

A to Z of Measurement

Demystifying the language used to describe measurement

Aa

Aggregated: grouping together into a class or cluster.

Bb

Baseline: a base for measurement or point of reference.

For example, you've observed a high rate of sickness in your team and your organisation decides to do something about it. You gather data from the last one-year period about the number of reported sickness absences (this is your baseline), and then you would measure for the next year, comparing the new figure against your baseline.



Bias: the average (expected) difference between the measurement and the truth.

For example, if you get on the scale with clothes on, that biases the measurement to be larger than your true weight (this would be a positive bias).

Cc

Causality: the relation between an event (the cause) and a second event (the effect), where the second event is understood to be a consequence of the first.

For example, this July and August have been the hottest months this year. Ice cream sales increased by 100 percent during these months; it can be assumed that ice cream sales increased due to the hot weather.



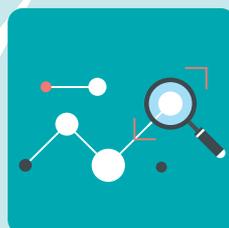
Correlation: refers to any of a broad class of statistical relationships involving dependence. Two variables can be strongly correlated without having any causal relationship, and two variables can have a causal relationship and yet be uncorrelated.
For example, both ice-cream sales and reported jellyfish stings



increase during the summer, but while the numbers of both fluctuate at the same time, neither causes the other to change. People with jellyfish stings don't eat more ice-cream and we assume that ice-cream doesn't make swimmers more attractive to jellyfish. In this case we can assume that another variable is causal, perhaps warm weather increases ice-cream consumption and also increases visitors to beaches where jellyfish swim.

Dd

Data (plural) / **Datum** (singular): a set of values, facts or information. May be 'qualitative' (words) or 'quantitative' (numbers).



Deliverable: a term used in project management to describe an object produced as a result of the project that is intended to be delivered to a "customer". For example, a deliverable could be a report, a document, a server upgrade or any other building block of an overall project.

Demographics: the measurable dimensions of a given population. For example, common demographics include gender, age, ethnicity, knowledge of languages, disabilities, mobility, home ownership, employment status, and even location.

Denominator: the number or expression written below the line in a fraction (thus 2 in $\frac{1}{2}$). It functions as the divisor of the numerator.



Dependencies: any relationships between two random variables, two sets of data or two things.

For example, if you are building a building, you can't paint the walls before putting the insulation into the walls. Well, maybe you could, but it will be expensive, because you would need to remove the wall, place the insulation, test the insulation and then fill the holes. It would be much faster and less expensive, to put the insulation in first, put the cement to actually build the wall around the insulation, and finally paint the walls.

Deviation: the difference between a datum and some reference value, typically the mean of the data.



Ee

Estimation: to roughly calculate or judge the value, number, quantity, or extent of.

For example,

- if 30% of 100 people have blue eyes, we can estimate that 60 people in 200 will have blue eyes.

- Using data collected from the 2011 census and data from other sources such as births and deaths, and migration data, we can estimate the total population of the UK in 2013 is 64.1million people.

Evaluation: the making of a judgement about the amount, number, or value of something using criteria governed by a set of standards.



Ff

Foresight: the ability to foresee or prepare wisely for the future.

Gg

Hh

li

Impact: a significant or strong influence; an effect.

Indicator: a type of measure which can give an idea of general trends in the real world. It might not tell you what is wrong, but flag that something needs attention.

For example, the rock band Van Halen famously asked for all brown M&M's be removed from the bowls of sweets they wanted as part of their 'rider' (i.e. the food provided when on tour). This was not rock and roll excess gone mad, but a clever use of indicators. They had a very complex set of safety requirements for their stage set up, and reasoned that if a venue overlooked details such as brown M&M's, then they might have missed other important technical requirements.



Infographics (also **Information graphics**): graphic visual representations of information, data or knowledge intended to present complex information quickly and clearly.

Insight: the understanding of a specific cause and effect in a specific context.

Interdependencies: people, animals, organisations or things depending on each another.

For example consumers depend on producers for products / items such as groceries, and producers depend on consumers to buy their goods and services.



Jj

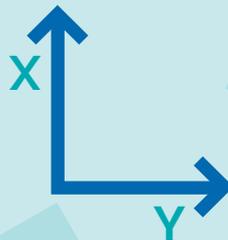
Kk

Key performance indicator: a type of performance measurement. An organisation may use KPIs to evaluate its success, or to evaluate the success of a particular activity in which it is engaged.

For example, call length (the time to answer a call), volume of calls handled (per call centre staff), customer ratings of service (customer satisfaction).

Ll

Linear: involving or showing directly proportional change in two related quantities.



Mm

Magnitude: the size of a mathematical object, a property by which the object can be compared as larger or smaller than other objects of the same kind.

