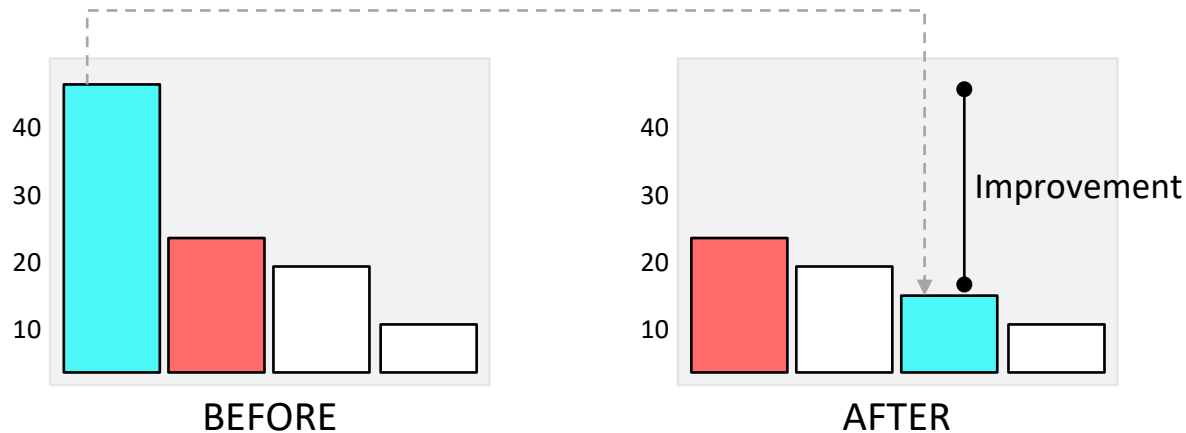
This data can be very useful in later analysis when investigating the root cause concepts and ideas.

Country	Gender	College
Australia	Male	Business
South Africa	Female	Medicine
Finland	Female	Medicine
Australia	Female	Engineering
Australia	Male	Art
New Zealand	Male	Business
Palestine	Male	Computing
Turkey	Male	Medicine
Finland	Female	Engineering
Australia	Male	Business
Turkey	Male	Engineering
Finland	Male	Art
Australia	Female	Computing

PARETO ANALYSIS

Further Information

The Pareto principle can help you measure the impact of an improvement by comparing the before and after

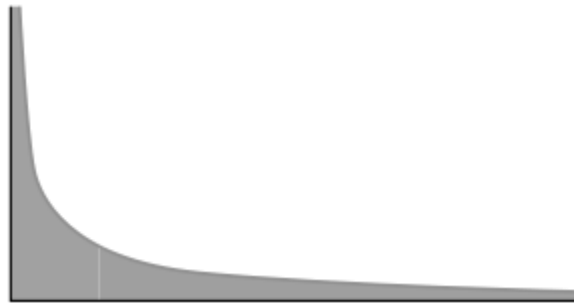


The new Pareto chart should confirm a reduction in the primary causes

PARETO ANALYSIS

Further Information

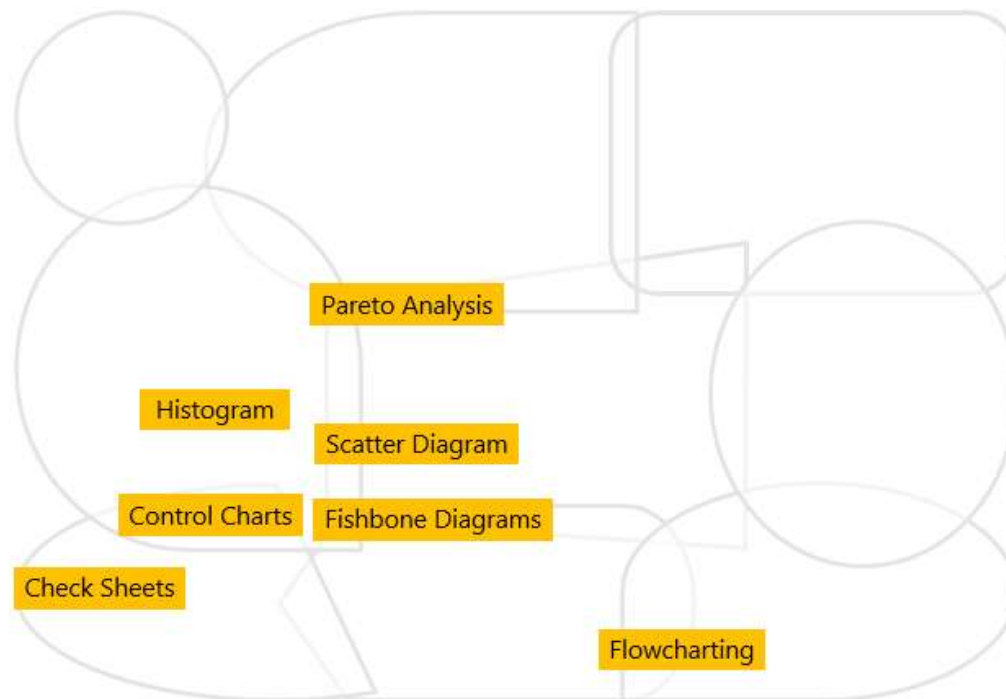
Statistically, the Pareto principle can be described by the **power law distribution**, and many natural phenomena have been shown to exhibit this distribution.



PARETO ANALYSIS

Further Information

One of the seven basic tools of quality.



PARETO ANALYSIS

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