What is Sigma in Six Sigma

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First time, I ever heard the term Six Sigma, I was puzzled, lost and obviously amazed. Here was a term that I couldn't make out a bit. I felt exactly the same when I first heard H2O from my primary school science teacher.

By the way, **what is Sigma in Six Sigma**? That's the next question that I wanted someone to answer. The Six Sigma Black Belt who introduced this term to me in a training, gave a very complicated answer, which confused me further. In those days, Google didn't exist, so I flipped many pages of our company's Six Sigma manual, and then couple of statistics books, but I finally reconciled.

Sigma is the Greek alphabet (in small letters), which is used to represent 'Standard Deviation'.

Sigma (standard deviation) has been in existence since the days of Gauss, who found out the bell shaped curve. But it has become very popular after Motorola coined the term Six Sigma. Now, this methodology has evolved into Lean Six Sigma.

Without complicating things for you, Standard Deviation is a measure of variation that exists in any process.

The term variation itself is very simple to understand. For example, if your morning newspapers arrive between a time window of 6 to 9 am, while your friend's newspapers arrive between 7 to 7:30 am, then your 'newspaper delivery process' has high variation compared to your friend's.

So, let's learn standard deviation in layman's language, so that we can understand what is sigma in Six Sigma in practical sense.

Standard Deviation is the average distance of all the data points from their average.

Let's consider the time when your newspaper gets delivered, for a week : Mon – 6:30 am, Tue – 7am, Wed – 6:45 am, Thur – 8 am, Fri – 6 am, Sat – 8:30 am, Sun – 9 am.

For this data, the average time when newspaper gets delivered is 7:23 am. So some days delivery is before this time and some days after.

Next, you compute the difference between each day's delivery time and average time for all 7 days, i.e, for Monday : (6:30 am – 7:23 am) = – 0:53 minutes, and likewise for all values.

Now, we need to calculate the average of all these differences. But the differences you compute will have both minus and plus values. If we add them as such, they will nullify. That wouldn't work. So, we use the following approach.

- Square all the differences. By doing so, all minus signs will become plus, because (minus x minus = plus) and (plus x plus = plus).
- Now add all the squared differences.
- Divide them by total number of days of data you collected. In this case, it is 7.
- Whatever value you get is already squared, so we have to find its square root.

Finally, the value you get after finding the square root, is the Standard Deviation. For this example, standard deviation or Sigma turns out to be nearly 1 hour (precisely 62 mins). This means that your newspaper boy is on an average one hour ahead or behind than his usual delivery time of 7:23 am.

Coming back to our original question, what is Sigma in Six Sigma? So Sigma is a measure of variation in any process. Higher the sigma, higher is the variation, which is undesirable.

So, one could compare two similar processes for their Sigma values and find out which one is better. In this case, your friend's newspaper delivery boy is better than your delivery boy!

This will give you a simple idea of What is Sigma in Six Sigma, but this is only understanding half the story.