Mean: the sum of a collection of numbers divided by the number of numbers in the collection.

*For example,
 $1+2+3+4+5 = 15$ (sum of collection),*



15 (sum of collection), 15 (numbers in the collection) = 3 (Mean)

Median: the "middle value" of a list, the numerical value separating the higher half of a data sample, a population, or a probability distribution, from the lower half.

For example, e.g., the median of $\{3, 3, 5, 9, 11\}$ is 5 .

Metadata: a set of data that describes and gives information about other data.

For example, metadata usually lists the variables or characteristics about a dataset. My contacts list includes the following metadata: first name, second name, mobile number, address, birthday.

Metrics: limits or measures of quantitative assessment used for measurement, comparison or to track performance or production.

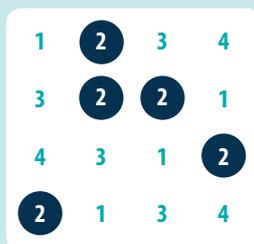
For example, analysts use metrics to compare the performance of different companies, despite the many variations between firms.

Mode: the value that appears most often in a set of data.

For example: $3, 7, 5, 13, 20, 23, 39, 23, 40, 23, 14, 12, 56, 23, 29$

In order these numbers are: $3, 5, 7, 12, 13, 14, 20, 23, 23, 23, 23, 29, 39, 40, 56$

This makes it easy to see which numbers appear most often, in this case the mode is 23 .



Modelling: a scientific activity, the aim of which is to make a particular part or feature of the world easier to understand, define, quantify, visualise, or simulate. It requires selecting and identifying relevant aspects of a situation in the real world and then using different types of models for different aims.

Multitude: a large number of people or things.

Nn

Numerator: the part of a fraction that is above the line and signifies the number to be divided by the denominator.



Oo

Outcome: the way a thing turns out; a consequence.

For example, 'heads' is a possible outcome when a coin is tossed



Output: the amount of something produced by a person, machine, or industry.

For example, a person will create an electronic document and sent it to a printer. The output is the physical document the printer creates.

Pp

Probability: a measure of the likeliness that an event will occur.

For example, when a single die is thrown, there are six possible outcomes: 1, 2, 3, 4, 5, 6.

The probability of any one of them is 1/6.

Probability of an event happening x Number of ways it can happen = Total number of outcomes



Proxy: Something which doesn't directly measure the thing we are interested in, but gives a good approximation. You may use a proxy where data isn't available or possible.

For example, I cannot safely measure the height of my house, but I can measure the depth of bricks and count the number of courses to the roof, which gives an approximation. Another example is that I cannot ask my dog his favourite type of food, but by observing the relative quantity he eats I may be able to infer that he eats more of the food he prefers.

Qq

Qualitative: data which is shown in words, an opinion or description which cannot be measured.

"Service at my hospital has improved enormously"

Quantitative: data which is shown in numbers, a quantity of something which can be measured.

Rr

Random Variable: a variable whose value is subject to variations due to chance (i.e. randomness, in a mathematical sense).

Ratio: a relationship between two numbers of the same kind (e.g. objects, persons, students, spoonfuls, units of whatever identical dimension), expressed as "a to b" or a:b.

For example, the ratio of men's jobs to women's is 8 to 1.



Residual Value: how much a fixed asset is worth at the end of its lease, or at the end of its useful life.

For example, if you lease a car for three years, its residual value is how much it is worth after three years.



Ss

Sample: a small part or quantity intended to show what the whole is like.

For example, when choosing a wedding cake, the baker will give customers a box of cupcakes of various flavours. This is to demonstrate the range of flavours they will be able to create (a sample) before the customer chooses what exactly they'd like for their big day.



Statistic: a fact or piece of data obtained from a study of a large quantity of numerical data.

Significance: an important or meaningful finding. In statistical terminology this usually means that a statistical test has shown the finding is unlikely to be down to chance, or a special cause. This should usually state the percentage or confidence in the finding. This is not normally needed for improvement work and is more common in clinical trials.

For example, with 95% confidence the height of men was significantly greater than that of women in the first year class at Leeds University.

Tt

Uu

Vv

Validity: refers to how well a test measures what it is reported to measure.

For example, we might assume that the flavour of ice-cream which is sold in the largest quantities is the nation's favourite. However, there may be other reasons which influence the flavour purchased, such as other household members, cost, availability.



Variable: a quantity which during a calculation is assumed to vary or be capable of varying in value. A class of children at school will have different heights, weights and eye colours and are all examples of variables.

Variation: a change or difference in condition, amount, or level, typically within limits.

**Ww****Xx****Yy****Zz**

Z Score: a statistical measurement of a score's relationship to the mean in a group of scores.

For example, a Z-score of 0 means the score is the same as the mean.

